PREHISTORIC DAN RIVER HUNTING STRATEGIES

by

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GREGORY A. WASELKOV. Prehistoric Dan River Hunting Strategies. (Under the direction of JOFFRE L. COE).

Prehistoric Dan River subsistence was based on corn and beans agriculture and deer hunting. Several other plant and animal species were selectively utilized when available at seasonally high densities. The seasonal round emphasized deer hunting and food storage in winter, small game capture in spring, fishing and wild and domestic plant food harvesting throughout the summer and fall, and nut gathering and turkey hunting during the fall and early winter. White-tailed deer, the most important protein source, were hunted primarily by stalking in winter. This type of hunting strategy was shared with most prehistoric cultures in the East. However, an evolution in hunting methods correlates with the development of chiefdom-level societies. Some examples are the Middle Mississippian cultures which relied on deer drives and other intensive exploitative techniques. The historic fur trade led to the adoption of similar strategies by tribal-level societies attempting to compete effectively for trade goods.

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Acknowledgments

Throughout the course of this project I have benefited from the help and cooperation of many people. William Fitzhugh and Clifford Evans arranged for me to study the Smith Mountain Reservoir and Clarksville site collections at the Museum of Natural History, Smithsonian Institution. The staffs of the Department of Anthropology (especially George Phebus, Joseph Brown, and Dorothy Estep) and the Divisions of Birds and Fishes made my stay at the Smithsonian pleasant and fruitful. The National Anthropological Archives staff provided me with the Smith Mountain project field notes as well as the maps reproduced in Figures 3 and 4.

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I wish to thank my thesis committee, particularly my advisor, Joffre L. Coe, for his insights on Dan River

archaeology, and Richard A. Yarnell, for some stimulating discussions and constant encouragement.

I have profited from the recommendations and suggestions of several friends. John Cottier, Thomas Hatley, Robert Paul, and Randolph Turner will recognize their influence on this work. Stephen Potter, as usual in the course of our association, has been especially helpful. He first introduced me to Virginia archaeology and the germ of this thesis was developed during conversations with him. Finally, I reserve my deepest thanks for my wife, Linda, for her unfailing assistance and inspiring ways.

Introduction

The development of an ecological approach to archaeology has been an uphill struggle. "Laundry lists" tabulating the species recognized in the plant and animal remains (Olsen 1971: 1) were often the only evidence that an archaeologist considered his site in the context of the total environment. Gradually, the awareness that much valuable information was being lost prompted many archaeologists to attempt a remedy. More multi-disciplinary studies have been undertaken and archaeologists are themselves attempting to bridge the arbitrary boundaries between social and natural sciences. Drawing a sharp distinction between what were natural and cultural aspects of the past is specious, since humans have been active participants in the environment for quite some time, changing it while it has affected them. Anthropological studies of non-artifactual data bear on "problems directly relevant to the study of man's past no less so than artifactual studies of archaeologists _sensu strictu_" (Butzer 1975: 110).

This thesis is essentially an analysis of faunal remains found in southwest Virginia at two sites of the Dan River culture (defined by Coe 1952: 309-310). In

1962 and 1963 these two sites, Booth Farm and Hales Ford, were dug by Carl Miller of the Smithsonian Institution as part of a project to salvage some information about the prehistory of the northern (Staunton) branch of the Roanoke River. Soon afterwards, the sites and a large portion of the river valley were flooded by the impoundments of two dams. The archaeological material has never been analyzed and reported on, so a portion of this thesis is devoted to describing the artifacts associated with some of the faunal sample. Then, the two sorts of data, artifactual and non-artifactual, are applied in a functional analysis of some features from the Hales Ford site to achieve some understanding of the seasonal round in Dan River culture. This analysis sets the background for interpreting the culture's subsistence base, particularly the faunal exploitative strategy.

A brief discussion of the natural environment is followed by a detailed investigation of the animal species hunted by the site's prehistoric inhabitants, the relative dietary importance of these species, seasonality of exploitation, and hunting strategy. The study is still more closely focused to analyze deer hunting techniques and their apparent correlation with levels of socio-political integration. Comparative faunal data from two other Dan River sites and an historic component of the similar Clarksville phase are included in this section.

A major goal of this study is to integrate the diverse data of archaeology into a unified explanatory scheme which emphasizes the interrelatedness of the Dan River cultural system and its environment.

Chapter I
The Smith Mountain Sites

A. The Smith Mountain Project

In 1962-1963 Carl F. Miller conducted an archaeological survey and excavations in the proposed Smith Mountain and Leesville Reservoirs for the River Basin Surveys of the Smithsonian Institution (Figure 1). The lower dam, located two miles south of Leesville, impounded a seventeen mile stretch of the Roanoke River and flooded 3,400 acres. The upper dam at Smith Mountain Gap created a forty mile long lake covering 21,500 acres.

According to Miller's field notes (Miller, n.d.; on file in the National Anthropological Archives of the National Museum), the two reservoir areas were surveyed by car and on foot, and forty-six sites were found in the intensively farmed bottomlands (Figure 2). Two sites, Anthony Ford (44Bel) and Tolers Bridge (44Pi6), were test excavated, while two others, Booth Farm (44Fr2) and Hales Ford (44Fr15), were extensively excavated. Work at Booth Farm began on November 13-14, 1962 and was continued from April 2 to May 13, and throughout July, 1963. The Hales Ford excavations lasted from October 13 to November 12, 1962 and were resumed from May 21 to June 31, 1963.

Figure 1. Locations of Some Dan River and Clarksville Sites on the Upper Roanoke River Drainage.

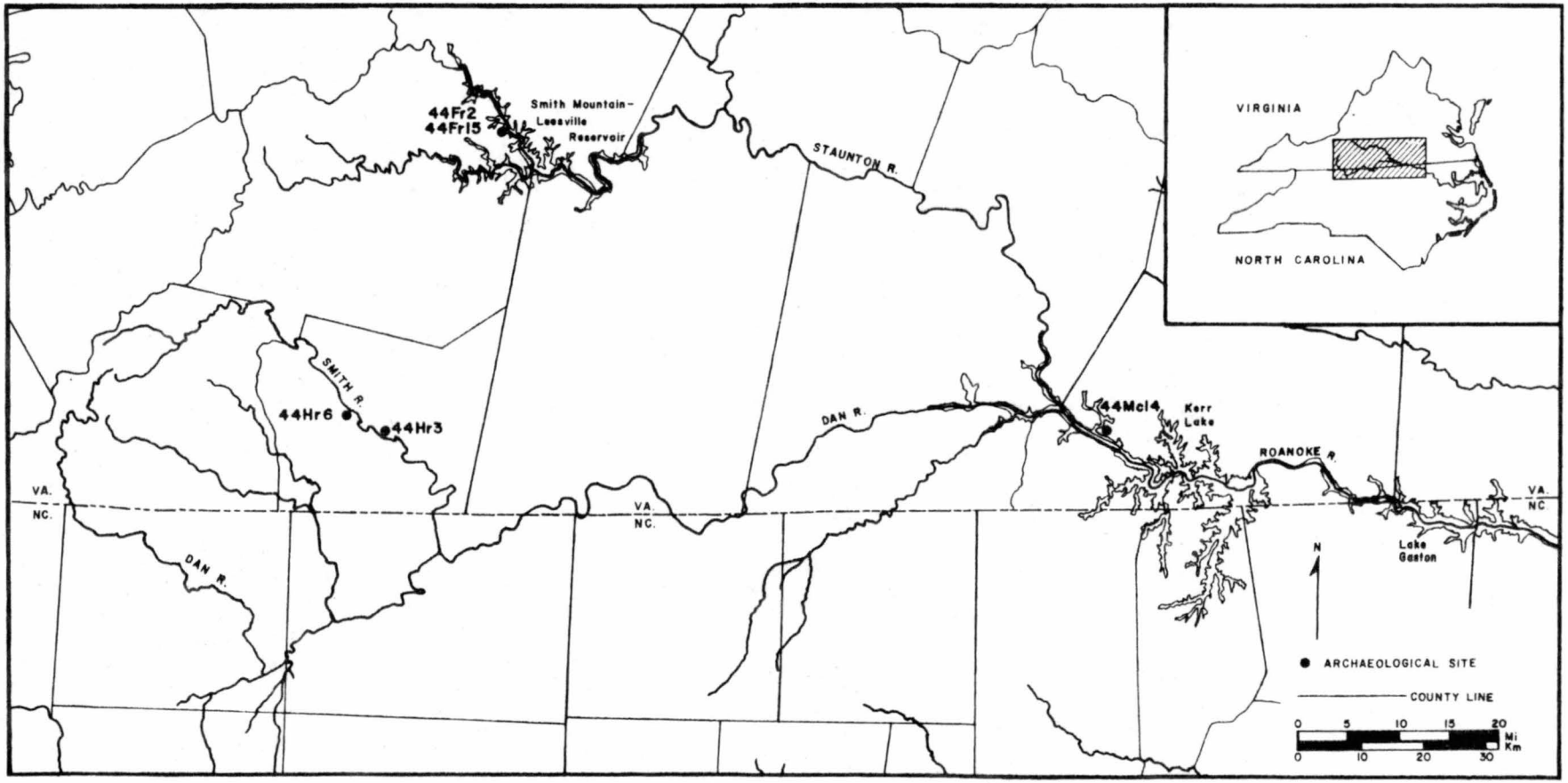

Smith Mountain-
Leesville
Reservoir
44Fr2
44Fr15
STAUNTON R.
VIRGINIA
NORTH CAROLINA
SMITH R.
44Hr6
44Hr3
DAN R.
44Mc14
Kerr
Lake
ROANOKE R.
VA.
NC.
Lake
Gaston
N
ARCHAEOLOGICAL SITE
COUNTY LINE
0 5 10 15 20 Mi
0 10 20 30 Km

Figure 2. The Smith Mountain - Leesville Reservoir Sites.

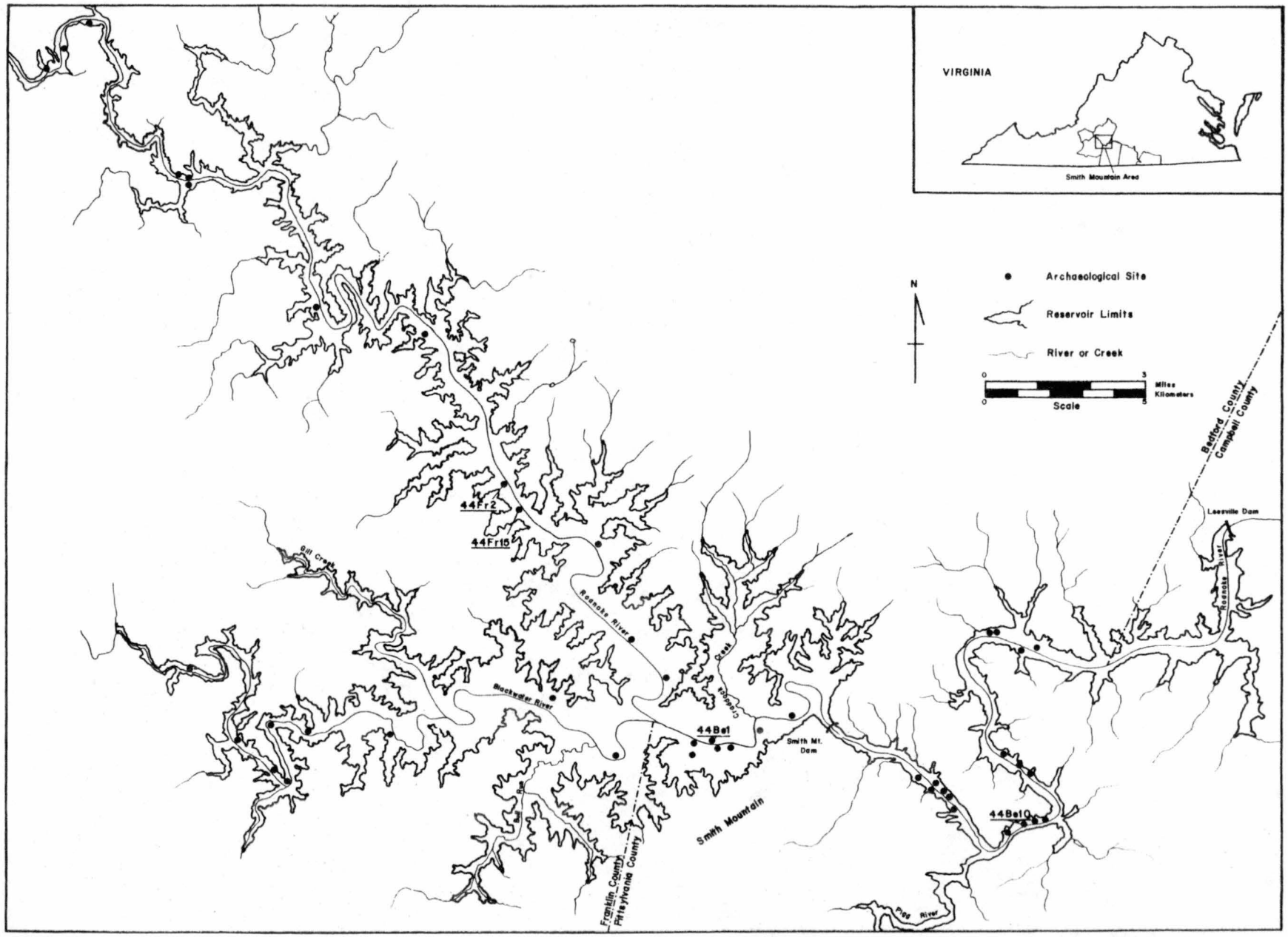
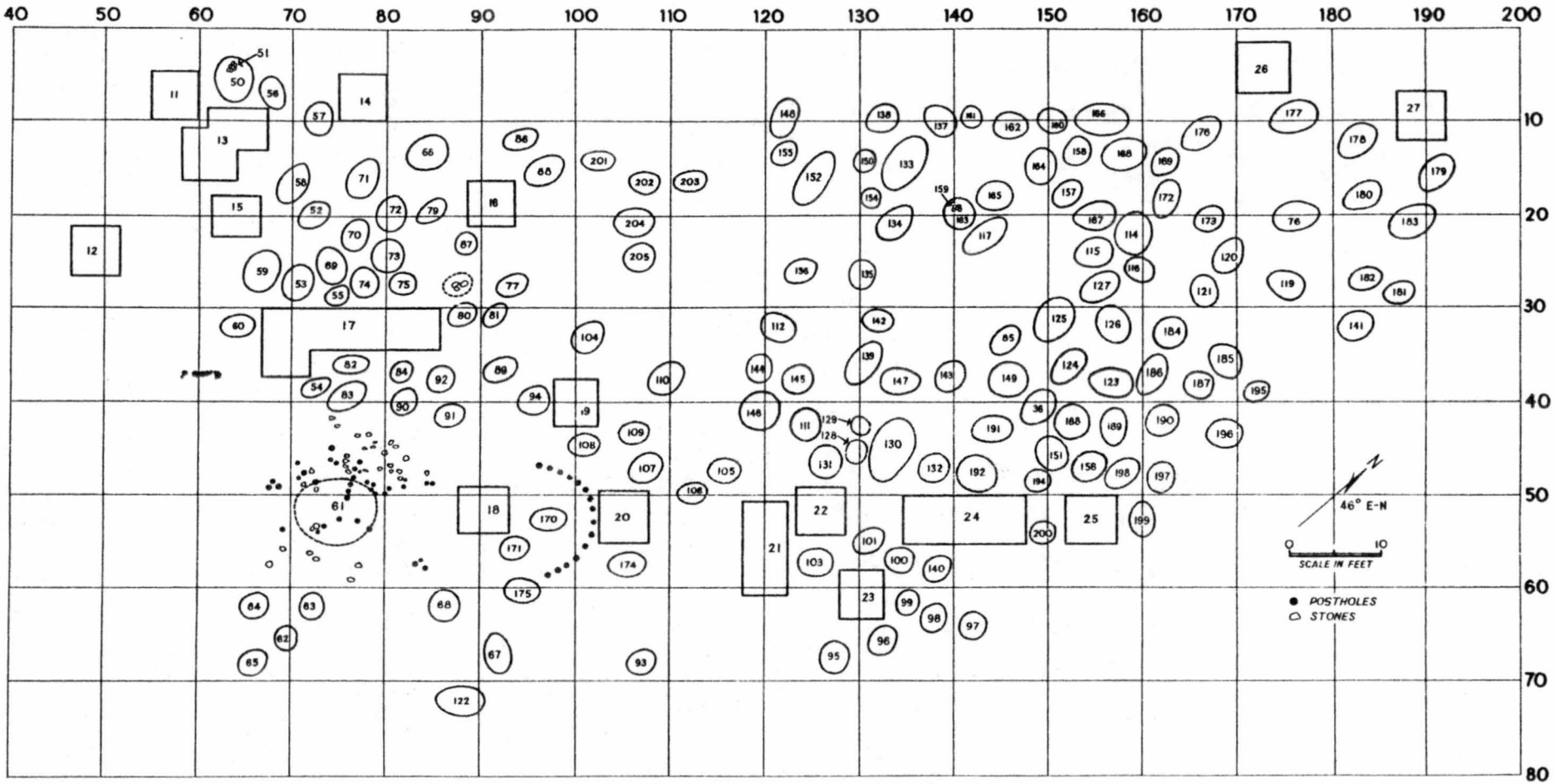
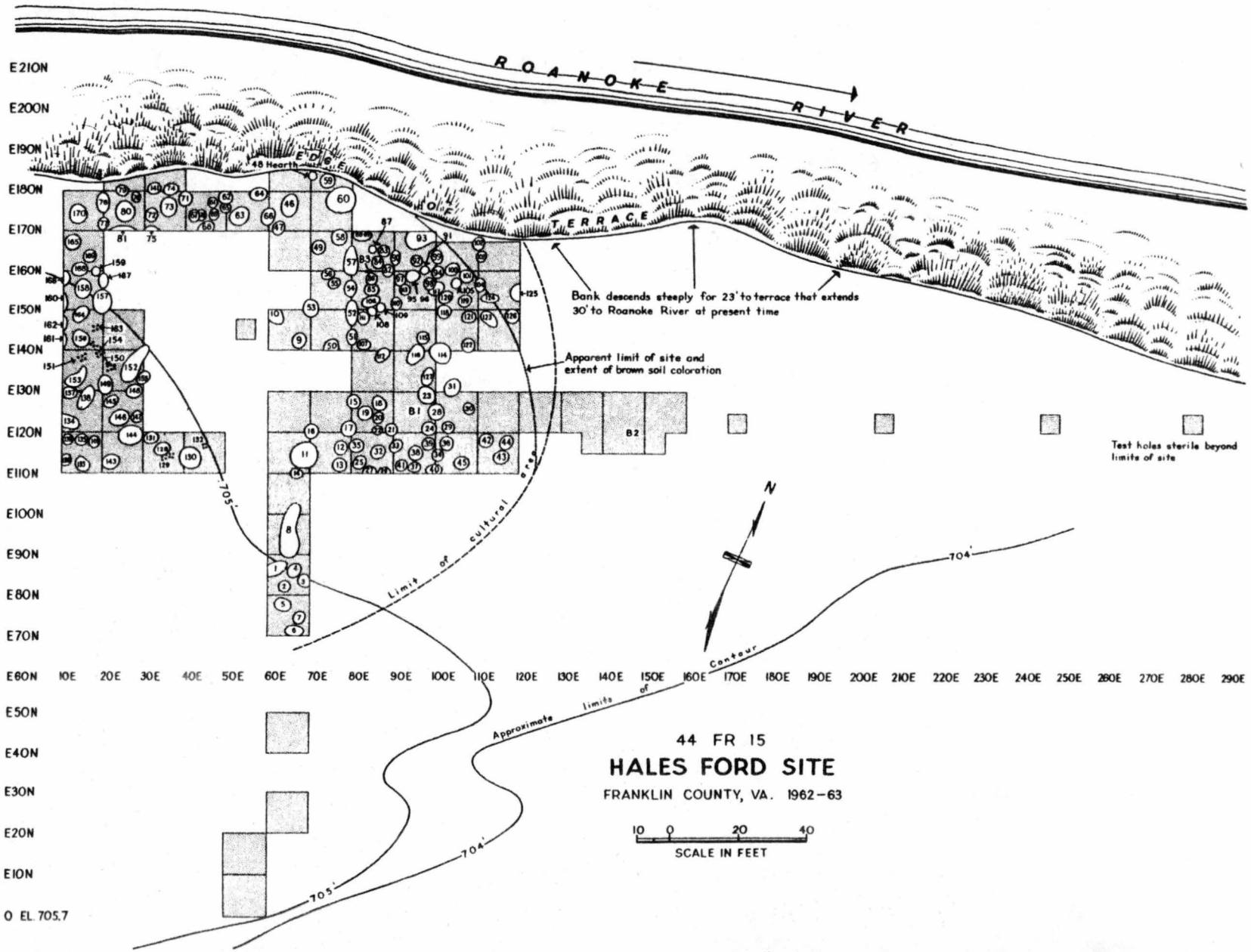

VIRGINIA
Smith Mountain Area
N
Archaeological Site
Reservoir Limits
River or Creek
0
3
Miles
Kilometers
Scale
Bedford County
Campbell County
Leesville Dam
Roanoke River
44Fr2
44Fr15
Gill Creek
Roanoke River
Blackwater River
Cherrystone Creek
44Be1
Smith Mt. Dam
Bull Run
Franklin County
Pittsylvania County
Smith Mountain
44Be10
Pigg River

Figure 3. Excavations at the Booth Farm Site (44Fr2).



BOOTH FARM SITE 44 FR 2

Figure 4. Excavations at the Hales Ford Site (44Fr15).



44 FR 15

HALES FORD SITE

FRANKLIN COUNTY, VA. 1962–63

Although the field notes are quite incomplete, the excavation procedures at the two sites seem to have been somewhat different. At Booth Farm (Figure 3), Appalachian Power Company earthmoving equipment stripped the topsoil off of a large area, and the underlying features were mapped, trowelled out, and the contents sifted in a power screen. The technique employed at the Hales Ford site (Figure 4) was to shovel and sift the plowed midden, either shovel or trowel the undisturbed midden and features, and sift the soil from both.

For this study twenty-five features were randomly chosen from each site (feature numbers were selected from a random numbers table). All the animal and plant remains from these fifty features were identified. Because the major emphasis of this project was on the faunal remains, those features with the largest number of bones were then selected for complete analysis of the artifacts (Table 1). Therefore, this study should in no sense be considered a complete site report. After briefly examining all of the excavated material, it is my impression (although I cannot demonstrate it) that these features are representative of the larger site samples. The ceramics from both sites are remarkably homogeneous and there was relatively little recorded overlap of features, indicating that the main occupations at the site were limited to a few years, perhaps one or two decades.

Table 1. Features Chosen for Analysis from the Booth Farm (44Fr2) and Hales Ford (44Fr15) Sites.

44Fr2 234 Total Features	Features -	8, 49, 52, 61*, 63, 64, 72, 75, 82, 92, 94, 106, 108, 112, 121*, 134, 140*, 153, 157, 160, 167, 175*, 176*, 192*, 202*.
44Fr15 189 Total Features	Features -	3, 5, 11, 14, 20, 25*, 36, 41, 43, 46*, 60*, 67*, 83, 93, 99, 122, 125*, 129, 131, 141*, 142*, 157*, 167, 169, 175*.

*Artifacts analysed from these features.

The only published reference to the Smith Mountain project is a short article by Carl Miller (1964) entitled "Bone Flutes from Southern Virginia." His conclusion was that the flutes from Booth Farm and Hales Ford date from the Late Archaic and Early Woodland periods. Although there are small Late Archaic components at both sites, the following discussion of the artifacts demonstrates that not only the bone flutes, but the overwhelming majority of the artifacts and cultural debris derive from the prehistoric Dan River occupations.

B. Features

All but one of the features selected for this study were pits. Unfortunately, not all of the features were described, or even sketched, in the field notes (Miller n.d.). Fifteen of the fifty randomly chosen features are briefly described as follows:

44Fr2

Feature 61 - Possible house structure.

Feature 72 - Large midden pit.

Feature 175 - Ash bed, midden pit. Archaic axe found in upper limits of this pit. Quite sizeable sherds also came from the ash filled pit besides few broken rocks and some shells.

44Fr15

Feature 3 - appeared to have a more flattened base, but still within limits of saucer-shaped.

Feature 41 - Large pot fragment with strap handle - restorable. This pit was deeper than the average. Walls were vertical.

Feature 60 - from here came a small child's clay bowl - ca one inch in diameter and nicely burned. Hearth: Present depth 3.6'.

Feature 67 - Hearth. Depth 2.5'. Compact ash - deeply burned.

Feature 83 - beads (1 bone and 1 perforated tooth), awl, toe-bone projectile point.

Feature 122 - Turtle dish.

Feature 125 - Burned acorns from fill.

Feature 129 - A few other rocks, ca. 54, were spaded out and away from the central grouping in getting down to this level: Depth from surface 1.4'. No. of stones photographed in position: 40.

Feature 141 - in the small space on the edge of the terrace west of the pit robbed earlier. Lots of periwinkle shells and several large sherds.

Feature 157 - Deep pit with a large broken stone in the upper limits of the pit. Then lens of periwinkle shells and humic soil beneath.

Feature 169 - Large rock with flat side down inside pit - meaning? Deer skull beneath stone.

Feature 175 - Very blackened area, rock contents high.

Miller (n.d.) made a few other comments relevant to this study. Concerning the Booth Farm site, he noted that the ". . . site is fairly evenly covered with Johnson grass. Indications of ground hog holes in several of the test areas . . . most pits had vertical walls and flat bases; a minority were hemispherical . . . . Most pits contained mussel shells (Unio), the ubiquitous periwinkle and the usual midden material. Bones were well preserved and those from fish, fowl, large and small mammals were found and saved . . . . Two Stallings Island points found 6 inches apart at the base of the cultural zone in 75E20S."

Evidently the excavation procedures were somewhat less than exceptional, but they do seem to have been

Feature 67 - Hearth. Depth 2.5'. Compact ash - deeply burned.

Feature 83 - beads (1 bone and 1 perforated tooth), awl, toe-bone projectile point.

Feature 122 - Turtle dish.

Feature 125 - Burned acorns from fill.

Feature 129 - A few other rocks, ca. 54, were spaded out and away from the central grouping in getting down to this level: Depth from surface 1.4'. No. of stones photographed in position: 40.

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Evidently the excavation procedures were somewhat less than exceptional, but they do seem to have been

consistently applied. All of the features examined do appear to have been sampled by the use of ¼-inch screens during excavation. Consequently, while few objects smaller than ¼-inch are present in the collections, this bias is a constant factor which can be accounted for. The following sections contain descriptions of the artifacts recovered during the 1962-1963 excavations.

C. Ceramics

Archaeologists have puzzled over the ceramics from south-central Virginia for many years and consequently some interpretive errors have appeared in the literature. A major source of confusion derives from the difficulty in distinguishing late prehistoric and early historic Dan River and Clarksville Series ceramics (Carter and MacCord 1968; MacCord 1968, 1971). The major error has been to misidentify Dan River sherds as Clarksville (Benthall 1969: 116-123, 1971: 10; Evans 1955: 110-111, 146, 152; Gravely 1967: 16). Since the pottery from sites discussed in this thesis belongs almost exclusively to these two series, the distinction is important and deserves a brief explication.

Clarksville pottery was first identified by Coe in 1938 during a survey of the Buggs Island Reservoir (Coe 1964: 100). Evans (1955: 49-54) and Miller (1962: 152-171) later proposed several type descriptions based on independently collected samples from the Clarksville

site (44Mc14). According to these three statements the series is characterized by bowls and jars with recurved rims. The paste is compact, but feels granular due to the large amounts (up to 25 percent) of fine to medium sand temper. Exterior surfaces are mostly net roughened, an effect created by beating a newly coiled pot with a net-wrapped paddle. Other less common surface treatments are smoothed, cord marked, corncob impressed, simple and check stamped varieties. A large minority of vessel interior surfaces were scraped with finely serrated tools, a technique generally referred to as combing. Another typical attribute of Clarksville jars is a thickened rim, either an added fillet or a rim fold. Decorative elements, such as incising, punctation, or finger pinching, were usually restricted to the base of the rim strip, except for frequent notching of the lip.

Dan River ceramics were first described by Griffin (1945: 325-326) from a sample excavated by Coe at $Rk^{v}1$ on the Dan River. Other archaeologists have expounded on this series at some length (Coe 1952: 310; Coe and Lewis 1952: 1-11; Holland 1970: 49-51; Lewis 1951: 214-264, 1953: 9). The consensus of these accounts is that Dan River pottery has a compact, gritty paste, containing sand tempering and crushed quartz, ranging in quantity from an occasional fragment to "large amounts" (Lewis 1951: 243). The bowls and flaring rimmed jars are predominantly net impressed, with lesser proportions

of smoothed, cord marked, corncob impressed, and brushed exterior surfaces. Interior surfaces are smoothed, roughly smoothed, or combed. Decoration occurs in a partially smoothed band around the constricted neck and consists of incising, finger pinching, and jabbed punctates. In addition, thinned vessel rims have flattened or rounded lips with notches along the exterior edge. Strap or loop handles are infrequently appended to the rims, which are even more rarely castellated at the point of attachment.

We can now summarize the attributes which differentiate the Dan River and Clarksville series. Dan River paste is usually tempered with crushed quartz particles, whereas Clarksville vessels are either exclusively sand tempered or contain some fragments of crushed feldspar. Although the most numerous types in both series are net impressed, these can often be distinguished according to the type of net. Dan River pottery was generally beaten with finer, knotted nets, as opposed to the coarser, looped Clarksville nets. The rim folds so characteristic of the Clarksville series are quite rare at Dan River sites. Decoration was most often applied to the base of Clarksville rim folds, but is limited to the necks of Dan River vessels. Finally, nodes, lugs, and strap handles are unknown in the Clarksville series.

If one were to attempt to attribute contextless body sherds to one series or the other, the two might indeed

be difficult to distinguish. On the other hand, the series were defined on the basis of similarities discovered within large samples. Type statements normally (or should) include descriptions of the expectable range of variation around an average. Thus, careful perusal of the reports on Clarksville and Dan River ceramics indicates that the pastes of each are very similar and, indeed, are identical in some instances. Sherds within this zone of ware overlap cannot confidently be assigned to either series on this basis alone. But an entire site assemblage is another matter.

Virtually all of the pottery from the Booth Farm (44Fr2) and Hales Ford (44Fr15) sites belongs to the Dan River series (Tables 2 and 3). The collections do not differ markedly from that from $Rk^{v}1$ described by Lewis (1951). The hard, compact paste is sand tempered with very few crushed quartz inclusions. Jars and bowls were constructed by coiling beveled or flat strips of clay around a basal disk (Figure 5: G) (Holland 1970: 49). Then the vessel walls were beaten to a fairly uniform thickness (Table 4), and the completed vessels were fired. The resultant colors are dark brown to light tan with fire clouds.

Exterior surface treatment types are listed in Table 2. Knotted nets were used more often than looped nets for malleating the surface, but the exact percentages were not noted. Only 1% of the net impressed sherds from both

Table 2. Ceramic Types from Booth Farm (44Fr2) and Hales Ford (44Fr15).

Type	44Fr2* No.	44Fr2* %	44Fr15+ No.	44Fr15+ %
Dan River Series				
Net Impressed	1603	92.0	2572	82.7
Cord Marked	50	2.9	330	10.6
Plain	37	2.1	60	1.9
Corncob Impressed	9	0.5	5	0.2
Uwharrie Series				
Cord Marked	-	-	5	0.2
Catawba Series				
Burnished	1	-	7	0.2
Unidentified	43	2.5	129	4.2
Total	1743	100.0	3108	100.0

*7 Features: 61, 121, 140, 175, 176, 192, 202

+9 Features: 25, 46, 60, 67, 125, 141, 142, 157, 175

Table 3. Percentage Distribution of Ceramic Types by Feature at Booth Farm and Hales Ford.

			Dan River Series						
	Feature	Sherd Count	Net Impressed	Cord Marked	Plain	Corncob Impressed	Catawba Burnished	Uwharrie Cordmarked	Approximate Seriation Sequence
44Fr2	61	261	95.0	1.9	1.1	1.9			3
	121	44	97.7	2.3					1
	140	250	92.8	1.6	5.2	0.4			6
	175	467	95.1	3.2	1.1	0.6			4
	176	148	97.3	1.4	1.4				2
	192	284	93.3	2.5	4.2				5
	202	246	92.2	6.5	0.8				7
44Fr15	25	254	82.7	14.6	2.0			0.8	7
	46	272	90.4	5.5	3.7	0.4			3
	60	595	81.4	14.6	3.4	0.3	0.2		8
	67	167	85.0	14.4	0.6				6
	125	47	93.6	6.4					1
	141	581	89.0	8.8	1.5		0.3	0.3	4
	142	365	81.3	16.2	1.6	0.5		0.3	9
	157	248	86.7	10.5	2.8				5
	175	450	92.4	6.2	0.4		0.9		2

Table 4. Dan River Series Ceramics - Vessel Wall Thickness.

Site	Body Sherds			Basal Sherds		
	ave.	range	n	ave.	range	n
Booth Farm (44Fr2)	5.9	2.7-9.4	1554	8.0	4.6-13.1	96
Hales Ford (44Fr15)	5.8	3.0-8.9	2849	8.6	5.5-12.2	96

Table 5. Smith Mountain Ceramics - Interior Surface Treatment

Interior Surface Treatment	44Fr2		44Fr15	
	No.	%	No.	%
Hand Smoothed	1376	78.9	2305	74.2
Rough	299	17.2	596	19.2
Striated	25	1.4	78	2.5
Unidentified	43	2.5	129	4.2
Total	1743	100.0	3108	100.0

sites have distinct net impressions (Figure 5: D). The rest are best characterized as net roughened (Figure 5: A-C). The net cords were 0.8 to 2.5 mm in diameter in a mesh set 2 to 8 mm apart. Knots were normally 3 mm thick. On cord marked sherds (Figure 5: E; Figure 7: G), the cord marking is perpendicular, or nearly so, to the lip. Wrapped cords were spaced on the paddles at an average density of 4 per cm. Cord width varied from 1.5 to 3 mm. Plain sherds have had most evidence of previous paddling erased by hand smoothing (Figure 5: H). Corncob impressed sherds are quite rare at both sites (Figure 7: F).

Interior surface treatment was limited to three types (Table 5). Most sherds have a smooth interior with relatively little temper on the surface. A less numerous category contains sherds with flat, but rough, granular surfaces. Sand temper is prominent on the interiors of these sherds. The third class has faint striations created by scraping the interior walls (Figure 5: F).

Vessels are of two basic forms: bowls and jars. Bowls are shallow, with flat or slightly conoidal bases and straight or incurving rims (Figure 5: G-J). Jars are globular with conoidal bases and constricted necks and flaring rims (Figure 5: A). Appendages include 2 notched nodes (Figure 7: M) (44Fr2-2, 44Fr15-0), 11 lugs (Figure 7: E) (6,5), 2 loop handles (0,2), and 9 strap handles (Figure 7: A-B, D) (7,2). Five of the strap handles have rows of punctations reminiscent of some Fort Ancient

specimens (cf., Griffin 1966: Plate IV). The strap handles had been attached by means of clay rivets through holes in the vessel walls (Figure 7: D).

Decoration is almost wholly restricted to the lip and neck regions. Lips were usually thinned and either flattened or rounded with the fingers, leaving a smooth surface, or with the paddle, creating a roughened surface (Table 6). Decoration was limited to simply notching either the exterior edge or the top of the lip (in a ratio of 3:10 at 44Fr2).

The variety of decorative elements found on Dan River ceramics is rather limited, consisting essentially of three types in different combinations and orientations. At the Smith Mountain sites (Tables 7 and 8), "fingertip punctations" are the most abundant design element, made either by poking or pinching the clay in a band around the vessel neck (poked and pinched sherds are found in approximately equal proportions at both sites) (Figure 5: A, B, D; 6: C). Standard oblong punctations and horizontal incising are the next most frequent sorts of decoration (Figure 5: C; 6: B, G). Besdies combinations of these elements, two other minority types are short, slashed diagonal incisions and curvilinear incisions.

A mere handful of non-Dan River ceramics were found in the analyzed features at the Smith Mountain sites. There was a minor Uwharrie component at Hales Ford. Five cord marked sherds match Coe's (1952: 308)

Table 6. Dan River Ceramic Lip Forms.

Form	Decoration	Exterior Surface Treatment (%)				Total %
		Net Impressed	Cord Marked	Plain	Corncob Impressed	
Square	Smoothed	9.1/7.9*		1.5/1.5	.8/	11.4/9.4
	Roughened	1.5/2.0				1.5/2.0
	Notched	21.9/13.4	2.3/	.8/1.5		25.0/14.9
Round	Smoothed	16.7/11.9	1.5/3.0	3.8/2.5	/.5	22.0/17.9
	Notched	35.6/49.2	.8/4.0		1.5/	37.9/53.2
Folded	Smoothed	/1.5		/.5		/2.0
	Roughened	.8/.5				.8/.5
	Notched	1.5/				1.5/
	Total %	87.1/86.4	4.5/7.0	6.1/6.0	2.3/.5	100.0
	n	115/174	6/14	8/12	3/1	132/201

*44Fr2/44Fr15

Table 7. Decoration on Ceramics from Booth Farm.

Decoration	Surface Location	Exterior Surface Treatment (%) Net Impressed	Cord Marked	Plain	Total No.	Total %
Fingertip Punctation, Horizontal	Neck	80.3	2.0		84	82.3
	Rim	2.0			2	2.0
Fingertip Punctation and Punctation	Neck	1.0			1	1.0
Incising, Horizontal	Neck	1.0		4.9	6	5.9
Jab Incising, Diagonal	Neck	2.0			2	2.0
Punctation, Horizontal	Neck	4.9	1.0		6	5.9
Punctation, Vertical	Neck	1.0			1	1.0
Total		92.2	3.0	4.9	102	100.0

Table 8. Decoration on Ceramics from Hales Ford.

Neck Decoration	Exterior Surface Treatment (%)				Total	
	Net Impressed	Cord Marked	Plain	Burnished	No.	%
Fingertip Punctation, Horizontal	68.1	2.2			97	70.3
Vertical	.7				1	.7
Jab Incising, Diagonal	2.2				3	2.2
Incising, Horizontal	14.5		2.9	2.9	28	20.3
Punctation	2.2				3	2.2
Horizontal Incising and Punctation	.7				1	.7
Incising, Horizontal and Diagonal	.7				1	.7
Incising and Punctation, Diagonal	.7				1	.7
Curvilinear Incising	2.2				3	2.2
Total	92.0	2.2	2.9	2.9	138	100.0

description of the crushed quartz tempered Uwharrie type. A few burnished sherds have the high degree of burnishing typical of Catawba trade pieces (Lewis 1951: 262). Several rim sherds with Clarksville-like rim folds are classified as Dan River sherds, since in most cases they also display Dan River characteristics such as notched lips or strap handles (Figure 5: C; 7: A).

A comparison of the Smith Mountain ceramics with Lewis's statistics for the $Rk^{v}1$ pottery indicates that there is considerable variety within the samples. Net impressed pottery is still the most common type at $Rk^{v}1$ (69.5%), but the percentages of plain (22.7), cord marked (3.0), corncob impressed (1.9), brushed (1.2), and complicated stamped (0.1) sherds present a very different picture. Similarly, combed interiors (27.5%) far outnumber the few representative sherds at the more northern sites. Decorative elements, especially punctation (30.2%), horizontal incising (24.1), and fingertip punctation (16.4) are present in almost inverse proportion to their frequency in the Smith Mountain region.

Direct comparisons of the data from these three sites, such as by a seriation graph is not warranted because of the unknown effects of geographical, chronological and cultural variables. For instance, there is no guarantee that people using the same pottery types were necessarily members of the same cultural group (Coe 1964: 107, also see p. 6). For similar reasons, Holland's seriation of

Dan River sites in the Virginia Piedmont Uplands is of questionable validity (1970: Figure 7, p. 53). According to Holland's tabulation, sites predominantly with pottery assigned to his Grayson series are earlier than those having mostly Dan River pottery. However, his seriated distribution is better explained by reference to geographical factors, since all but one of the "early" sites are in the New River Valley, whereas all but one of the "later" Dan River sites are along the Dan, Mayo or Smith rivers, in the Roanoke River drainage to the east. The Grayson series may actually be earlier than Dan River (Clark 1976), but Holland's use of seriation is inappropriate for this problem.

There are a few clues to the relative age of the sites. Corncob impressed pottery is thought to occur solely in

> "...a historic context. In the Dan River Series it represents only 3.6 per cent of the total pottery but increases in prominence to almost 5 per cent in the Caraway Series nearly fifty years later." (Coe and Lewis 1952: 9)

Applying this logic to the Smith Mountain sites, with their miniscule sample of corncob impressed sherds, they probably predate $Rk^{v}1$ by an unknown length of time. Likewise, the high percentage of cord marking at Hales Ford may place that site early in a trend toward the disappearance of that technique (Coe and Lewis 1952: 11).

Besides pottery, four other ceramic artifact types were found (Table 9). One is an almost perfectly

Table 9. Ceramic and Bone Artifacts from the Booth Farm and Hales Ford Sites.

Type		44Fr2 Booth Farm	44Fr15 Hales Ford
Ceramic Artifacts			
	Ball	1	
	Smoking Pipe	4	14
	Spoon	2	1
	Toy Pot	3	3
	Totals	10	18
Bone Artifacts			
	Awl, Bird Bone Splinter	10	5
	Deer Metatarsal		1
	Deer Radius	1	1
	Deer Ulna	4	1
	Mammal Bone Splinter	3	20
	Turkey Tibiotarsus	1	1
	Bead, Bird Bone	7	1
	Beamer, Deer Metapodial	1	
	Mammal Bone	1	3
	Bowl, Painted Turtle Carapace		2
	Box Turtle Carapace	1	
	Chisel, Beaver Incisor	1	
	Fishhook, Mammal Bone	1	
	Fishhook Manufacturing Debris, Bird Bone	1	6
	Deer Ulna	2	
	Mammal Bone	4	1
	Turkey Bone	1	
	Flaker, Antler Tine	1	1
	Gouge, Deer Metatarsal	1	1
	Mammal Bone	2	5
	Pendant, Bobcat Canine		1
	Box Turtle Humerus		1
	Dog Mandible		1
	Fox Squirrel Mandible		2
	Painted Turtle Humerus	1	
	Turkey 1st Phalanx	2	
	Projectile Point, Antler Tine	1	
	Deer 3rd Phalanx		1
	Polished Splinter, Bird Bone	2	1
	Mammal Bone		1
	Rattle, Box Turtle Carapace		2
	Scored and Snapped, Bird Bone	4	10
	Cottontail Ulna		1
	Deer Bone	1	
	Mammal Bone	1	2
	Turkey Bone		1
	Spatula, Bird Bone	1	3
	Mammal Bone	1	3
	Whistle, Bird Bone	2	
	Totals	59	79

spherical clay ball (Figure 7: L), with no counterpart reported from any nearby site. Of the eighteen smoking pipe specimens, four are nearly complete and have bowls set on straight tubes at angles varying from ten to thirty degrees. There are equal numbers of squared and rounded stem bits, and two are collared (Figure 7: H). Twelve of the pipes have smooth surfaces, four are burnished, one is corncob impressed, and the remaining pipe is cord marked. One unusual pipe bowl has a keel or flange beneath the bowl (Figure 7: K), very similar to a specimen from $Rk^{v}1$ (Lewis 1951: 276, Plate XI: g). The pipes resemble those found at other late prehistoric sites on the Roanoke River (Coe 1964: 117; Benthall 1969: 114).

Three pieces of clay spoons or dippers, so-called because of their resemblance to modern utensils, were found (Figure 7: I-J). These objects have been reported from numerous sites (Gravely 1967: 16; Holland 1970: 104-105; MacCord 1969: 18, 1976: 132; Miller 1962), but their original use is unknown. Six toy pot fragments were also recovered from the Smith Mountain sites.

D. Bone Artifacts

Split bird and mammal bone awls are the most numerous of the bone artifacts (Table 9; Figure 8: O). The average dimensions (and ranges) for these objects are: length - 67.3 (38.3 - 116.0 mm), width - 7.3 (5.0 - 21.1 mm), thickness - 1.6 (1.1 - 2.2 mm). A few splinter awls

were made from recognizable deer or turkey bones (Figure 8: R, T). Eight tubular beads were fashioned from bird bone. Several other long bone fragments still retain the scoring marks left from the manufacturing process when beads and other artifacts were snapped off. Five fragments of beamers or hide scrapers were recognized in the samples.

Turtle bones were altered in a number of ways. Two painted turtle carapaces had the vertebral columns scraped away and the margins ground smooth for use as bowls or spoons. Three box turtle carapaces likewise had the vertebrae removed, and two of these were perforated along the caudal margins by two crudely punched holes (Figure 9: J). These last two specimens are interpreted as rattles (see Dickens 1976: 156; Manson, MacCord, and Griffin 1943: 397). One humerus of each species has a hole drilled through the distal condyle. This type of pendant as well as the scraped carapace bowl are characteristic traits of the Fort Ancient culture (Hanson 1975: Figures 62, 64; Prufer and Shane 1970: 136). The latter are also found on Monongahela Late Prehistoric sites (Mayer-Oakes 1955: Figure 25: O).

Other pendants include a bobcat canine with a hole drilled through the root, a dog and two fox squirrel mandibles with holes punched through the ascending rami, and two turkey first phalanges (second digit) with holes punched through the proximal facet (Figure 8: Q)

(Miller 1962: Plate 71: E; MacCord 1976: 128).

Eight spatulas, defined as bones with flat, thin working ends, and nine gouges, with wide-pointed tips, are distinguished from finely pointed awls. One beaver incisor was modified into a chisel. Antler was worked into flakers and a hollow-ended projectile point. An analogous, hollow-ended deer phalanx (Figure 8: P) is likewise classified as a projectile point. The remaining artifacts are a fishhook and fishhook manufacturing debris. The fishhook, which measures 29.3 mm long, 7.2 mm wide, and 1.9 mm thick, has a notched shaft. The other objects have been convincingly demonstrated by Webb (1946: 289, Figure 45: B) to be the discarded refuse from fishhook manufacture (Figure 8: U, V). However, at least half of these specimens have one point polished from use as an awl (Wells 1971: Figure 14; Benthall 1969: Figure 60: 83; but misidentified by South 1959: Plate 37: D).

Finally, two whistles were found in the analyzed features from Booth Farm. Whistles from the Smith Mountain sites are the subject of the only publication relating to work done in that reservoir (Miller 1964) In this article, Miller stated that "heretofore no demonstrable wind musical instruments have been reported from Virginia to the writer's knowledge." He concluded that "the flutes from southern Virginia represent traits of the Late Archaic and Early Woodland cultures of Franklin County." Since Miller wrote his article, whistles have

been found on at least one other Dan River site (Gravely 1967: 16). Since virtually identical specimens have been found on Fort Ancient sites (see Mills 1917; Schweinsberger 1955; Hanson 1975: 87, Figure 69: A) which share so many traits with Dan River assemblages, there is no compelling reason to deny the late date of these whistles.

E. Stone Artifacts

There are relatively few stone artifacts in the Smith Mountain site collections. Most of the debitage was discarded when the collections were cataloged, and undoubtedly some worked flakes and tool fragments were lost at that time. The remaining specimens are enumerated according to form and raw material in Table 10. Microscopic wear patterns were very difficult to discern on the numerous artifacts made of translucent quartz, quartzite, and smoky chalcedony. The retouched flakes seem to have been used as side scrapers (Figure 8: M).

A Savannah River knife (Figure 8: A) (Coe 1964: Figure 40) and two small examples of Savannah River Stemmed projectile points (Figure 8: B) (South 1959: 153-159; Coe 1964: Figure 106, A) were found at Hales Ford, as was a Potts Point (Figure 8: F) (McCary 1953). The majority of points are triangular with straight or slightly concave bases, and classifiable as Dan River Triangular points (Figure 8: C-E, G-J) (Coe 1952: 310). Throughout the Piedmont, triangular points became

Table 10. Stone Artifacts from the Booth Farm and Hales Ford Sites.

Type	Raw Material						Total
	Quartz	Chert	Chalcedony	Rhyolite	Quartzite	Other	
44Fr2							
Unworked Flakes	25	3	5		1		34
Retouched Flakes	2	1	1		2		6
Biface Fragments	2						2
Small Biface			1				1
Projectile Points							
Dan River Triangular	7	6	1	2			16
Chipped and Pecked							
Celt, Greenstone						1	1
Hammerstones, Sandstone						6	6
Total	36	10	8	2	3	7	66
44Fr15							
Unworked Flakes	124	7	11	1	8		151
Retouched Flakes	2	4			1		7
Biface Fragments	6	1		1			8
Small Biface	1						1
Projectile Points							
Savannah River, Small Variant	1		1				2
Potts	1						1
Dan River Triangular	6	1	2				9
Savannah River Knife		1					1
Chipped and Pecked							
Celt, Greenstone						1	1
Hammerstone, Sandstone						1	1
Metate						1	1
Total	141	14	14	2	9	3	183

Table 11. Dan River Triangular Projectile Point Dimensions.

	Dimension	Mean (mm)	Range (mm)	n
44Fr2				
Large Variant	L	40.2	37.4-43.1	
	W	28.0	28.0	2
	T	4.2	3.9-4.5	
Small Variant	L	26.2	19.5-32.1	
	W	16.7	11.7-22.3	14
	T	4.8	3.0-6.9	
44Fr15				
Large Variant	L	27.1	27.1	
	W	27.9	27.9	1
	T	9.0	9.0	
Small Variant	L	21.6	15.0-27.8	
	W	16.3	12.9-20.9	8
	T	4.5	3.2-6.1	

Figure 5. Ceramic Artifacts.

A. Dan River Net Impressed, fingertip punctations on neck.

B. Dan River Net Impressed, vertical pinched pattern.

C. Dan River Net Impressed, with rim fold.

D. Dan River Net Impressed, fingertip punctations on neck.

E. Dan River Cordmarked.

F. Dan River Net Impressed, combed interior.

G. Dan River Plain, bowl basal disk.

H. Dan River Plain, bowl rim.

I. Dan River Net Impressed, bowl.

J. Dan River Net Impressed, bowl.

44Fr2 - C-E, G, I

44Fr15 - A-B, F, H, J

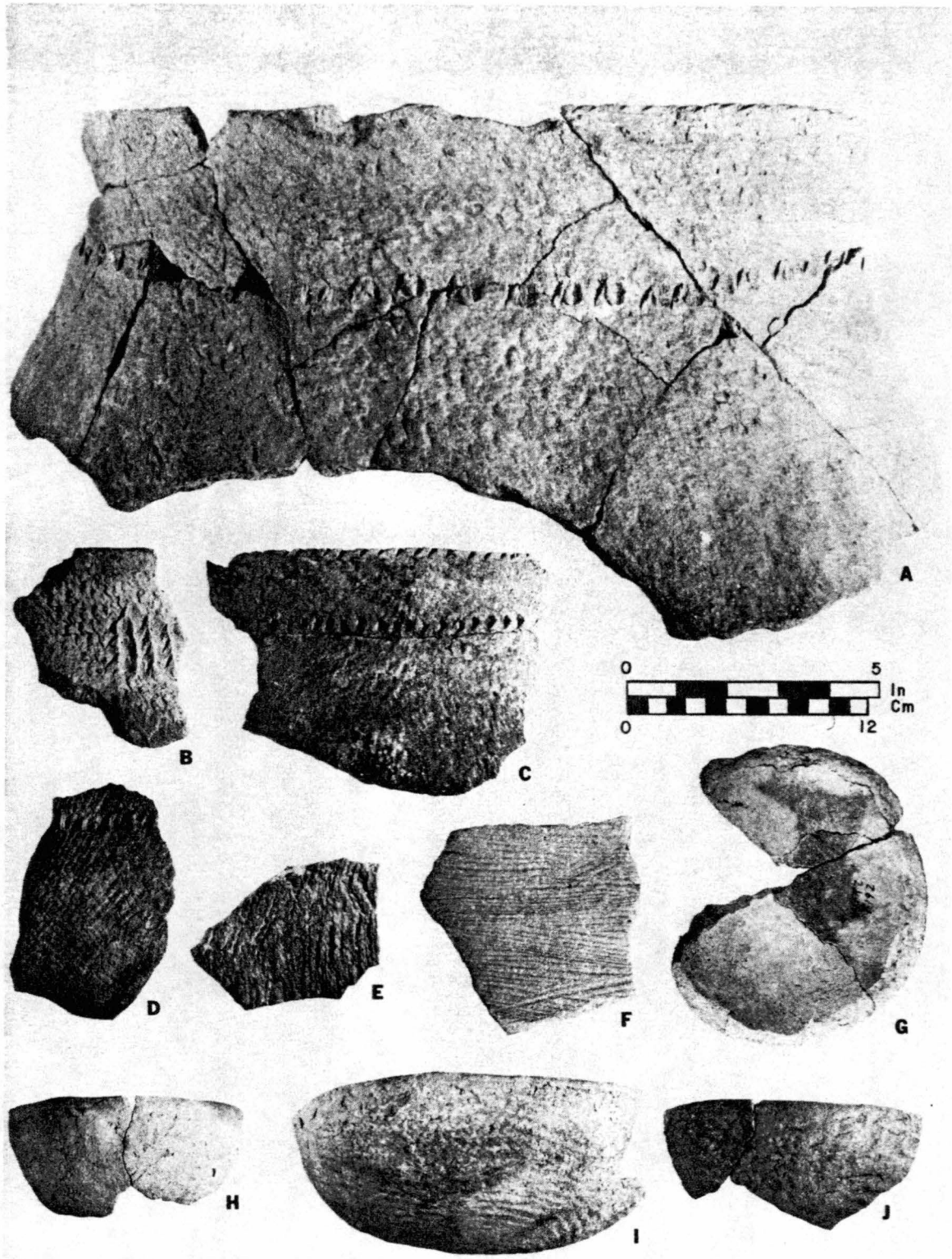

Figure 5

Figure 6. Pottery Rim Profiles.

A-D. Dan River Net Impressed, Jars.

E. Dan River Plain, Bowl.

F. Dan River Net Impressed, Bowl.

G. Dan River Net Impressed, Jar.

44Fr2 - A, F

44Fr15 - B-E, G

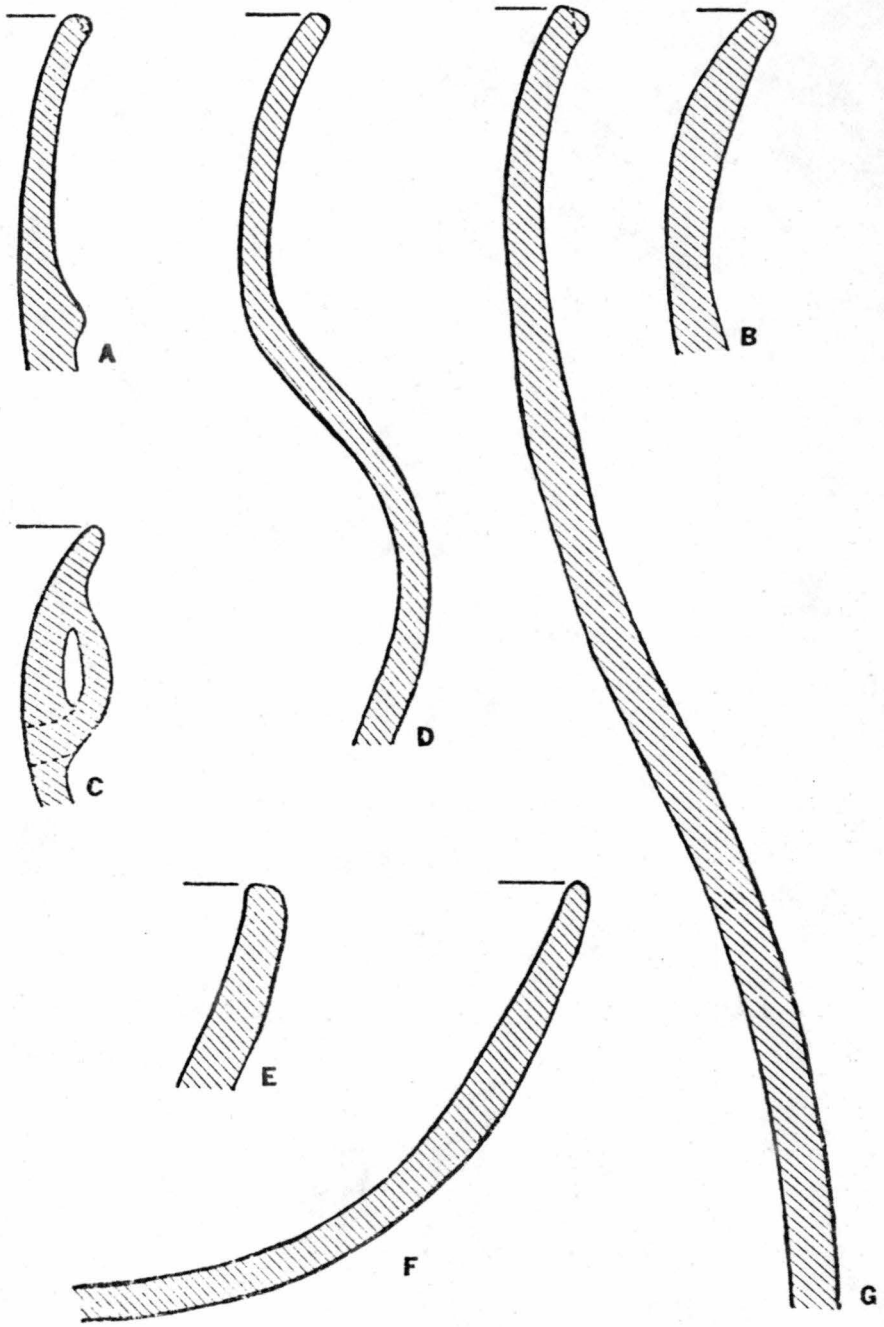
A
B
C
D
E
F
G

Figure 7. Ceramic Artifacts and Plant Remains.

A. Dan River Net Impressed, with rim fold, strap handle with punctations and notched, castellated lip.

B. Dan River Net Impressed, strap handle with punctations and notched castellation.

C. Dan River Net Impressed, fingertip punctations on neck.

D. Dan River Net Impressed, cross section showing strap handle attached by rivet (arrow).

E. Dan River Net Impressed, notched lug.

F. Dan River Corncob Impressed.

G. Dan River Cordmarked, punctations on neck.

H. Bent tubular smoking pipe, burnished.

I. Ceramic spoon bowl.

J. Ceramic spoon fragment.

K. Keeled tubular smoking pipe.

L. Ceramic ball.

M. Notched node.

N. Eight-rowed corncob.

44Fr2 - B-G, K-M

44Fr15 - A, H-J, N

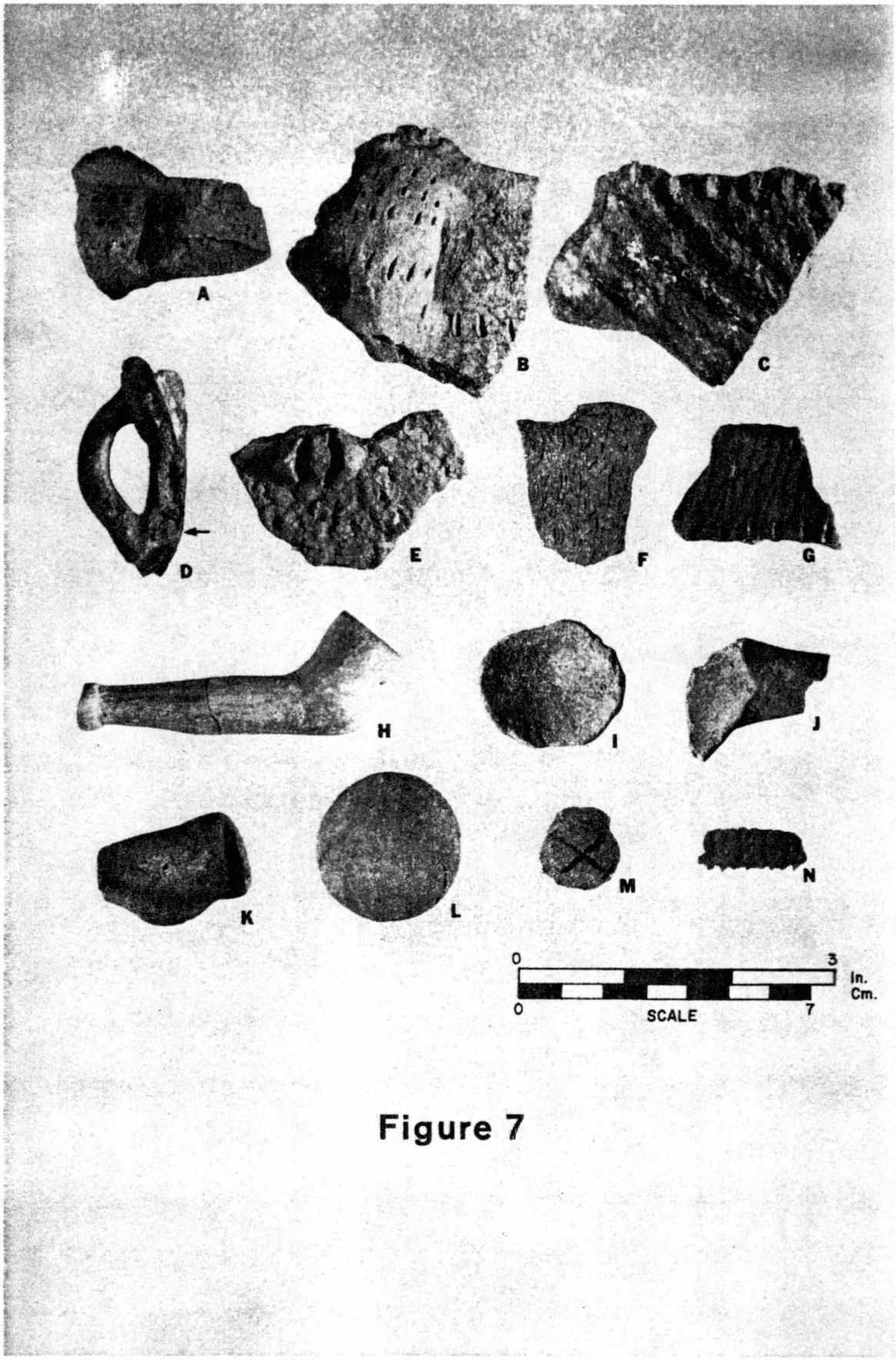

Figure 7

Figure 8. Stone and Bone Artifacts.

A. Savannah River knife.

B. Savannah River stemmed projectile point, small variant.

C-E. Dan River Triangular projectile points.

F. Potts projectile point.

G-J. Dan River Triangular projectile points.

K-L. Small bifaces.

M. Utilized flake.

N. Whistle, bird bone.

O. Splinter awl, bird bone.

P. Projectile point, deer phalanx, proximal end hollow.

Q. Pendant, turkey first phalanx.

R. Awl, turkey tibiotarsus.

S. Flaker, antler.

T. Awl, deer radius.

U. Fishhook blank, bird bone.

V. Fishhook manufacturing debris, bird bone, reworked into awl.

W. Gouge, deer metatarsal.

44Fr2 - C, E, G, L, O-P, R-V

44Fr15 - A-B, D, F, H-K, M-N, Q, W

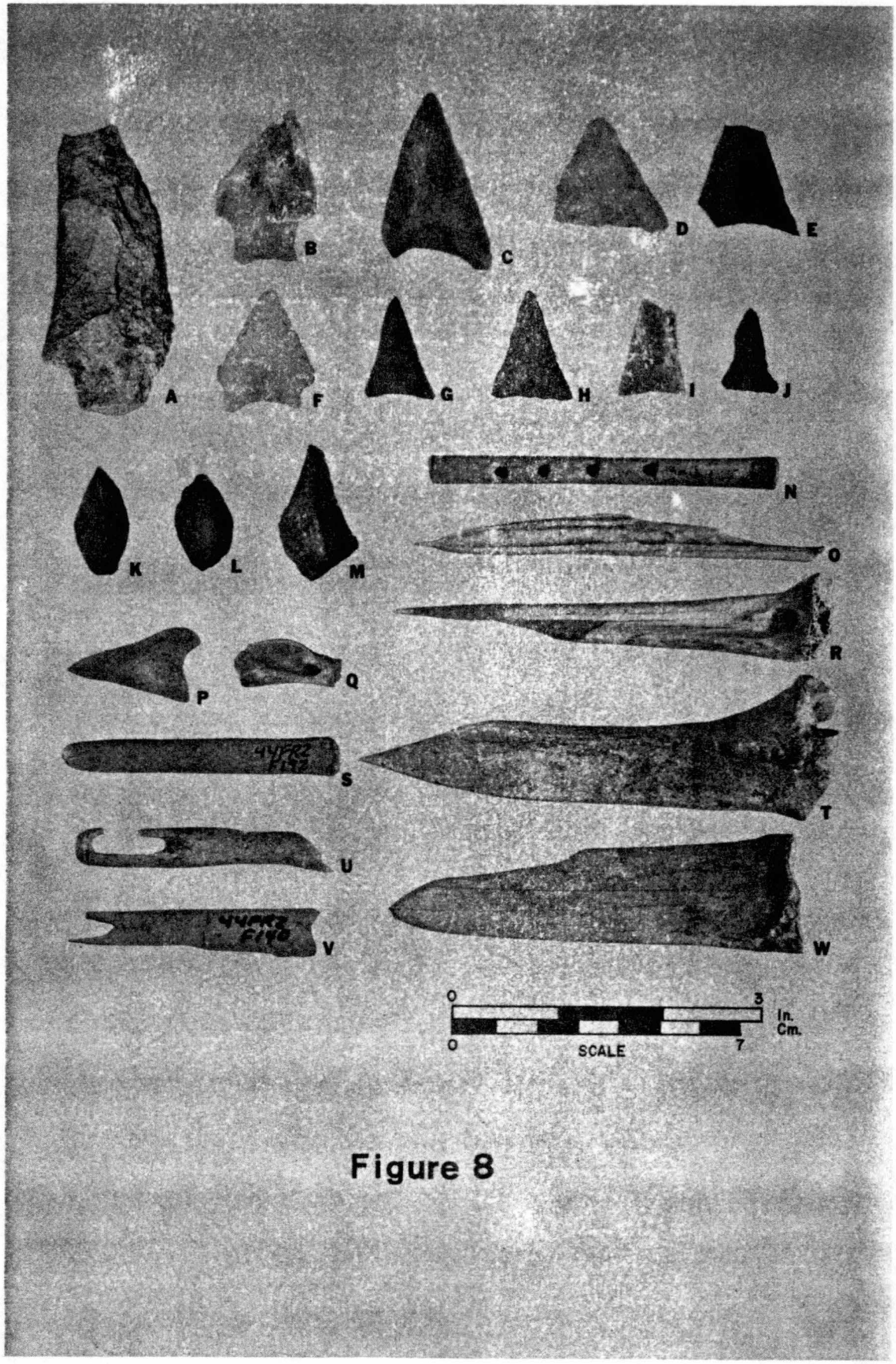

Figure 8

Figure 9. Stone and Bone Artifacts and Butchering Marks.

A. Chipped and pecked celt.

B. Pecked hammerstone.

C. Deer pelvis (arrows point to butchering marks, C-H).

D. Deer scapula.

E. Deer humerus, distal end.

F. Deer skull, antlers shed (top view).

G. Deer calcaneus.

H. Deer humerus, distal end.

I. Deer skull, antlers shed (front view).

J. Box turtle carapace (arrows point to holes punched for suspension or handle attachment).

44Fr2 - C-D, F-I

44Fr15 - A-B, E, J

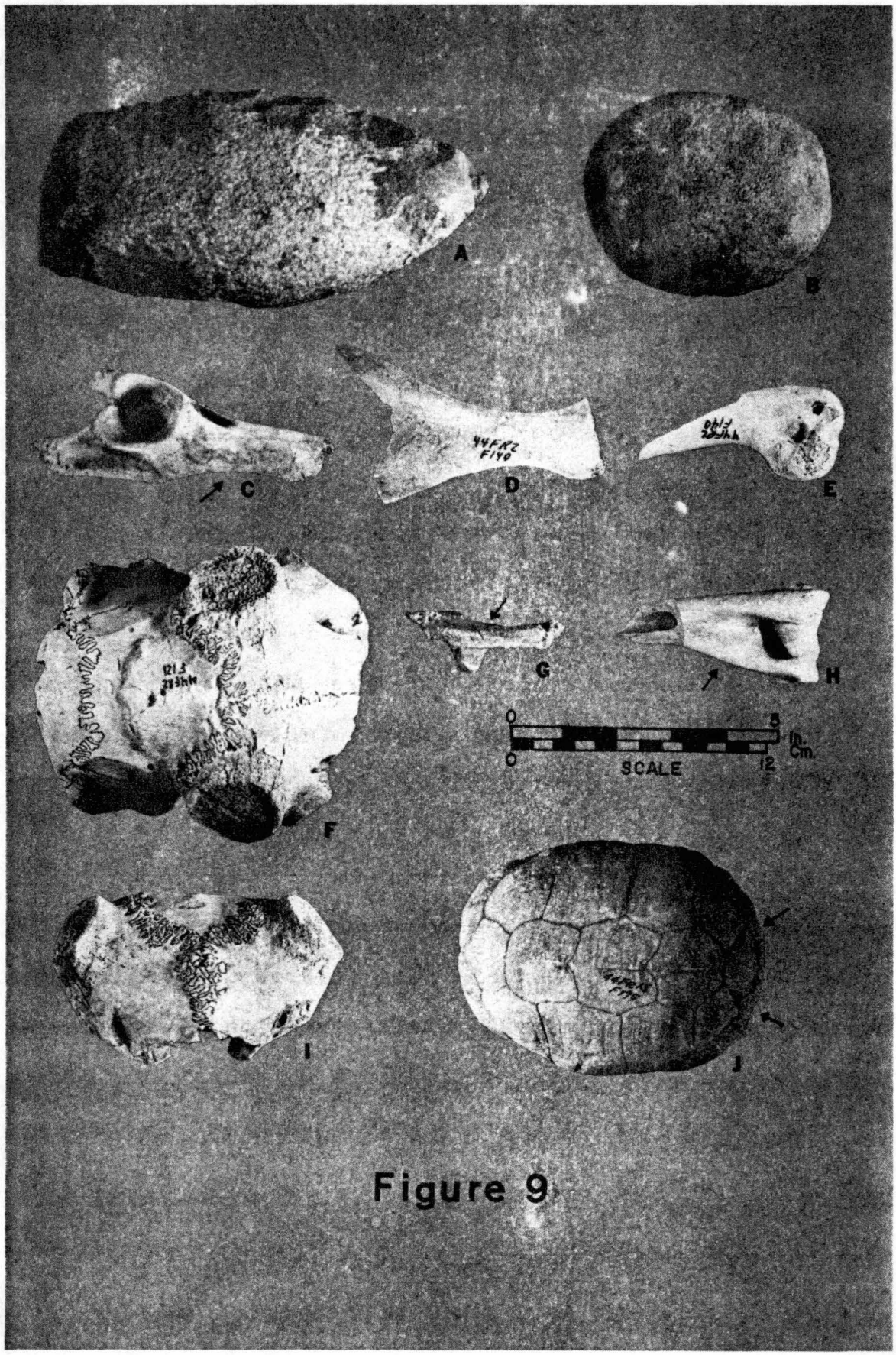

Figure 9

progressively smaller until early historic times when Clarksville points, which average only 14 mm long, were the most common form (Coe 1964: 111-112). Most of the Dan River points from Booth Farm and Hales Ford are at the small end of the range for the type, but are slightly larger than the largest Clarksville points (Table 11).

Two celts and seven hammerstones were also found at the sites. The celts were chipped and pecked from greenstone (Figure 9: A). The hammerstones are evenly abraded sandstone cobbles, with only a few remaining traces of cortex. These tools do not have the battered and pitted faces often seen on hammerstones, which suggests that they may have served multiple functions, perhaps as grinding stones. A metate or shallow mortar is made of an igneous rock slab with a depression ground into one surface.

F. Functional Interpretations

The artifacts from Booth Farm and Hales Ford described in the preceding sections have been given what are essentially functional labels. Terms such as "projectile point" and "awl" are standard in the archaeological lexicon and imply some very general functions for the artifacts. Fowler (1959), Winters (1969), and Ahler and McMillan (1976) have summarized the arguments for many of these functional classifications. The latter have gone one step further and interpreted these artifact classes

as activity indicators. Actually, since many artifacts seem to have been multi-functional, certain attributes are the indicators. For instance, the artifact category "hammerstone" is a generic term for rounded stones, small enough to be held in the hand, with at least one battered surface. These attributes are usually accepted as indicative of hammering or pounding. But other attributes sometimes occur on these artifacts, perhaps small pits or depressions on one or more face, which probably imply a separate activity.

The Hales Ford data were chosen to test the usefulness of this analytic procedure. The goal is to discover any meaningful variations in the material recovered from nine analyzed features. Booth Farm was not selected because there were more features studied (nine completely analyzed features from Hales Ford compared to seven from Booth Farm), more stone and bone artifacts found, and more plant remains recovered from the Hales Ford site. Excavation techniques are directly responsible not only for the material recovered, but also for whatever the sample does not contain. If the excavation procedures were rigorous, then the absence of a non-perishable artifact in the sample is fairly strong evidence for its nonoccurrence in the excavation unit. Unfortunately the Hales Ford field notes, although more complete than for the Booth Farm site, are sketchy and inadequate in many ways. The absence of artifacts from the recovered sample

cannot be interpreted as a necessarily meaningful reflection of the cultural remains in that excavation unit. Therefore, this functional analysis is very conservative in procedure and conclusions. Negative evidence is disregarded unless confirmed by several independent types of positive evidence. The conclusions are limited to the seasonality of the activities indicated by the feature refuse.

Artifacts found in the nine features from Hales Ford are listed in Table 12. The artifacts can be interpreted as indicating the following activities (adapted from Ahler and McMillan 1976: 192-196).

Hunting. The presence of projectile points is accepted as evidence of hunting. Only one of the Hales Ford triangular points has an impact fracture on the tip (Ahler 1971: Plate 45c). The other points could conceivably have also served as hafted cutting tools.

Fishing. Fishhook manufacturing debris is taken as evidence of fishing. In the final analysis, this activity indicator is compared with the presence of fish bones for confirmation.

Hammering/Grinding. The hammerstone from Hales Ford is abraded on all surfaces and so may have served primarily as a mano, though multiple functions are not ruled out. Another activity indicator is a fragmentary metate.

Generalized Cutting. Evidence for generalized

Table 12. Distribution of Artifacts from Nine Features at the Hales Ford Site.

Artifact Classes	Features 25	46	60	67	125	141	142	157	175
Unworked Flakes	16	24	25	19	6	3	21	27	10
Retouched Flakes	2	2	2					1	
Biface Fragments			3	3		1	1		
Small Biface			1						
Dan River Projectile Points	1	1		1			3		2
Celt							1		
Hammerstone						1			
Metate	1								
Ceramic Sherds	254	272	595	167	47	581	365	248	450
Pipes	2	2	4				3	2	1
Spoons			1						
Toy Pots			1		1	1			
Awls	3	2	5	5		3	1		3
Beamer	1	1	1						
Fishhook Manufacturing Refuse			3	1			1		
Antler Flaker			1						
Gouge	2	1							
Pendant		3						1	1
Carapace Rattle			1						1
Scored and Snapped Bone	2	2	4			2	1	1	1
Spatula		3		2					

cutting includes all otherwise unidentifiable biface fragments and the one "small biface."

Heavy-duty Cutting. A celt was probably used for heavy woodworking.

Generalized Scraping. Bone beamers, gouges, and spatulas are taken as indicators of scraping activities. Retouched flakes, most with steep retouch along one edge, are interpreted as sidescrapers.

Perforating. The presence of any sort of bone awl is evidence of some perforating activity, almost certainly including animal hides.

Generalized Flaking. Generalized flaking is inferred from the presence of unworked flakes and an antler tine flaker (used for pressure flaking).

Bone Working. The scored and snapped remnants of bone artifact manufacturing are included as activity indicators. The more specific fishhook manufacturing refuse is not subsumed under this category.

Containment. In addition to fragments of ceramic vessels, other sorts of containers are toy pots and spoons.

Ornamentation. Several kinds of bones and teeth with drilled or punched holes are interpreted as forms of ornamentation.

Ritual. Turtle shell rattles and smoking pipes are considered, mainly on the basis of ethnographic analogies, to be indicators of either personal or communal rituals.

Nut Processing. The presence of hickory, walnut and acorn remains is indicative of cracking and shelling activities. The raw counts of fragments are used in the calculations.

Plant Food Preparation. The occurrence of other plant food remains is evidence for this activity.

The frequencies of these activity indicators are presented in Table 13. Frequencies of elements from the principal faunal resources (discussed in Chapter II) are presented in Table 14. This method of presentation seems preferable to a method (more akin to a functional approach) developed by Elizabeth Wing (1976: 224). She groups the various species found at a site according to their probable economic role (i.e. large game, small game, fur bearers, aquatic species, and incidental species). Since the primary goal of this analysis is to discover seasonal variation, Wing's technique would blur some of the variation by lumping together large numbers of species. For this analysis, McMillan's (1976: 214) approach has been followed.

To aid in interpreting the raw counts of activity indicators and faunal elements, the chi-square statistic was used to measure whether frequencies are significantly higher or lower than would be expected to occur by chance alone. The crucial question is "Are the frequencies of the various activity indicators randomly distributed among the features or are there statistically significant

occurrences of some artifacts?" Still adhering to a cautious course, a chi-square value is deemed significant only when greater than 3.8 (3.84 is a significant chi-square value at the 0.05 confidence level with one degree of freedom).

Tables 15 and 16 present the chi-square values for each faunal group and activity indicator. Significant values are marked with an asterisk. Significantly low values are preceded by a minus sign to readily distinguish them from significantly high values. The most important faunal groups and activity indicators from each feature are summarized in Table 17.

Seasonality for each feature was determined from the presence of certain key species which were predominantly hunted at specific times of year (refer to the discussion on faunal seasonality in Chapter II). These estimates of seasonality are believed to represent the seasons during which most of the refuse accumulated prior to its disposal in the pits. The fact that six of the features contained winter/spring or winter/spring/summer accumulations may mean that pits which had served other purposes during those seasons, perhaps for storage, were filled in with refuse when empty and fresh pits were dug.

The correlation of fish remains with fishhook manufacturing refuse is confirmatory evidence that the latter is a valid indicator of fishing activity, and not simply of bone working. Likewise, the association of turkey

Table 13. Activity Frequencies at Hales Ford : Raw Counts.

Feature	Hunting	Fishing	Hammering/ Grinding	Generalized Cutting	Heavy-duty Cutting	Generalized Scraping	Perforating	Generalized Flaking	Bone Working	Containment	Ornament	Ritual	Nut Processing	Plant Food Preparation	Total
25	1	0	1	0	0	5	3	16	2	254	0	2	0	0	284
46	1	0	0	0	0	7	2	24	2	272	3	2	0	0	313
60	0	3	0	4	0	3	5	26	4	597	0	5	1	0	648
67	1	1	0	3	0	2	5	19	0	167	0	0	0	0	198
125	0	0	0	0	0	0	0	6	0	48	0	0	78	0	132
141	0	0	1	1	0	0	3	3	2	582	0	0	85	24	701
142	3	1	0	1	1	0	1	21	1	365	0	3	27	0	424
157	0	0	0	0	0	1	0	27	1	248	1	2	454	0	734
175	2	0	0	0	0	0	3	10	1	450	1	2	490	1	960
Total	8	5	2	9	1	18	22	152	13	2983	5	16	1135	25	4394

Table 14. Principal Faunal Resources at Hales Ford : Element Counts.

Feature	Fish	Aquatic Turtle	Terrestrial Turtle	Snake	Duck	Turkey	Cottontail	Groundhog	Squirrel	Beaver/ Muskrat	Raccoon	Carnivore	Deer	Total
25	0	26	39	0	0	1	0	1	1	0	0	0	34	102
46	3	21	111	0	0	3	1	0	14	0	0	0	30	183
60	24	43	69	0	0	4	4	0	2	0	2	1	27	176
67	15	20	17	0	2	0	0	1	0	1	1	0	7	64
141	1	0	24	1	0	2	1	0	1	0	0	0	5	35
142	6	71	49	2	0	3	0	0	1	1	2	0	16	151
157	0	28	0	0	0	0	0	0	0	0	0	1	3	32
175	4	17	17	0	0	8	1	0	0	1	1	1	16	66
Total	53	226	326	3	2	21	7	2	19	3	6	3	138	809

Table 15. Principal Faunal Resources at Hales Ford : Chi-square Values.

Feature	Fish	Aquatic Turtle	Terrestrial Turtle	Snake	Duck	Turkey	Cottontail	Groundhog	Squirrel	Beaver/ Muskrat	Raccoon	Carnivore	Deer
25	-6.7*	-0.2	-0.1	-0.4	-0.2	-1.0	-0.9	2.2	-0.8	-0.4	-0.8	-0.4	15.8*
46	-6.7*	-17.8*	18.8*	-0.7	-0.4	-0.6	-0.2	-0.4	21.9*	-0.7	-1.4	-0.7	0.0
60	13.5*	-0.8	0.0	-0.6	-0.4	-0.1	4.0*	-0.4	-1.1	-0.6	0.4	-0.2	-0.3
67	27.9*	-0.2	3.0	-0.2	21.2*	-1.7	-0.6	4.4*	-1.5	2.4	0.6	-0.2	-1.4
141	-0.7	-9.8*	7.0*	5.8*	-0.1	1.3	1.6	-0.1	0.0	-0.1	-0.3	-0.1	-0.2
142	-1.5	19.7*	-2.3	3.7	-0.4	-0.2	-1.3	-0.4	-0.7	0.3	0.7	-0.6	-3.7
157	-2.1	40.6*	-12.9*	-0.1	-0.1	-0.8	-0.3	-0.1	-0.8	-0.1	-0.2	6.4*	-1.1
175	0.0	-0.1	-3.5	-0.2	-0.2	23.1*	0.3	-0.2	-1.6	2.4	0.5	2.4	2.0

*Significant chi-square values (greater than 3.8).

Table 16. Activity Frequencies at Hales Ford : Chi-square Values.

Feature	Hunting	Fishing	Hammering/ Grinding	Generalized Cutting	Heavy-duty Cutting	Generalized Scraping	Perforating	Generalized Flaking	Bone Working	Containment	Ornament	Ritual	Nut Processing	Plant Food Preparation
25	0.4	-0.3	5.8*	-0.6	-0.1	12.7*	1.8	3.9*	1.6	19.4*	-0.3	0.9	-73.4*	-1.6
46	0.3	-0.4	-0.1	-0.6	-0.1	25.6*	0.1	16.0*	1.2	16.7*	19.4*	0.6	-80.8*	-1.8
60	-1.2	6.9*	-0.3	5.4*	-0.2	0.0	1.0	0.6	2.2	56.1*	-0.7	3.0	-165.4*	-3.7
67	1.1	2.8	-0.1	16.9*	0.0	1.8	16.2*	21.6*	-0.6	7.9*	-0.2	-0.7	-51.1*	-1.1
125	-0.2	-0.2	-0.1	-0.3	0.0	-0.1	-0.7	0.4	-0.4	-19.3*	-0.2	-0.5	57.0*	-0.8
141	-1.3	-0.8	1.4	-0.1	-0.2	-2.9	0.1	-18.6*	0.0	23.7*	-0.8	-2.6	-51.0*	100.4*
142	6.5*	0.6	-0.2	0.0	8.1*	-1.7	-0.6	2.7	0.0	20.7*	-0.5	1.4	-62.2*	-2.4
157	-1.3	-0.8	-0.3	-1.5	-0.2	-1.3	-3.7	0.1	-0.6	-125.7*	0.0	-0.2	368.7*	-4.2*
175	0.0	-1.1	-0.4	-2.0	-0.2	-3.9*	-0.7	-16.2*	-1.2	-62.4*	0.0	-0.6	236.2*	-3.6*

*Significant chi-square values (greater than 3.8).

Table 17. Summary of Significant Activities and Faunal Classes by Feature.

Feature	Season-ality	Significant Positive Values*		Significant Negative Values*	
		Activities	Fauna	Activities	Fauna
25	W/Sp	hammering/grinding generalized scraping generalized flaking containment	deer	nut processing	fish
46	W/Sp	generalized scraping generalized flaking containment ornamentation	terrestrial turtle squirrel	nut processing	fish aquatic turtle
142	W/Sp	hunting heavy-duty cutting containment	aquatic turtle	nut processing	
60	W/Sp/Su	fishing generalized cutting containment	fish cottontail	nut processing	
67	W/Sp/Su	perforating generalized cutting generalized flaking containment	fish duck groundhog	nut processing	
141	Sp/Su	containment plant food preparation	terrestrial turtle	nut processing generalized flaking	aquatic turtle
157	Sp/F	nut processing	carnivore aquatic turtle	containment plant food preparation	terrestrial turtle
125	F	nut processing		containment	
175	F/W	nut processing	turkey	generalized scraping generalized flaking containment	

*Based on chi-square values greater than 3.8.

remains with nut fragments is good evidence that turkeys were indeed hunted in the fall and winter, as is often assumed but very seldom demonstrated.

Keeping in mind the limitations of the data, this sort of functional analysis can be useful in discovering general trends in the distribution of cultural material within a site. At Hales Ford the seasonal subsistence round emphasized deer hunting and food storage in the winter, small game capture in the spring, fishing and wild and domestic plant food harvesting throughout the summer, and nut gathering and turkey hunting during the fall and early winter.

G. Other Related Sites

Bones and plant remains from three other sites were analyzed and are presented for comparison with the Booth Farm and Hales Ford material. Two of the sites, the Koehler and Belmont sites, are Dan River sites. The third, the Clarksville site, is a component of the closely related Clarksville culture.

The Koehler site (44Hr6) is located southwest of Martinsville, Virginia, on the west bank of Smith River. The site is predominantly a prehistoric Dan River village, but with evidence of a historic component (Clark 1976: 2; Coleman 1976a). The Belmont site (44Hr3) has been briefly described by Gravely (1967: 16-17) as a large, probably palisaded, prehistoric village of the Dan River culture.

The site is situated on a second bottomland terrace on the east bank of the Smith River, just south of Martinsville, Virginia.

The Clarksville site (44Mc14) was located on the north bank of the Roanoke River across from the downstream end of Occaneechi Island, before the inundation of that area by the Buggs Island Reservoir (Kerr Lake). This five acre site was a historic village of the Occaneechi tribe dating to about 1675 (Griffin 1945: 323; J.L. Coe, personal communication; cf. Miller 1962: 230).

Chapter II
Exploitation of the Natural Environment

A. Local Vegetation

The present-day vegetation near Smith Mountain is Oak-Pine forests with white oak, short-leaf pine, and Virginia pine. However, here as elsewhere in the Southeast, an understory of mixed hardwoods is appearing in the pine forests, indicating that this forest type is not the climax vegetation in the area. Rather, pines have become dominant due to past fire, agricultural, and lumbering disturbances which have lessened in recent years (Waggoner 1975: 24). Braun (1950: 259) has suggested that the Oak-Pine forest is an artificially maintained occupant of the Eastern Oak-Hickory region. A few relicts of this original forest community still exist at the Randolph-Macon Nature Reserve in Campbell County, and at Sweet Briar College in Amherst County (Radford and Martin 1975: 206-209).

In order to discover the nature of the Smith Mountain area's vegetation in late prehistoric-early historic times, one may turn to the notes and records made by surveyors (Virginia Land Office Records). A sample of fifty land patents and grants were selected,

twenty-four patents registered in Bedford County from 1756 to 1764 and twenty-six grants registered in Franklin County (organized from Bedford) between 1786 and 1796. Each of these documents records the location and species of witness trees which had been blazed with an axe to mark the limits of an individual tract. The patents and grants were for lands along the Roanoke and Blackwater rivers, Gill Creek, and Bull Run within the area shown on Figure 2. Twenty-nine common names of trees mentioned in the patents and grants are listed in Table 18.

The witness trees can be grouped into at least two different communities. In the narrow bottomlands of the rivers and major creeks was a forest consisting mainly of white oak, chestnut, poplar, maple, and gum. This contrasts sharply with the composition of the upland forest between the streams with a preponderance of white, red, and other oaks, as well as chestnut and hickory. In both situations, pines were minor constituents of the communities.

When the early and late records are compared, only four species differ greatly in frequency of occurrence. In the later grants, the percentage of hickory decreased, while chestnut, chestnut oak, and post oak increased significantly. These changes seem to be due to the addition of a parcel of uplands along Blackwater River which had not been surveyed previously. There is no reason to think that vegetation communities were unstable

Table 18. Eighteenth Century Forest Compositions in the Smith Mountain Area.

Species	Valley Bottom Forest		Upland Forest	
	No.	%	No.	%
White Oak	9	18.7	176	33.5
(Northern) Red Oak	1	2.1	95	18.1
Chestnut	7	14.6	39	7.4
Post Oak			36	7.0
Hickory	2	4.2	34	6.5
Spanish (Southern Red) Oak	2	4.2	32	6.1
Chestnut Oak	2	4.2	31	5.9
Pine	2	4.2	9	1.7
Black Oak	1	2.1	9	1.7
Poplar	5	10.4	8	1.5
Maple	4	8.3	7	1.3
Black Gum			7	1.3
Ash	2	4.2	6	1.1
Dogwood	2	4.2	6	1.1
Locust	1	2.1	5	0.9
Black Jack Oak			5	0.9
Sorrelwood (Sourwood)			5	0.9
Gum	3	6.2	4	0.8
Black Walnut	1	2.1	3	0.6
Beech	1	2.1	2	0.4
Linn (Basswood)	1	2.1		
Cucumber Tree			1	0.2
Mulberry			1	0.2
Papaw			1	0.2
Water Currant			1	0.2
Water Oak			1	0.2
White Hickory			1	0.2
White Pine	1	2.1		
White Walnut (Butternut)	1	2.1		
Totals	48	100.0	525	100.0

or had changed noticeably in the interim. Another interesting aspect of these data is the presence of young trees. Small or "shrub" white oaks (19), red oaks (9), post oaks (8), hickories (3), gum (1), and maple (1) are mentioned in the patents and grants, indicating that the forest was not mature, and had possibly been subject to some disturbance. A road, with two pines growing along side, is mentioned in a grant dated March 11, 1795, but neither roads nor agriculture can account for the presence of numerous small trees in the 1756-1764 forests. Fires, either those started by humans or lightning-caused, possibly were responsible for the second growth.

Smith Mountain lies on the interface between the Piedmont and Blue Ridge physiographic provinces (Butler et al. 1975). This large-scale ecotonal position of the Booth Farm and Hales Ford sites has certain implications for the sorts of plant communities found in the area. The two Smith Mountain area forest types are approximately equivalent to varieties of the Piedmont Upland Forest (Waggoner 1975: 25; Oosting 1942). However, due to their proximity to the Blue Ridge physiographic province, there are certain similarities to mountain communities. This can be demonstrated by reference to an eighteenth century survey along the Fairfax Line across the northern Shenandoah Valley (Strahler 1972). Using information from a modern survey as well as the original one, Strahler (1972: 668) defined a Transition Hardwood Forest,

characterized by such species as beech and basswood, which is very similar to the Smith Mountain bottomland forest. On the Fairfax Line this forest is transitional to the northern hardwood forest, whereas the bottomland forest along the Roanoke River is a response to the nearby Blue Ridge with its northern vegetation and to the cooler microclimates of the narrow valley.

The eighteenth century survey information is certainly a more reliable indicator of the late prehistoric forest than is the present-day vegetation. This discussion sets the stage for a detailed analysis of Dan River exploitative practices, particularly hunting techniques. Unfortunately, very few plant remains were saved during the excavations at Booth Farm and Hales Ford, so this segment of the subsistence base will be treated only briefly.

B. Plant Remains

The Clarksville site (44Mc14) collections, first analyzed by Miller in 1962, were reexamined and the plant remains which could be located are included with the Smith Mountain material in Table 19. In addition to the hickory nuts, walnuts, acorns, and corn kernels found in the collections, Miller (1962: 218) wrote that common beans and some wild grass seeds were recovered from the Clarksville site. The single measurable corn kernel (W - 7.7 mm, D - 5.6, T - 4.5) is identifiable as

Table 19. Plant Remains from Three Late Woodland Sites on the Roanoke River.

Species	Clarksville 44Mc14	Booth Farm 44Fr2	Hales Ford 44Fr15	
	No.	No.	No.	Wt.(g)
Wood Charcoal				
Unidentified	22		15	
Chestnut, *Castanea* sp.		1	3	
Poplar, *Populus* sp.			1	
Hickory, *Carya* sp.		6	13	
Red and Black Oak, Erythrobalanus	1	1	7	
Wild Plant Foods				
Hickory, *Carya* sp. nutshell fragments	82		1048	116.5
Oak, *Quercus velutina* (?) acorn cotyledon fragments	15		77	17.5
Persimmon, *Diospyros virginiana* seed fragment			1	0.5
Sedge, *Cyperus* sp. tuberous rhizomes			22	4.1
Walnut, *Juglans nigra* nutshell fragment	1		10	1.9
Domesticated Plant Foods				
Bean, *Phaseolus vulgaris* cotyledon			1	1.3
Corn, *Zea mays* kernel fragments	11			
cob fragment			1	-

Eastern Complex corn, judging from the crescentic shape and the high width/depth ratio (Jones 1948; Galinat 1970: 220). Likewise, the corncob from Hales Ford is eight-rowed and the cupule width/internode length ratios are greater than 1.0, both diagnostic traits of Eastern Complex corn. While corn has frequently been reported from late prehistoric and early historic sites in Virginia (e.g., Benthall 1969: 143; Holland 1970: 29), very seldom have measurements accompanied the descriptions. One protohistoric site in southeast Virginia, the Hand site (44Sn22), had corn cobs with a mean row number of 8.9 (Cutler and Blake 1973: 71). The earliest corn (of unspecified type) discovered in Virginia is from the Clark site on the South Mayo River, which dates A.D. 1015 $\pm$ 55 (Clark 1976: 2). Eight- or ten-rowed Eastern Complex corn has been reported from the late prehistoric Warren Wilson site in western North Carolina (Yarnell 1976b: 223).

One bean cotyledon was found at the Hales Ford site. Beans seem to have been adopted quite late in the east (Yarnell 1976a: 252). They have also been reported from one other site in southwest Virginia, the Shannon site (Benthall 1969: 143), but are identified as Prosopis sp. (mesquite). This seems an unlikely possibility at best.

The remaining plant food remains found at Hales Ford are typical of most eastern Late Woodland sites, except for sedge. The underground rhizomes of sedges (the

species is probably Cyperus filiculmis) or any other plant are very seldom preserved in archaeological sites. Only three other examples of this sort of underground plant part have been found east of the Appalachians; specifically, Jack-in-the-pulpit (Arisaema triphyllum) corms from a Late Woodland site in the Upper Delaware Valley (Moeller 1975: 54), tuckahoe (Poria cocos) tubers from coastal North Carolina (Haag 1958: 102, Figure 15), and groundnut (Apios americana) tubers from a Lamar site in Georgia (Cutler and Blake 1973: 15). Undoubtedly such plants were utilized more than their frequency of recovery would otherwise indicate. Sedges are presently found in moist open areas, particularly disturbed locations (Seaman 1969: 9, 16). The valley bottom site of Hales Ford village is just such a place. The large number of rhizomes found is fairly strong evidence that this part of the plant was used for food and that its presence is not just fortuitous.

Four types of wood charcoal were identified as chestnut, poplar, hickory, and red or black oak. This analysis, with pine conspicuously absent, agrees well with the early historic survey data, and tends to confirm Braun's hypothesis that the present-day Oak-Pine forest is subclimax to an Oak-Hickory forest, such as was present prehistorically (Braun 1950: 259).

The relative importance of the various plant food species is difficult to assess for the Hales Ford sample

since no rigorous recovery method was used to collect charcoal from the site. Late summer and fall were the times when the domesticated species were harvested and the wild nuts, fruits, and rhizomes were gathered.

C. Local Fauna

There are many publications detailing the varied fauna of southeastern North America (e.g., Fowler 1945; Handley 1971; Hubbard 1971; Jenkins *et al*. 1971). Besides the animals which still populate the region, there are several species which have been exterminated or locally extirpated in historic times, or have been recently introduced. Elk and bison (Byrd 1967: 289; Clayton 1963: 35; Dunbar 1964; Rostlund 1960) were seen in the Piedmont by the first settlers, but no longer inhabit the area. Black bears are now rarely encountered east of the Appalachians and wolves scarcely ever, though they once were commonly found throughout the Piedmont. Huge flocks of passenger pigeons were often seen (Byrd 1967: 216) although they have since been exterminated. Red fox are now present in the region, due to modern changes in land use which have allowed them to reoccupy an area abandoned at the end of the Pleistocene (Guilday 1971b: 247). Carp were introduced in the mid-nineteenth century and so are not present in prehistoric archaeological contexts (cf. Holland 1970: 4; West 1971: 41).

D. Animal Remains

The bones, teeth, antler, and other non-perishable animal remains from five archaeological sites (Figure 1) within the Upper Roanoke River drainage were identified and analyzed for this study (Table 20). Four of the sites were prehistoric Dan River villages, while the fifth, the Clarksville site, is the location of a historic Occaneechi village dating to about 1675. Two of the Dan River complex sites, Booth Farm and Hales Ford, have been previously discussed at some length. The major occupation at the Belmont site was prehistoric Dan River. Likewise, the Koehler site is predominantly prehistoric, but with evidence of a historic component. Faunal remains from the presumably historic feature (Feature 122) are omitted from this study.

All of the animal species identified could have lived in the biotic communities in the immediate vicinities of the sites. All of the fish genera and species now occur in the Roanoke River and its major tributaries. However, two of the species, channel catfish and yellow perch, have recently been described, respectively, as "probably or possibly introduced" and "regarded as native but possibly introduced" into this river system (Jenkins et al. 1971: 51, 55). Both of these species identifications are definite, the first based on a pectoral spine (see Paloumpis 1963) and the second on numerous elements from

Table 20. Animal Remains from Five Archaeological Sites

Species	Booth Farm 44Fr2		Hales Ford 44Fr15		Belmont 44Hr3		Koehler 44Hr6		Clarksville 44Mc14	
	Frag.	MNI	Frag.	MNI	Frag.	MNI	Frag.	MNI	Frag.	MNI
Unidentified Fish	94	-	20	-	14	-	747	-	31	-
Lepisosteus osseus, Longnose Gar	1	1	1	1			18	4	6	3
Cyprinidae, Minnow							2	2		
Hybopsis sp., Chub	6	2	17	9			165	6	2	2
Catostomidae, Sucker	14	5					74	3	10	3
Moxostoma anisurum, Silver Redhorse					3	1				
Ictalurus sp., Catfish	3	1	2	1	11	2	57	14	12	2
Ictalurus punctatus, Channel Catfish	1	1								
Ictalurus nebulosus, Brown Bullhead							3	3		
Perca flavescens, Yellow Perch	43	6	23	6	5	2	99	36	2	1
Micropterus salmoides, Largemouth Bass							8	5		
Unidentified Amphibian							34	-		
Scaphiopus holbrooki, Spadefoot Toad							30	7		
Bufo americanus, American Toad	1	1			1	1				
Rana catesbeiana, Bullfrog	4	1			2	1			2	1
Rana pipiens, Leopard Frog							9	4	7	1

Table 20. (cont.)

Species	Booth Farm 44Fr2		Hales Ford 44Fr15		Belmont 44Hr3		Koehler 44Hr6		Clarksville 44Mc14	
	Frag.	MNI	Frag.	MNI	Frag.	MNI	Frag.	MNI	Frag.	MNI
Unidentified Turtle	37	-	17	-			220	-	3	-
Chelydra serpentina, Snapping Turtle	3	1	33	1	6	1				
Sternothaerus odoratus, Stinkpot			74	3						
Kinosternum subrubrum, Mud Turtle									3	2
Terrapene carolina, Box Turtle	196	30	385	33	539	16	223	22	173	13
Chrysemys picta, Painted Turtle	98	7	91	10	180	5				
Pseudemys concinna, River Cooter	174	14	159	8	6	1	162	13	126	5
Trionyx spinifer, Spiny Softshell			3	1					9	2
Squamata, Lizard									62	1
Sceloporus undulatus, Fence Lizard							1	1		
Serpentia, Snake			1	-			42	-		
Natrix sp., Water Snake							11	3		
Coluber constrictor, Black Racer			1	1			50	7		
Elaphe guttata, Corn Snake							10	3		
Crotalinae, Pit Viper	78	1	1	1						
Unidentified Bird	175	-	167	-	245	-	75	-	135	-
Olor columbianus, Whistling Swan					4	2				
Branta canadensis, Canada Goose	1	1			1	1				
Chen hyperborea, Snow Goose							2	1	2	2

Table 20. (cont.)

Species	Booth Farm 44Fr2		Hales Ford 44Fr15		Belmont 44Hr3		Koehler 44Hr6		Clarksville 44Mc14	
	Frag.	MNI	Frag.	MNI	Frag.	MNI	Frag.	MNI	Frag.	MNI
Anas sp., Mallard, Pintail, Black Duck			2	1					2	2
Anas discors, Blue-winged Teal									3	1
Buteo sp., Hawk					1	1				
Colinus virginianus, Bobwhite			1	1	2	1			7	2
Meleagris gallopavo, Wild Turkey	63	13	25	8	198	12	14	5	94	6
Ectopistes migratorius, Passenger Pigeon	26	8			34	7	27	7	25	7
Corvus brachyrhynchos, Common Crow			1	1	2	1	1	1	8	2
Turdidae, Thrush							1	1		
Unidentified Mammal	970	-	1002	-	3017	-	5303	-	251	-
Didelphis marsupialis, Opossum					2	2			13	3
Sylvilagus floridanus, Cottontail	12	6	7	4	22	3			68	8
Marmota monax, Woodchuck	2	2	4	4	3	1	3	2	7	2
Sciurus carolinensis, Gray Squirrel	3	3	6	4	7	2	6	4	45	11
Sciurus niger, Fox Squirrel	2	2	13	4	32	4	15	5	61	9
Castor canadensis, Beaver	13	3	1	1	18	3	1	1	10	4
Neotoma floridana, Woodrat	3	2			1	1	2	2		
Peromyscus sp., White-footed Mouse							4	2		
Microtus pennsylvanicus, Meadow Vole							9	3		

Table 20. (cont.)

Species	Booth Farm 44Fr2		Hales Ford 44Fr15		Belmont 44Hr3		Koehler 44Hr6		Clarksville 44Mc14	
	Frag.	MNI	Frag.	MNI	Frag.	MNI	Frag.	MNI	Frag.	MNI
Ondatra zibethicus, Muskrat	4	4	2	2	2	1	1	1	54	13
Canis familiaris, Domestic Dog			2	2	12	2			57	3
Urocyon cinereoargenteus, Gray Fox	2	2			6	1	2	2	13	2
Ursus americanus, Black Bear					5	1			2	1
Procyon lotor, Raccoon	14	10	12	8	11	3	13	7	21	4
Spilogale putorius, Spotted Skunk	2	2					3	2	1	1
Mephitis mephitis, Striped Skunk					4	2			1	1
Lynx rufus, Bobcat	1	1	2	2					4	1
Odocoileus virginianus, White-tailed Deer	321	25	199	20	1077	30	140	13	129	13
Cervus canadensis, Elk					1	1				
Subtotals Fish	162	16	63	17	33	5	1173	73	63	11
Amphibian	5	2			3	2	73	11	9	2
Reptile	586	53	765	58	731	23	719	49	376	23
Bird	265	22	196	11	487	25	120	15	276	22
Mammal	1349	62	1250	51	4220	57	5502	44	737	76
Grand Total	2367	155	2274	137	5474	112	7587	192	1461	134
Total Identified Beyond Class Level	1091	46%	1068	47%	2198	40%	1428	19%	1044	71%

all of the sites.

All of the turtle species, except box turtles, prefer slow-moving or shallow water habitats, such as ponds or river and stream backwaters. Even box turtles frequent wet places in the summer (Wood and Goodwin 1958: 60). Before Smith Mountain Reservoir permanently inundated the bottomlands, the river used to flood almost every year creating many small ponds. The archaeological sites were located on "islands", high spots in the terrain which normally escaped flooding. Box turtles are found throughout the forested area. This species is as ubiquitous as deer on southwest Virginia sites (e.g., Holland 1970: Table 3). The Clarksville site is approximately at the westernmost limits of the range for mud turtle, which explains its nonoccurrence at any of the Dan River sites.

Quail, turkeys, crows and hawks are permanent residents of the Piedmont, the first two mainly in oak forests. Geese winter in the area, but most have flown north by March 1. Teals, snow geese, and whistling swans spend the winter farther east or south, and migrate through the area during fall and early spring. The transient species would have been restricted to rivers and ponds in prehistoric times.

The mammals can be divided into two groups according to habitat preferences. One includes those animals which live in woodlands and along forested streams (i.e., opossum, gray squirrel, beaver, woodrat, muskrat, bear,

raccoon, and bobcat). Woodrats and bobcats often frequent rocky cliffs and outcrops, which are not uncommon in the western Piedmont. The remaining species (i.e., cottontail, woodchuck, fox squirrel, white-footed mouse, meadow vole, gray fox, skunks, deer and elk) occupy semi-open or brushy woods and forest-meadow ecotones. Short-faced dog is the only domesticated species. Fifty of the dog bones from the Clarksville site are from a dog burial.

In addition to these animal remains, several other species are represented from these sites. Riverine mussel shells (Elliptio complanata) and periwinkles (Mudalia carinata variabilis, M. c. procissa, and Oxytrema symmetrica) occur in profusion. However, only from the Koehler site were these shells consistently collected. A few unidentified terrestrial gastropods were also found at all sites. Sixteen crayfish clay fragments were recovered by waterscreening the contents of five features at the Koehler site.

Finally, eight fired mud-dauber nests (Sceliphronini) were found in Feature 46 at the Hales Ford site. Wasp nests have been reported from three other Late Woodland sites in Virginia and North Carolina (Coleman 1976b: 70; South 1959: 208; Stewart 1941). The presence of wasp nests is usually accepted as evidence of standing structures between May and October (Wedel 1961: 74). According to this interpretation, nests were removed and deposited in refuse pits to discourage further nesting.

> In addition, no known human group is reported to have eaten wasp larvae when available to them. Thus, we do not believe that the larvae were eaten by prehistoric people. We do not know if the larvae are edible or even tasty (Freimuth and LaBerge 1976: 113).

Of course it is always risky to assume that what is seemingly unpalatable to us has always been held to be so. Immature insect cuticle has been found among the intestinal contents of the Salts Cave mummy (Yarnell 1974: 109). Even more pertinent to the Hales Ford case is "An Account of the Indians of North Carolina" written by John Lawson in 1709. " . . . young Wasps, when they are white in the Combs, before they can fly, this is esteemed a Dainty" (Lefler 1967: 182). All of the Hales Ford nest cells are broken open, which one would expect if the contents were eaten. At the very least, this possibility should not be discounted.

E. Incomplete Recovery and Sample Bias

All practical excavation methods result in only partial recovery of the cultural material in the soil. One question the archaeologist must ask is whether the excavated sample adequately represents what the soil held. The partial recovery of bones can affect their interpretation in a number of ways. Most obvious is the loss of small bones which occurs when neither screening nor flotation are used. Riverine fish remains are particularly misrepresented when samples are not collected by flotation, because of the small general size of fish

skeletal elements (Limp 1974: 341; Casteel 1976: 195).

The five site samples included in this study were collected following four different excavation procedures. The Clarksville bones were gathered during shovelling and trowelling and were not assigned any specific provenience aside from the site designation. The high percentage of identifiable bones from this site (Table 20), in comparison with the other four sites, is a good indication that only a select portion of the observed bones (probably those thought to be identifiable) were actually saved. The Belmont site, like the Clarksville site, was excavated as a single unit but a ¼ inch mesh screen was used to collect the bones. Bones from the Booth Farm and Hales Ford sites were gathered in a like fashion, during trowelling and screening, but in these cases the material was kept separate by feature. Finally, the Koehler site, most recently dug of the five sites, was shovelled, trowelled, and the feature contents were water-screened. Samples of the feature contents were washed through 1.5 mm window screen.

Excavation procedures determine how the minimum number of individuals of each species can be calculated. This figure is the basis for comparing the relative importance of different species in the diet and is far more reliable for this purpose than a simple bone count. Donald Grayson (1973: 438) has described three not necessarily comparable methods of estimating minimum

number of individuals. The "Minimum Distinction Approach" ignores cultural units, smaller than the site such as was done at Clarksville and Belmont. According to this method, the frequency of the most commonly occurring element of a species establishes the minimum number of individuals for the entire sample. For instance, at least thirty white-tailed deer were killed, butchered, and disposed of within the excavated area of the Belmont site, judging from the thirty left deer astragali found there. The "Maximum Distinction Approach", not applicable to any of the sites discussed here, uses separate arbitrary excavation units as a basis of analysis. Obviously, both approaches are undesirable since they blur the culturally meaningful divisions still existing within a site. For the Booth Farm, Hales Ford, and Koehler bone samples, minimum numbers of individuals are calculated for individual features, most of which were large refuse pits containing large numbers of bones, as well as other artifactual remains.

Small species are notably underrepresented from all sites but Koehler. At this site, where samples of the pit contents were watersifted through 1.5 mm window screen, ten species or taxonomic families were recovered which had not been found at the other four sites (Table 20). Since these ten newly identified animals (i.e. minnows, brown bullhead, largemouth bass, spadefoot toad, fence lizard, water snake, corn snake, thrush, white-footed

mouse, meadow vole) are all relatively small, their presence at only one site is evidently a result of the better excavation techniques used there. At the other sites, small bones either were considered unimportant or went unnoticed. In any case, the result was to ignore significant archaeological evidence.

The large numbers of very small fish bones from the Koehler site are enlightening regarding the sort of fishing done at Dan River sites. Fishhooks are found at most Dan River sites, along with bones of medium and large fish (ten cm or longer). Hook and line fishing will catch some small fish, but 80% of the fish from Koehler were probably less than ten cm long. The numerous smaller individuals found at Koehler indicate that a mass capture method was also used. Nets, so commonly used to treat the surfaces of their ceramic vessels, certainly could have been used for fishing by the Dan River people.

Excavation methods are only one potential cause of sample bias. It perhaps seems obvious that dense bones are more likely to be recovered than thin-walled or cancellous bones, but ignoring this fact has occasionally led to some unwarranted conclusions. Raymond Dart, in his analysis of animal bones associated with Australopithecus africanus remains at Makapansgat, concluded that the disproportionate abundance of certain limb bones was due to their intentional selection for use as tools by the hominids (Dart 1957). C.K. Brain has

recently demonstrated that the Makapansgat sample closely resembles bone accumulations from Hottentot villages (Brain 1976). In this case, the Hottentot goat bones were not selected, but were differentially preserved, the most resistant skeletal elements being the most numerous. Brain discovered that in both samples, mandibles and distal ends of humeri were quite common, while such elements as caudal vertebrae and proximal humeri had disappeared almost entirely.

The goat and bovid bones used in Brain's study are not strictly comparable to deer bones found in North America. There is one ethnographic report on moose bones preservation (Bonnichsen 1973), but I know of none for deer or caribou. In fact, comparative zoo-archaeological data are still rarely published. Table 21 includes the percentages of deer bone fragments reported from the Buffalo site (Guilday 1971a: 24), an early historic Fort Ancient village in West Virginia, and the Apple Creek site (Parmalee et al. 1972: 49), a Middle and Late Woodland village in the Illinois River valley. The two largest Dan River deer bone samples, from the Booth Farm and Belmont sites, were chosen for comparison. The general trends in survival of deer bones from the Buffalo, Apple Creek and Belmont sites are consistent overall. The lower percentages from Booth Farm probably result from small sample size and the method used to calculate minimum number of individuals. For the other

Table 21. Percentage Survival of Different Deer Skeletal Elements.

Element	Expected Frequency/ Ind.	Buffalo* (746 Ind.)	Apple Creek+ (103 Ind.)	Belmont (30 Ind.)	Booth Farm (25 Ind.)
Humerus, distal	2	99%	73%	60%	12%
Astragalus	2	93	86	98	14
Calcaneum	2	80	90	83	20
Radius, proximal	2	81	46	70	28
Tibia, distal	2	74	82	45	16
Mandible, half	2	67	36	48	18
Scapula	2	62	57	32	10
Metacarpal, proximal	2	62	24	43	22
Ulna	2	47	66	42	20
Metatarsal, proximal	2	62	41	40	16
Innominate	2	41	24	53	22
Metapodial, distal	4	36	15	38	15
Tibia, proximal	2	32	24	22	10
Radius, distal	2	30	24	27	12
Proximal Phalanx	8	30		22	9
Femur, distal	2	22	22	30	8
Lumbar Vertebrae	6	22		31	3
Atlas	1	21	12	7	24
Axis	1	18	18	10	8
Femur, proximal	2	17	22	18	
Occipital	1	17	9	20	16
Humerus, proximal	2	12	7	7	2
Cervical 3-7 Vertebrae	5	12		7	10
Second Phalanx	8	9		21	9
Sacrum	1	9		7	4
Thoracic Vertebrae	13	4		6	2
Distal Phalanx	8	3			6
Maxilla	2		97	13	14
Tibia Tarsal	2		29	35	14
Frontal	2		19	5	12
Hyoid, half	2		3	3	2
Patella	2			12	4
Ribs	26			5	2

*Guilday 1971: 24

+Parmalee, Paloumpis, and Wilson 1972: 49

three sites, this statistic was estimated with entire site assemblage as an analytical unit, while it was calculated separately for each feature at the Booth Farm site. The relatively uniform percentages from the Booth Farm features perhaps suggest that bones discarded in refuse pits are less likely to have been affected by differential destruction than those found in the midden. For instance, although proximal humeri are still less frequently found than distal humeri, the apparent discrepancy is smaller for pit samples than undifferentiated midden collections.

Another instance of differential preservation occurs between elements from males and females. The standard method of estimating the sex ratio of prehistoric deer kills has been to compare frontal bones. Male frontals either bear antlers, antler pedicles or are simply much thicker and denser than their female counterparts. Females are rarely antlered (1:18,000 according to Rue 1967: 238). Since the sex ratio of deer _in utero_ is 117.2 males to 100 females (Severinghaus and Cheatum 1956: 66), one would expect that an unbiased hunting technique would result in an equal number of male and female deer being killed. However, the kill ratio at the southwestern Virginia sites was highly biased toward male deer, according to the frontal bone criteria. Similar findings from archaeological sites throughout the east have led faunal analysts to question the

validity of the criteria. The frontals of does and fawns are fragile and more easily shattered into unidentifiable fragments (Guilday et al. 1962: 72; Parmalee 1965: 28). Bruce Smith (1975: 33) has attempted to partially account for the disparity by suggesting that the skulls of antlered bucks were more frequently retrieved because of the potentially valuable antler used for many tools.

A preferable method for determining the deer kill sex ratio is based on morphological differences of male and female pelves, particularly the pubic symphysis (Taber 1956). This criterion, unaffected by problems of differential destruction, indicates that deer exploitation was sexually balanced at the Dan River sites (Table 22).

Sample bias has been introduced by at least two major factors: excavation techniques and differential preservation of bones. In the first case, partial recovery at some sites can be recognized by comparison with samples which were gathered more intensively. Likewise the disproportionate abundance of certain elements can be accounted for by the fact that other elements are more delicate and hence, less readily identifiable after the butchering, cooking, weathering and crushing they have undergone. Unfortunately, other factors have also affected the faunal sample in sometimes still unfathomable ways. Scavenging activities by aboriginal dogs are evident from the gnawed ends of many bones (e.g. Figure

Table 22. Sex Ratio of the Deer Kill Based on Antler Presence/Absence and Pelvis Characteristics.

Site	Sexing Criteria	Male	Female	Immature
Booth Farm	antlers	4	1	1
(44Fr2)	pelvis	2	2	2
Hales Ford	antlers	1	0	1
(44Fr15)	pelvis	1	1	0
Belmont	antlers	2	1	1
(44Hr3)	pelvis	1	3	0
Koehler	antlers	2	0	1
(44Hr6)	pelvis	0	0	0
Clarksville	antlers	3	0	0
(44Mc14)	pelvis	0	0	0

9: C). Indeed, dog-scavenging may have been the single most important factor responsible for the preservation curves in Table 15.

John Lawson observed a custom among the Carolina Piedmont Siouan groups which, even if it cannot be accepted without reservations, raises some questions concerning the completeness of the archaeological sample.

> All the Indians hereabouts carefully preserve the Bones of the Flesh they eat, and burn them, as being of Opinion, that if they omitted that Custom, the Game would leave their Country, and they should not be able to maintain themselves by their Hunting (Lefler 1967: 58).

Only about eight percent of the bones from Booth Farm and Hales Ford are burned and few of these are completely calcined. Presumably, if such a custom were rigorously practiced, a larger proportion would show some trace of burning.

F. Butchering Techniques

The techniques used to skin and butcher deer killed by Dan River hunters can be ascertained by examining the bones and discovering where cuts and breaks were made. The distribution of deer elements from the Belmont site (Table 21) indicates that most deer were carried back to the village for butchering, which further suggests that most kills were made near the village (i.e. well within a day's walk). There are no major deer parts, such as the fore- or hind-limbs, which are greatly over or underrepresented in relation to their expected

survival frequency.

The process of deer butchering at Dan River sites was very similar to the painstaking procedure used by most other prehistoric people in the east (see Guilday, Parmalee, and Tanner 1962; Parmalee 1965; Guilday and Tanner 1969; Guilday 1971a). Cut marks around antler pedicles and on the plantar surfaces of two proximal phalanges indicate that the entire animal was first skinned. Then the carcass was disarticulated at the leg joints. Judging from the locations of butchering marks, the foreleg was severed at three locations: 1) a scapula neck was scored when the head of the humerus was detached; 2) three humeri bear cut marks on the lateral surfaces of the distal condyles, as do the proximal ends of two ulnae, made while the foreleg was separated at the elbow; 3) a single left metacarpal has scoring on the lateral proximal surface resulting from severing the last joint. The same procedure was repeated for the hindlimb: 1) either the ilium was broken just above the acetabulum or the femur was cut away from the socket; 2) then the ligaments at the knee were severed; 3) and the ankle was disarticulated, leaving cut marks on a tibia tarsal, two astragali, and a proximal metatarsal. The back muscles were stripped off and the neck was severed at the fifth and sixth cervical vertebrae. Once the meat was removed from the bones, nearly all of the long bones were broken with hammerstones to extract the marrow (Gilbert 1969: 291;

Bonnichsen 1973: 14-15). The resulting fragments include numerous splinters as well as distal and proximal ends with characteristic "green breaks" (Figure 9: E, H) (compare with Miller 1975: 220-223).

The frequency of butchering cut marks on deer bones varies greatly from site to site, but quantified data are limited. Four percent of the Booth Farm and Hales Ford deer bones were scored. Only one percent of the deer bones from a feature at the Lilbourn site (23Nm38), a Mississippian site in southeast Missouri, have cut marks (Waselkov 1974: 46). At the other extreme, approximately 39% of the early historic Eschelman site (36La12) deer bones had either been chopped with axes or cut with metal knives. A hypothesis concerning the presence of cut marks which could be tested at other sites is that the availability of cutting material, whether it be trade knives and axes or conchoidally fracturing stone, is directly proportional to the frequency of cut marks resulting from butchering. The posited causal link is that at sites where the raw material for knives and cleavers was difficult to obtain, such as at the Lilbourn site located in the stoneless Mississippi Lowlands, butchering was done more carefully to conserve the scarce commodity. In most regions of the east and midwest, lithic raw material was readily available, as at the Dan River sites, so one might expect butchering procedures to be less meticulous. The steel tools introduced in

early historic times were more durable than their stone counterparts, and their use required less skill and precision to achieve the same ends. Hence, butchering cuts occur more frequently at sites where metal tools were commonly used. This small sample of four sites is only suggestive of a trend which may exist at other sites.

G. Seasonality

All five sites analyzed for this study were occupied throughout the year. Plant remains from the Clarksville, Hales Ford, and Koehler (Coleman 1976a) sites constitute solid evidence for summer and very probably fall occupations. The many fish and turtle remains from all sites corroborate this conclusion. Fish, amphibians, reptiles and some hibernating mammals were usually unavailable to primitive hunters during the winter and so must have been taken at other times. Many of the mammals and four species of birds were permanent, active residents of southwest Virginia, so little can be said regarding the seasonality of their capture. However, six bird species are migratory and their presence is somewhat more informative. Canada geese and mallards are winter residents of the region, arriving in late fall and leaving by early March. Whistling swans, snow geese, and blue-winged teal are transient residents during their fall and spring migrations. Occasionally individuals of all these species can be found during other seasons. There are many

historic references to great flocks of passenger pigeons in western Virginia during fall and into the winter (September to November), but few for spring. Apparently the pigeons flew south through this region, but returned north on the west side of the Appalachian Mountains (Schorger 1955: 268, 280).

Cottontails and squirrels seem to have been caught in snares or traps either in the late fall and winter or, what is more likely, during the spring when the percentages of juveniles in the populations are lowest (Smith 1975: 100, 115). Twenty-five percent of the cottontails and eight percent of the gray and fox squirrels represented in the Booth Farm and Hales Ford samples were juveniles, based on the proportion of long bones with unclosed epiphyses (Carson 1961; Hale 1949).

The seasonality of deer hunting can be determined from two osteological criteria, stages of antler growth and the eruption stages of mandibular dentition. Deer antlers grow and are shed in regular annual cycles and so provide a reliable indicator of the time of year bucks were killed. The only segments of this cycle which are discernible from archaeological deer skulls are when the antlers were attached (May to mid-February) and when they had been shed (mid-December to May) (Figure 9: F, I). Of the ten recognized buck frontal bones from the sites, only one has unshed antlers.

Another method of discovering the seasonality of

deer kills is by aging mandibles of deer less than 20 months of age. The rate of eruption and replacement of the mandibular dentition has been described by C.W. Severinghaus (1949). Archaeological fawn mandibles can be accurately assigned to age classes within a two or three month range (e.g., 3-4 months, 4-7 months, etc.). Thirty-six mandibles from deer less than 20 months old were found at Booth Farm, Hales Ford, and Belmont. Of these, 32 deer (89%) were killed during November, December and January, overlapping the major hunting period for adult bucks.

H. Hunting Strategies

The amount of meat available from each species has been computed for the five sites and is presented in Table 23. The calculations are based on the average weights of usable meat per individual as estimated by White (1953), Cleland (1966), and Smith (1975). There has been no attempt to adjust the resulting figures by excluding species usually assumed by archaeologists not to have been food sources (the exception is a dog burial omitted from the Clarksville site totals). Including the few amphibians, snakes, and rodents does not affect the relative rankings of the other species, although the Koehler sample shows that they contributed more to the diet than their small numbers at the other sites indicate due to sampling bias for larger species.

Table 23. Amounts of Usable Meat in Pounds.

Species	Estimated Usable Meat/Ind. lbs.	Booth Farm 44Fr2 lbs.	%	Hales Ford 44Fr15 lbs.	%	Belmont 44Hr3 lbs.	%	Koehler 44Hr6 lbs.	%	Clarksville 44Mc14 lbs.	%
Longnose Gar	1.0	1.0	-	1.0	-			4.0	.3	3.0	.2
Minnow	.2							.4	-		
Chub	1.0	2.0	.1	9.0	.4			6.0	.4	2.0	.1
Sucker	4.0	20.0	.8					12.0	.9	12.0	.7
Silver Redhorse	.4					.4	-				
Catfish	1.5	1.5	-	1.5	.1	3.0	.1	7.0+	.5	3.0	.2
Channel Catfish	1.5	1.5	-								
Brown Bullhead	1.0							3.0	.2		
Yellow Perch	.4	2.4	.1	2.4	.1	.8	-	7.2+	.5	.4	-
Largemouth Bass	1.0							5.0	.4		
Spadefoot Toad	*							.1	-		
American Toad	*	*				*					
Bullfrog	.1	.1	-			.1	-			.1	-
Leopard Frog	*							.1	-	*	
Snapping Turtle	10.0	10.0	.4	10.0	.5	10.0	.3				
Stinkpot	.3			.9	-						
Mud Turtle	.3									.6	-
Box Turtle	.3	9.0	.3	9.9	.5	4.3	.1	6.6	.5	3.9	.2
Painted Turtle	.3	2.1	.1	3.0	.1	1.5	-				
River Cooter	1.0	14.0	.5	8.0	.4	1.0	-	13.0	.9	5.0	.3
Spiny Softshell	3.0			3.0	.1					6.0	.3
Fence Lizard	*							*			
Snakes	.2	.2	-	.4	-			2.8	.2		
Whistling Swan	10.0					20.0	.6				
Canada Goose	6.0	6.0	.2			6.0	.2				
Snow Goose	4.5							4.5	.3	9.0	.5
Duck	2.0			2.0	.1					4.0	.2
Blue-winged Teal	.5									.5	-
Hawk	2.0					2.0	.1				
Bobwhite	.3			.3	-	.3	-			.6	-
Wild Turkey	8.5	110.5	4.2	68.0	3.3	102.0	2.9	42.5	3.0	51.0	2.9
Passenger Pigeon	.7	5.6	.2			4.9	.1	4.9	.4	4.9	.3
Common Crow	1.0			1.0	-	1.0	-	1.0	-	2.0	.1
Thrush	*							*			

Table 23. Amounts of Usable Meat in Pounds (cont.).

Species	Estimated Usable Meat/Ind. lbs.	Booth Farm 44Fr2 lbs.	%	Hales Ford 44Fr15 lbs.	%	Belmont 44Hr3 lbs.	%	Koehler 44Hr6 lbs.	%	Clarksville 44Mc14 lbs.	%
Opossum	8.5					17.0	.5			25.5	1.4
Cottontail	2.0	12.0	.5	8.0	.4	6.0	.2			16.0	.9
Woodchuck	5.0	10.0	.4	20.0	1.0	5.0	.1	10.0	.7	10.0	.6
Gray Squirrel	1.0	3.0	.1	4.0	.2	2.0	.1	4.0	.3	11.0	.6
Fox Squirrel	1.5	3.0	.1	6.0	.3	6.0	.2	7.5	.5	13.4	.8
Beaver	31.5	94.5	3.6	31.5	1.5	94.5	2.7	31.5	2.3	126.0	7.2
Woodrat	.3	.6	-			.3	-	.6	-		
White-footed Mouse	*							*			
Meadow Vole	*							*			
Muskrat	2.0	8.0	.3	4.0	.2	2.0	.1	2.0	.1	26.0	1.5
Domestic Dog	8.0			16.0	.8	16.0	.5			16.0	.9
Gray Fox	5.0	10.0	.4			5.0	.1	10.0	.7	10.0	.6
Black Bear	210.0					210.0	6.0			210.0	11.9
Raccoon	15.0	150.0	5.7	120.0	5.8	45.0	1.3	105.0	7.5	60.0	3.4
Spotted Skunk	1.0	2.0	.1					2.0	.1	1.0	-
Striped Skunk	5.0					10.0	.3			5.0	.3
Bobcat	15.0	15.0	.6	30.0	1.4					15.0	.8
White-tailed Deer	85.0	2125.0	81.1	1700.0	82.5	2550.0	73.3	1105.0	79.1	1105.0	62.9
Elk	350.0					350.0	10.1				
Subtotals - Fish		28.4	1.1	13.9	.7	4.2	.1	44.6	3.2	20.4	1.2
Amphibian		.1	-			.1	-	.2	-	.1	-
Reptile		35.3	1.3	35.2	1.7	17.3	.5	22.4	1.6	15.5	.9
Bird		122.1	4.7	71.3	3.5	136.2	3.9	52.9	3.8	72.0	4.1
Mammal		2433.1	92.9	1939.5	94.1	3318.8	95.5	1277.6	91.4	1649.9	93.8
Total		2619.0	100.0	2059.9	100.0	3476.6	100.0	1397.7	100.0	1757.9	100.0

* - less than 0.1 lb.

\+ - adjusted for smaller individual weights.

The primary meat source at all sites was white-tailed deer. Bear and elk, when present in the samples, rank next in importance, followed by raccoon, beaver, and turkey. Bruce Smith (1975: 125-127) has developed a useful means to measure the relative importance of different animals in a faunal sample. Fourteen selected species or groups of species (i.e., turtle, fish) are ranked according to 1) their estimated meat yield and 2) the minimum number of individuals recovered from the four Dan River sites. Figure 10 illustrates the results of this procedure. Dotted lines, two standard deviations in length, intersect at each mean rank value to indicate the variance between sites.

The fourteen species categories cluster into five groups. Deer forms a separate class, ranking very high on both scales. Clearly the faunal exploitation strategy of the late prehistoric and early historic peoples was based on deer hunts. The second group consists of turkey, raccoon and beaver, which all contributed significant quantities of protein but were taken in limited numbers. These species were probably most heavily exploited during the winter, though evidence for this inferrence is sparse. According to early historical accounts (summarized by Schorger 1966: 377-408), turkeys were almost always hunted in late fall and winter when they congregated in large flocks. The functional analysis of the Hales Ford features seems to corroborate this assumption.

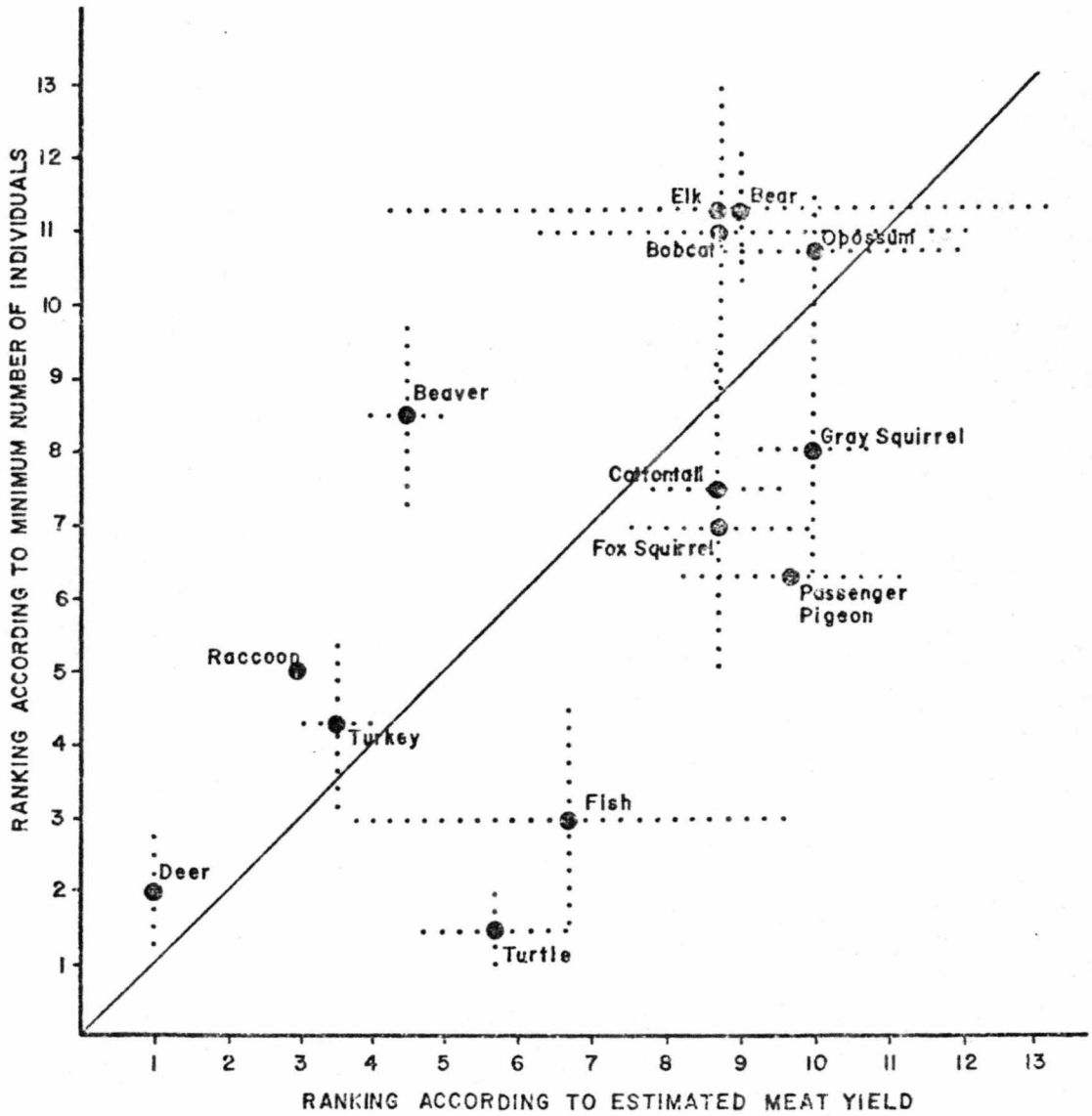

FIGURE 10. VARIATIONS IN ANIMAL EXPLOITATION

Raccoon and beaver are in prime condition during the winter, which may have influenced hunting strategy. The only archaeological evidence for such a preference is the presence of several kits (½ to 1 year old, 28%) at Booth Farm and Hales Ford. However the dental aging criteria for beaver mandibles (van Nostrand and Stephenson 1964) are too inspecific to indicate more than that beavers were probably hunted from October to April. The slightly higher percentage of beaver from the historic Clarksville site may be an effect of greater demand for pelts for the incipient fur trade.

The third species group is composed of elk, bear, bobcat, and opossum. Apparently, though these animals (especially elk and bear) yield a large amount of meat, they were killed only rarely. They were probably exploited about in proportion to their density. That is, they were killed when encountered but were too scarce to be regularly depended upon as major game animals. Bear and bobcat have low rates of reproduction, whereas elk remains are rare at most sites in the Southeast (e.g., Barkalow 1972: 30) and the species seems to have had a low prehistoric density in many areas. The small number of opossums, and their complete absence from the Smith Mountain area, is rather surprising considering their modern abundance. Perhaps they were prehistorically less numerous near the Blue Ridge and have become better established more recently, as have other tropical species

(Handley 1971: 298-302). The opossum has migrated northward within historic times and is absent from prehistoric sites in the Appalachian Plateau (Guilday 1958). Of course, some cultural factor may actually have been responsible for the low level exploitation of an otherwise abundant and accessible food source.

The fourth species cluster includes cottontail, gray squirrel, fox squirrel, and passenger pigeon. As has already been mentioned, these species were most heavily exploited in fall (passenger pigeon) and spring (the rest). All four species were captured in fairly large numbers, but even then were not very important meat sources.

Passenger pigeon remains are present in about 1/3 of the reported faunal assemblages from prehistoric sites in the eastern United States. Most of these represent not more than two or three individuals, but at six sites (at least) passenger pigeons were a significant contribution to the diet. These sites are the Woodland component at Tick Creek Cave, Missouri (Parmalee 1965: 7), the Late Woodland Juntenen site in Michigan (Cleland 1966: 188), the Late Woodland summer occupation of the Oakfield site, New York (Guilday 1963: 14), the Middle Mississippian Crosno site in southeast Missouri (Lewis 1974: 60), and two Ohio Fort Ancient sites, Philo II (Shane and Barber 1976: 2) and Blain Village (Parmalee and Shane 1970: 197, 201). All are late sites, but there are dozens of other contemporaneous sites with few or no

passenger pigeon remains. This distribution is particularly anomalous when contrasted with the historic accounts of incalculably large migrating and roosting flocks of the birds (see Schorger 1955). However, flocks of such numbers were not usual, and they did not necessarily appear every year in any given place (Greenway 1967: 305). The archaeological record reflects the unpredictability of the game bird.

The final group consists of fish and turtles, ranking relatively high according to both criteria of importance. Turtles were even more numerous than deer at three of the sites. Elizabeth Wing (1963: 57) has classified turtles as "slow game" since they can easily be caught by hand. Women and children usually are responsible for catching slow game, which is a low-risk activity and accords little prestige (Jochim 1976: 40). There is no way to determine at what season the archeological specimens were collected, but they simply may have been picked up whenever they were discovered during other warm-weather plant food gathering activities. If so, the abundance of turtle remains at these sites may be inversely correlated to the dietary importance of agriculture (Wing 1963: 59). On the other hand, if turtle collecting was actually subsidiary to fishing, and many of the turtles are aquatic or semi-aquatic, the two activities could have been scheduled so as not to conflict (e.g., planting in spring, fishing in summer).

The fish remains collected at all the sites but Koehler are strictly from large, older individuals. The younger, smaller individuals and small species (less than about ten cm in length) were apparently not retrieved during excavations at the other sites. The presence of these small individuals at Koehler indicates that some mass capture technique, such as netting, was used along with hook and line fishing.

We can now summarize the exploitation of faunal resources practiced at Dan River sites, as well as at the Clarksville site. However, to understand the faunal adaptive strategy, the total subsistence round must be considered. Little is yet known about Dan River plant exploitation, but evidence from several sites indicates that corn and beans were important domesticates, and wild plant foods, such as hickory nuts, walnuts, acorns, and persimmons, were gathered in significant quantities. Though the conceptual distinction between hunter-gatherer and agriculturalist or food producer is valid, the Dan River people are clearly intermediate along the spectrum of activities linking these two polar opposites. Charles Cleland (1966: 42-45; 1976) has proposed an evolutionary model of economic adaptation which shifts the emphasis from the nature of the food source (wild versus domesticated) to the entire exploitative strategy (focal or diffuse). The environment presents humans with seasonal, locational, associational and other sorts of variety.

Humans will rarely exploit all phases of all cycles but are likely to concentrate on the most accessible ones (Shawcross 1975: 45). The series of alternative choices which are finally made is the adaptive strategy of a cultural group. Cleland's focal-diffuse model differentiates strategies on the basis of specialization and intensity of exploitation. For instance, eastern Late Woodland cultures were generally focally adapted. Corn and beans, which are highly productive and readily stored, provided a stable resource base requiring only secondary reliance on other plant and animal resources (Cleland 1976: 71). But these supplemental resources were selectively utilized when available at seasonally high densities which required a minimum of energy expenditure to harvest or hunt (see Smith 1976: 292).

The Dan River hunters focused their efforts on the white-tailed deer, primarily during the winter when hunting would not interfere with agricultural activities. Turkey, raccoon and beaver were of secondary importance. In winter, compared to other seasons, these species occur at higher densities in restricted localities. Deer, turkey, and raccoon prefer to eat mast (acorns and some other nuts) when it is available in late fall and winter, so the animals cluster in stands of oak and chestnut trees. South-facing hillsides are the favorite habitat of these species during the winter even though mast production may be lower there than in the valleys.

Acorns are almost always accessible there since the hills are usually clear when the cooler, sheltered valleys are still covered with snow. Visibility in forests is also better in winter. Beavers are localized in and around their lodges during the late fall and winter. These factors could have worked to the benefit of aboriginal hunters.

According to the archaeological evidence, deer and probably beaver were hunted mostly in winter. That raccoon and turkey were also heavily exploited in winter seems likely, but the evidence for this is rather weak. Spring and fall hunting was mainly limited to a few small species (i.e., cottontail, fox squirrel, gray squirrel, and passenger pigeon). Fish and turtles were the major protein resources when most abundant, during summer. Hunting was a specialized activity with emphasis placed on different animals at different times of the year.

Deer were intensively exploited as the single most important source of meat. This statement is true for most prehistoric cultures of the eastern woodlands, but there was some variation in the hunting methods used by groups of differing socio-political complexity. The final chapter of this thesis is an attempt to demonstrate that such patterned variation did exist and to explain why different methods were practiced by certain groups during specific periods in the past.

Chapter III
Prehistoric and Historic Deer Hunting

A. Ethnohistorical Accounts

One of the primary means of archaeological interpretation is by analogy. Ethnohistorical accounts, written records of the Indians' way of life (usually by observers or participants of European descent), are a commonly used source of analogy. The major interpretive hurdle in the use of ethnohistorical analogies is to translate accounts of observed behavior into their archaeological equivalents. This is no mean task considering the vagaries of preservation and the numerous disruptive forces which affect most archaeological sites. But must we then infer that nothing can be known of the past? While few would toe such a rigid line, many others would agree that the basic underpinnings of a culture, technology and subsistence, are especially amenable to archaeological study. One of the most fruitful approaches to these realms of past cultures is by way of ethnohistorical analogy.

Some of the earliest and most complete ethnohistorical accounts for the eastern coast of North America are from the Virginia-North Carolina region. The sources relevant to deer hunting in this area are presented below, with

particular emphasis on the methods used in the Piedmont. These accounts provide a basis for hypothesizing the major deer hunting methods used prehistorically.

Members of one or another of the Roanoke Colony voyages left several frustratingly brief allusions to deer hunting by the coastal Algonquin groups. Arthur Barlowe, in a narrative on the first (July, 1584) voyage to Virginia, records what transpired after making first contact with the native peoples.

> A daye or two after this, we fell to trading with them, exchanging some thinges that we had for Chammoys, Buffe, and Deere skinnes . . . We exchanged our tinne dishe for twentie skinnes, woorth twentie Crownes, or twentie Nobles: and a copper kettle for fiftie skinnes woorth fiftie Crownes (Quinn and Quinn 1973: 4-5).

Later on Barlowe notes that the King, Wingina, "sent us every daye a brase or two of fatte Buckes, Conies, Hares, Fishe, the best of the worlde" (Quinn and Quinn 1973: 7).

Thomas Hariot accompanied the first colony to Roanoke Island and wrote a description of the marketable commodities to be found in Virginia, including deer hides.

> Deere skinnes dressed after the maner of Chamoes or undressed, are to be had of the naturall inhabitants thousands yeerely by way of traffique for trifles, and no more waste or spoile of Deere then is and hath bene ordinarily in time before (Quinn and Quinn 1973: 52).

The final account from this early period was written by John White, governor of the second ("Lost") Roanoke colony. He gives the clearest description of deer

hunting, though his main topic concerns the death, on July 28, 1587, of one of the colonists.

> The eight and twentieth, George Howe, one of our twelve Assistants was slaine by divers Savages, which were come over to Roanoake, either of purpose to espie our companie, and what number we were, or els to hunt Deere, whereof were many in the Island. These Savages beeing secretly hidden among high reedes, where oftentimes they finde the Deere asleepe, and so kill them... (Quinn and Quinn 1973: 98).

Summer stalking is the only method of deer hunting specifically mentioned in the Roanoke chronicles. The first settlers at the Jamestown colony, established in 1607, described a greater variety of hunting techniques employed by members of the Powhatan chiefdom. John Smith differentiates two types of surround methods.

> At their huntings in the deserts they are commonly 2 or 300 together. Having found the Deare, they environ them with many fires, and betwixt the fires they place themselves. And some take their stands in the midst. The Deare being thus feared by the fires and their voices, they chace them so long within that circle, that many times they kill 6, 8, 10, or 15 at a hunting. They use also to drive them into some narrowe point of land, when they find that advantage; and so force them into the river, where with their boats they have Ambuscadoes to kill them (Arber 1910: 70).

Henry Spelman's version differs somewhat.

> Ther maner of ther Huntinge is thiss wher they meett sum 2 or 300 togither and havinge ther bowes and arrows and every one with a fier sticke in ther hand they besett a great thikett round about ... which ye Deare seinge fleeth from ye fier, and the menn comminge in by a litell and litle incloseth ther game in a narrow roome, so as with ther Bowes and arrowes they kill them at ther pleasuer takinge ther skinnes which is the greatest thinge they

> desier, and sume flesh for their provision (Arber 1910: cvii).

Smith also describes a stalking method used by the Powhatan.

> One Savage hunting alone, useth the skinne of a Deare slit on the one side, and so put on his arme, through the neck, so that his hand comes to the head which is stuffed; and the hornes, head, eies, eares, and every part as arteficially counterfeited as they can devise. Thus shrowding his body in the skinne, by stalking he approacheth the Deare, creeping on the ground from one tree to another. If the Deare chance to find fault, or stande at gaze, hee turneth the head with his hand to his best advantage to approach, having shot him, hee chaseth him by his blood and straine till he get him (Arber 1910: 70-71).

A final account from the Jamestown sources is by Ralph Hamor.

> ...for of the Deere (they kill as doe wee Beefes in England) all the yeer long, neither sparing young nor olde, no not the Does readie to fawne, nor the yong fawnes, if but two daies ould ... (Hamor 1615: 20).

Thus, the Powhatan Algonquins in the early 17th century used at least three distinct deer hunting techniques: decoyed stalking, drives to water and fire drives.

The earliest accounts of hunting in the Piedmont near the Roanoke River date from 1671. Robert Fallam kept a journal of an expedition led by Thomas Batts to the Blue Ridge (Alvord and Bidgood 1912: 184). After visiting the Saponi and Totera Indian villages, they continued west for several days. At this point Fallam writes:

> Our Indians having done their best could kill us no meate, though Deare, they said were in such hoards and the ground so drie yet one or another of them would still spie them (Clayton 1688).

"Our Indians" refers to the Appomattox guides accompanying the explorers. Apparently the Indians were attempting to stalk the deer.

The Saponi and Tutelo (Totera) were Siouan-speaking peoples occupying the upper Roanoke River area in the early historic period. Sometime between 1671 and 1701, both groups joined the Occaneechi on three islands in the Roanoke River, just below the confluence of the Dan and Staunton branches (Mooney 1894: 38; cf. Feest 1974: 154).

The next description of deer hunting methods attributable to a specific cultural group dates from mid-February, 1701. At that time, John Lawson "... met with about 500 Tuskeruros in one Hunting-Quarter" (Lefler 1967: 65).

> When these Savages go a hunting, they commonly go out in great Numbers, and oftentimes a great many Days Journey from home, beginning at the coming in of the Winter ... Thus they go and fire the Woods for many Miles, and drive the Deer and other Game into small Necks of Land and Isthmus's where they kill and destroy what they please ... Here it is, that they get their Complement of Deer-Skins and Furs to trade with the English, (the Deer-Skins being in Season in Winter, which is contrary to England) (Lefler 1967: 215-216).

Robert Beverley, treating of all Virginia Indians in 1705, again described fire drives of deer and emphasized that "they make all this Slaughter only for the sake of the Skins, leaving the Carcases to perish in the Woods"

(Wright 1968: 155).

The final ethnohistorical sources we will consider for the Virginia area are William Byrd's day journals, kept while surveying the boundary line between Virginia and North Carolina in 1728. On October 29, the surveying party's Saponi hunters "drove the Woods in a Ring ... From the circumference of a Large Circle they all march't inwards, and drove the Game towards the center" (Byrd 1967: 244). On November 10,

> they fired the woods in a Ring, which burning Inwards drove the Deer to the Center, where they were easily kill'd. This Sport is called Fir-hunting, & is much practiced by the Indians, & some English as Barbarous as Indians. Three Deer were Slaughtered after this manner ... (Byrd 1967: 285).

The hunting techniques recorded as being used by Virginia and North Carolina Indians during the nearly 150 years from 1584 to 1728 can be grouped into four major types: 1) stalking, 2) using a decoy while stalking, 3) surrounds or drives to water, and 4) surrounds or drives using fire. A perusal of ethnohistorical accounts of deer hunting methods employed by other aboriginal cultures of eastern North America reveals that these four were the major techniques for the entire area, though not all were usually used by a single cultural group (Anell 1969; Swanton 1946: 312-321). While it is quite apparent that several ways to hunt deer might be used by the same group, the early sources often emphasize that a particular method seemed to be more important at a specific time

(referring either to the season or to the chronological era). Several archaeologists have attempted to operationalize these observed hunting methods in terms of remains recoverable by excavation.

B. Previous Anthropological Interpretations

The major approach to determining the sort of deer hunting done by prehistoric peoples is based on the age composition of deer kills. Faunal samples from archaeological sites "are assumed to be a composite of an unknown number of 'bags' of smaller numbers of animals" (Wilkinson 1976: 325). If the age composition of a prehistoric deer kill is similar to that of an entire deer population (a so-called natural population), then the hunting method can be inferred to have been non-selective. Selective hunting would result in certain age classes being overrepresented in the deer kill and, therefore, in the archaeological faunal sample. Charles Cleland first argued for such an interpretation in a report on animal bones from a Woodland site in Michigan (1966: 219-220). He reasoned that if deer were hunted by stalking, the very young and very old would be successfully hunted more often than middle-aged animals in their prime (between the ages of two and four years). The age distribution of deer taken by stalking would be bimodal, with the majority of individuals in the young and old age classes. Surrounds and drives are non-selective methods which would result in deer being

randomly culled from the local population. Over the long run, the ages of deer killed by these means would reflect the unimodal curve of a natural population. This straight forward correspondence between hunting methods and deer ages proposed by Cleland may appear reasonable, but problems in its application have led several faunal analysts either to modify or silently ignore the original hypothesis.

Cleland, himself, was one of the first to modify the hypothesis in a discussion of faunal remains from an Ohio Fort Ancient site. Concerning the age composition of the deer sample, he and Joan Kearney wrote that

> ... deer have been selected from the natural population in approximately the same frequency as they appear in the natural population. Thus, we see that the largest number of deer in the faunal sample are drawn from the two-to-three-year age category. Deer of this age are not only the most abundant in the population, but are also those which are most likely to be in prime physical condition (Cleland and Kearney 1967b: 56; emphasis added).

They go on to state that a non-selective mode of hunting was apparently used.

The error in this formulation lies in the assertion that deer of the 2-3 year age class are the most numerous of any class in a natural population. This can be readily grasped when one considers that in any stable population the youngest age class must be the most abundant, with progressively fewer in each succeeding class because of the normal dying-off, the attritional mortality, of

members of the population. Of course, this stable population curve will be affected by many factors, such as predation, but Cleland and Kearney are clearly in error since their statement includes no qualifications indicating that the "natural" population being hunted might be unstable.

Reliable data on natural deer populations are very difficult to obtain. Two of the best field studies of white-tailed deer were done in southern Ontario, one of the few remaining areas where there are undisturbed wolf packs which prey on deer. The effects of wolf predation on deer, as determined by these two studies, are shown in Table 24. Douglass Pimlott concluded that young and old deer were most vulnerable to wolf predation, although the number of fawns was very probably underestimated because of their smaller size and nearly complete consumption (Pimlott 1967: 267). George Kolenosky, a member of Pimlott's study group, refined the tracking methods of earlier researchers and observed higher percentages of fawn kills, nearly equaling the number taken by modern hunters with rifles in the same area (Kolenosky 1972: 365). The close similarity between the wolf and human deer kill compositions seen in Kolenosky's data is fairly strong evidence supporting Cleland's suggestions that stalking does result in a nonrandom sample. Hunting with a bow and arrow or spear and spearthrower, instead of with a rifle, probably would affect hunting by making two and

Table 24. Comparative Age Compositions of Modern Human and Wolf Deer Kills.

Source	Fawn	1+	2+	3+	4+	5+	6+	7+	8+
Wolf Predation Pimlott *et al.* 1969 n = 331	16.9	5.7	3.0	7.2	9.7	11.8	15.1	8.8	21.8
Wolf Predation Kolenosky 1972 n = 63	32.2	11.9	8.5	20.4	13.5	3.4	5.1	5.1	
Modern Hunter-Killed Kolenosky 1972 n = 444	36.7	16.7	11.0	14.5	9.3	6.0	4.1	1.7	

three year olds relatively less vulnerable than older deer.

A dissenting opinion has recently been propounded by Bruce Smith as part of a major analysis of Middle Mississippian animal exploitation (Smith 1974, 1975). Although he never cites Cleland, Smith offers an alternate hypothesis based on an analogy with the hunting practices of African predatory animals.

> ... the predator population which selects out the young of the year and the aged individuals are canids (hyenas) which hunt in groups by coursing techniques. Those exploiting the middle age classes (lions) use stalking techniques (Smith 1974: 37-38).

This analogy is objectionable since it involves a subtle change in the meaning and context of "stalking" as it is normally applied to hunting by humans. If Kolenosky's data are valid, lone humans and coursing canids (be they hyenas or wolves) most heavily exploit about the same segments of the deer population. Lion hunting techniques seem largely irrelevant.

However, Smith continues with this line of reasoning by hypothesizing that the use of a deer head decoy, as described for many early historic cultures, would result in a selected kill of middle-aged deer. As John Smith's excellent description (quoted above) of this hunting method indicates the hunter would carefully stalk a deer and then use the stuffed head to imitate another deer. According to Bruce Smith, rustling bushes with the decoy was in imitation of bucks in rut. Such activity during

most of the year would probably frighten away other deer. But from September to November, bucks become curious and belligerent, losing their characteristic shyness, charging at shrubs and trees, and attacking other males. Smith concludes that by taking advantage of this seasonal behavioral change, hunters could have killed mostly middle-aged deer in their prime. He then presents age compositions of deer samples from several Mississippian sites which have such a distribution (Smith 1975: 28). While I agree with Smith's general argument that decoy-stalking probably would result in a non-random selection of the population, he seems to have ignored the fact that this method would only attract male deer in rut. In fact, he offers convincing evidence that bucks and does were exploited in equal proportions at Mississippian sites (Smith 1975: 32). Furthermore, at all of his sites, many of the deer were hunted throughout the winter, implying that another hunting technique must have been used at least during the post-rut winter months (Smith 1975: 37, Figure 7; Waselkov 1974: 43).

This extended discussion has been necessary to point out some interpretational errors in prior faunal analyses. I think that Cleland's original proposition is still valid, with only a few alterations. Based on an analogy with wolf predation, stalking is still the best explanation for a deer kill with a bimodal age composition. Bruce Smith's decoy/stalking conclusions are acceptable

if we understand that middle-aged males were the primary autumn bag from such a method. Cleland and Kearney's correlation of a normal sample curve with a random hunting technique, such as a surround or drive, is not completely acceptable, for the following reasons.

Prehistoric bison drives on the Great Plains are classic examples of a non-selective hunting method. Yet this seemingly random sampling procedure appears distinctly nonrandom from the archaeologist's point of view. At nearly all of the thoroughly reported bison kill sites, juveniles are underrepresented in the sample compared to their expected numbers in the entire population (Reher 1973: 102-105, 1974: 119-122; Shay 1971: 35; Wheat 1972: 61). Statistical error could account for one or two aberrant samples but this general trend must be due to some sort of differential treatment of the meat and bones of juveniles. Charles Reher has suggested that separate processing areas, or the immediate consumption of the youngest animals might explain the discrepancy (1974: 122).

This discussion of bison kill age compositions is relevant to deer hunting in the east because virtually identical age curves for deer have been discovered, while truly normal curves are virtually unknown. If the bison kill age data are indicative of a non-selective hunting method followed by differential meat usage, then drives and surrounds may indeed have been the primary hunting methods at the sites where two-to-three year old deer

are most abundant. If we accept this argument, then Cleland and Kearney's similar hypothesis was correct, but for the wrong reasons (1967b: 56).

C. Archaeological Evidence

How well do these hypotheses fit the archaeological data? In order to assess their explanatory value, I have assembled most of the published information on age compositions of deer kills from sites in eastern North America (Table 25). I omitted seven site samples which are unreliable or ambiguous for the following reasons: insufficient sample size (McGinness and Reeves 1957: 8); unknown sample size (Cardinal 1975: 78); the use of incompatible age categories (Pillaert 1969: 104); mixed samples from different cultural traditions (Elder 1965: 367, two sites; Cleland 1965); fawns omitted (Kay 1974: 225). In addition to nineteen previously reported samples, there were a sufficient number of deer mandibles from Booth Farm, Hales Ford and Belmont to include these Dan River sites in the list. Only four mandibles were found at the other two sites considered in this study (Clarksville - 19 months; Koehler - 17 months, 4½ years, 8½ years).

The traditional procedure for determining deer ages was first developed by C.W. Severinghaus (1949) during a study of deer in New York state. For young deer (new born to eighteen months), age can be quite accurately

Table 25. Age Composition of Prehistoric White-tailed Deer Kills in Eastern North America.

Site (Source)	Culture and/or Cultural Tradition	n	Age classes by years (%) Fawns	1+	2+	3+	4+	5+	6+	7+	8+	9+
Tick Creek Cave Missouri (23Ph145) (Parmalee 1965: 27-28)	Late Archaic	212	17	26	16	12	5	5	6	5	5	3
" "	Woodland Tradition	547	18	23	16	11	6	7	6	7	2	3
Apple Creek Illinois (Parmalee et al. 1972: 50)	Middle-Late Woodland	58	33	45	3	3	5	3	3	2	-	2
Moccasin Bluff Michigan (20-Be-B8) (Cleland 1966: 218)	Late Woodland (A.D. 1200+)	44*	20	19	23	7	11	2	11	5	-	2
Chesser Cave Ohio (Cleland and Kearney 1967a: 58)	Late Woodland (A.D. 1070)	33*	18	33	9	24	-	3	3	-	3	6
Blain Village Ohio (Parmalee and Shane 1970: 193)	Fort Ancient (A.D. 950-1225)	36	22	31	6	14	14	6	3	5	-	-
Philo II, Ohio (Shane and Barber 1976: 4)	Fort Ancient (A.D. 1170-1320)	20	30	20	10	10	10	5	5	10	-	-
Buffalo Village West Virginia (46Pu31) (Guilday 1971a:51)	Fort Ancient (A.D. 1650)	345*	21	15	7	16	12	12	9	2	3	2
Conner's Midden Virginia (McGinnes and Reeves 1957: 8)	Clarksville Late Woodland	12	25	25	17	-	8	17	8	-	-	-
Booth Farm Virginia (44Fr2)	Dan River Late Woodland	29	35	24	7	10	7	7	10	-	-	-
Hales Ford Virginia (44Fr15)	Dan River Late Woodland	25	32	12	16	12	12	4	4	4	4	-
Belmont Virginia (44Hr3)	Dan River Late Woodland	17	23	23	6	12	12	-	6	12	-	6

*Percentages estimated from graphed data.

Table 25. Age Composition of Prehistoric White-tailed Deer Kills in Eastern North America (cont.)

Site (Source)	Culture and/or Cultural Tradition	n	Age classes by years (%) Fawns	1+	2+	3+	4+	5+	6+	7+	8+	9+
Graham Village Ohio (Cleland and Kearney 1967b: 91)	Fort Ancient (A.D. 1180)	17*	-	24	41	24	6	6	-	-	-	-
Banks, Arkansas (Smith 1975: 35)	Middle Mississippian (A.D. 1535)	81	21	17	16	16	12	9	5	3	1	-
Lilbourn Missouri (23Nm38) (Waselkov 1974: 42)	Middle Mississippian (A.D. 1200-1400)	26	15	15	27	15	8	8	4	4	4	-
Turner, Missouri (23Bu21A) (Smith 1975: 28)	Middle Mississippian (A.D. 1300)	20	-	15	35	25	15	5	-	5	-	-
Snodgrass, Missouri (23Bu21B) (Smith 1975: 28)	Middle Mississippian (A.D. 1300)	130	7	25	25	19	9	5	4	4	2	-
Chucalissa Tennessee (40Sy1) (Smith 1975: 28)	Middle Mississippian (A.D. 1000-1550)	55	11	16	20	16	14	11	6	4	2	-
Utz Village Missouri (23Sa2) (Elder 1965: 367)	Missouri Tribe Oneota (A.D. 1500-1750)	92*	8	18	22	8	13	12	11	2	1	5
Gumbo Point Missouri (23Sa4) (Elder 1965: 368)	Missouri Tribe Oneota (A.D. 1750-1777)	29*	4	17	45	17	10	4	4	-	-	-
Brown, Missouri (23Ve3) (Elder 1965: 368)	Osage Tribe (A.D. 1725-1780)	153*	3	21	23	22	12	7	3	5	3	-
Eschelman Pennsylvania (36La12) (Guilday *et al.* 1962: 72)	Susquehannock Tribe (A.D. 1600-1625)	182	11	11	17	21	12	11	11	4	-	1

*Percentage estimated from graphed data.

estimated from tooth eruption characteristics. Older deer are aged according to rates of tooth wear, which were once thought to be fairly constant, but actually vary between individuals and from place to place. Interpretation of tooth wear also depends to some extent upon the experience of the analyst.

A more accurate technique has since been devised which relies on annular growth in the cementum of deer teeth (Gilbert 1966). Compared to cemental annuli analysis, the tooth-wear method leads to overestimates of the number of deer in the younger age classes and underestimates of older deer (Gilbert and Stolt 1970: 533). Although age estimates from cemental annuli are clearly preferable, only one archaeological study (Kay 1974) has yet utilized this approach because of the cost and special equipment required. Also, the technique requires that the teeth be sectioned, which is sometimes difficult with fragile archaeological specimens. Despite the shortcomings of tooth-wear estimation, information collected by that means is still usable with discretion.

I have divided the sites shown in Table 25 into two groups. One group includes the first twelve sites (page 117) dating from the late Archaic period to early historic times. The age compositions of the deer samples from these sites are what Cleland called bimodal distributions (Cleland 1966: 219), consisting mainly of fawns, yearlings, and older deer (4½ years or older).

Stalking is believed to have been the predominant deer hunting method employed at sites with bimodal age curves. The remaining ten sites (page 118; except for the Banks site which will be discussed later) have unimodal age curves resulting from a reliance on surrounds and drives. Middle-aged deer are most numerous in these samples (see Figure 11).

Because of the increasing unreliability of age estimates, particularly beyond the two-year-old age class, it would probably be most profitable to focus our attention on the youngest age categories. The percentages of deer in the first four age classes indicate which hunting method was used. When fawns and yearlings greatly outnumber the combined frequencies of two and three year olds, stalking was the foremost hunting method. The other mode of the so-called "bimodal age curve", a high percentage of older deer, may or may not appear as an increase in the fifth, sixth, seventh, or eighth age class. Perhaps if a more precise aging technique were used, the proportion of older deer might become significant.

Assuming that the reader is a generous soul and accepts my interpretation of the archaeological deer kill, he would probably still be justified in asking, "So what?" Most of the other faunal analysts whose data I have borrowed have come to a similar pass. They have presented their views on the most important hunting

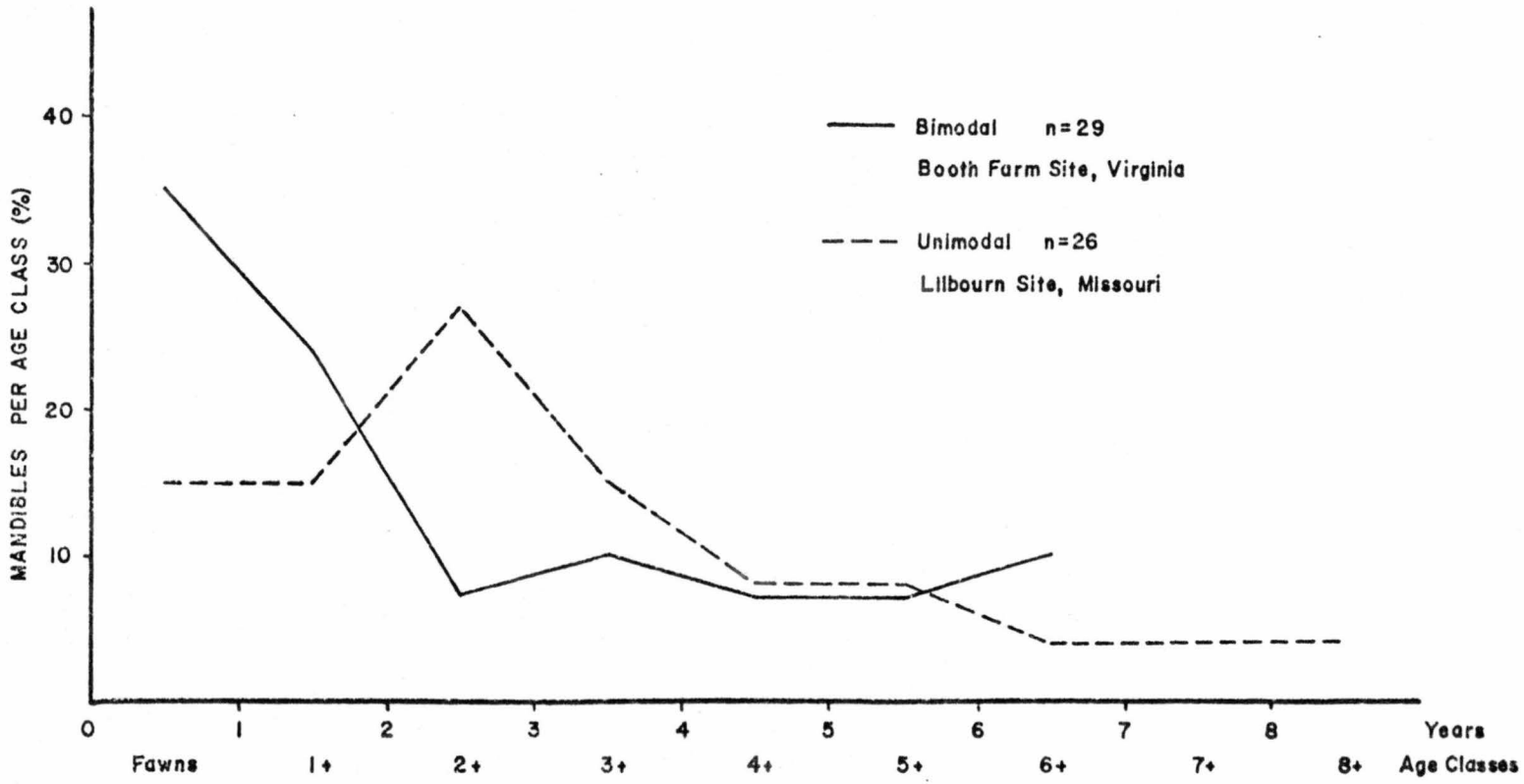

Figure II. EXAMPLES OF UNIMODAL AND BIMODAL AGE DISTRIBUTIONS OF PREHISTORIC DEER KILLS

technique used at a particular site, but have generally failed to see any overall trend or pattern. I suggest that such a pattern exists and that it mirrors an evolution in hunting methods which correlates with the socio-political development of native cultures in eastern North America.

D. Evolution of Deer Hunting Methods

The four categories of deer hunting techniques mentioned in ethnohistorical records for the Southeast (i.e., stalking, using a decoy while stalking, surrounds or drives to water, and surrounds or drives using fire) can be further reduced to two basic types: stalking versus communal drives. The first was practiced by the lone hunter, whereas drives involved several persons and sometimes hundreds, as among the Powhatan or Tuscarora. For these large-scale communal drives to be successful, the actions of many individuals needed to be controlled and coordinated. But a complex socio-political organization is not necessarily a prerequisite for communal drives. Great Basin Shoshone bands assembled periodically to hold communal rabbit drives (Steward 1955: 106). In areas where great herds of bison were available, prehistoric (pre-horse) bands and tribes from the Great Plains to the eastern prairies used drives and surrounds to procure their meat supplies (Wheat 1972: 92-94). These groups depended heavily, or even entirely, on hunting and

gathering for their subsistence.

The eastern woodlands offered prehistoric hunters a radically different situation. Deer tend to yard, or congregate in very restricted locales, in the north but not in the south. After the extinction of the Pleistocene megafauna and the concurrent northern retreat of caribou herds which used to roam the East, the remaining native species could all have been hunted readily by single hunters. Thus, we might predict that stalking would have been the principal deer hunting tactic from Early Archaic to Late Woodland times. With the increasing importance of agriculture during the Woodland period, hunting assumed a supplemental instead of a primary role in the exploitative strategy. Finally, in the Middle Mississippian cultures of the Midwest where large fortified villages were closely spaced in the bottomlands of the major rivers, competition for protein as well as agricultural land (Larson 1972) was intense. Carefully coordinated, seasonally scheduled deer drives would have been the most effective means of harvesting a limited resource. The Middle Mississippians had achieved a chiefdom level of socio-political organization; that is, they has redistributional societies with permanent central agencies of coordination (Service 1971: 134). This conclusion is derived from comparisons with flourishing Mississippian societies, such as the Natchez, observed by early European visitors, as well as from archaeological evidence for

hereditary ranked status (e.g., Larson 1971: 67). It seems reasonable to hypothesize that concommitant with the increase in social complexity was an elaboration of subsistence methods, specifically the intensified exploitation of selected species (cf. Smith 1975: 139).

The archaeological data on prehistoric deer kills fit the model quite well (Table 25). Considering for the moment only the prehistoric sites, twelve have bimodal deer age curves and five have unimodal curves. The first group consists of samples from one Late Archaic, eight Woodland, two Upper Mississippian (Fort Ancient), and one Middle Mississippian site (Banks site). The second group includes four Middle Mississippian and one Fort Ancient site (Graham Village). Hopefully without introducing an ad hoc argument to explain away the Banks and Graham Village deviations, it should be remembered that sampling error could be responsible. Paul Wilkinson has recently demonstrated that random deer hunting (in his case, unrestricted rifle hunting from a helicopter) can produce bone samples that are biased with respect to age (1976: 321), so we should not be surprised that the data do not exactly correspond to our expectations. The overall trends do hold, however; chiefly drives were used at Middle Mississippian sites and stalking at others, the Dan River sites among them.

The remaining five sites in Table 25 date from the period of historic contact with colonial British, French,

and Spanish cultures. The cultural affiliations of four of these sites are well established. Since all four were tribes and not chiefdoms, the fact that the deer kills at these sites resemble the unimodal Middle Mississippian curves seems to contradict the previously stated hypothesis. However, I suggest that in these cases a new factor, the European fur trade, is the disruptive influence responsible for the change in deer hunting methods from the prehistoric to historic periods.

The Europeans' desire for furs, especially for beaver pelts and deer hides (Crane 1929: 328), was a potent force in Indian-white relations from the earliest contacts (recall Arthur Barlowe's 1584 transactions with the coastal Algonquins, Quinn and Quinn 1973: 4-5). The Indians' desire for objects of European manufacture (Morgan 1975: 26) assured the continuation of trade once it was first established. To obtain the vast numbers of deer skins necessary to supply the traders, drives replaced stalking as the major method of deer hunting. Probably most of the groups had employed both hunting methods before, but to satisfy this new need, communal drives became preeminent.

Turning again to the archaeological data, we see that only one of the historic sites has a bimodal deer kill. This is the Buffalo site, where only two glass beads and three reworked brass scraps indicate trade with the English (Hanson 1975: 98). The other four

sites have abundant trade items, including firearms at three sites. Apparently the inhabitants were active participants in the fur trade.

The ethnohistorical records suggest several further tests of the hypotheses to explain the distribution of deer drives versus stalking methods. The early sources from the North Carolina coastal Algonquins make no mention of deer drives, even though drives and surrounds were quite important to the closely related Powhatan chiefdom twenty years later. Perhaps the Roanoke Colony accounts are simply incomplete, or the fur trade may have somehow taken root on the Chesapeake in the intervening twenty years. This latter possibility is lent some credence by a statement by Robert Beverley written in 1705. "It was the English alone that taught them first to put a value on their skins and furs, and to make a trade of them" (Wright 1947: 227). John Swanton (1946: 318) came to a similar conclusion on the basis of Spelman's assertion that, after a deer drive, the Powhatan took only "ther skinns which is the greatest thinge they desier, and sume flesh for their provision." However, Randolph Turner has cogently argued that furs were among the items of tribute levied by Powhatan, and that as early as 1610, accounts mention thousands of furs in Powhatan's storehouses at Orapaks (Turner 1976: 202). In other words, furs were an integral element of the tribute system which maintained the Powhatan chiefdom. If drives were not often held

further to the south, this may be because those groups were organized into small, relatively simple chiefdoms comprising only a few villages each, whereas Powhatan was paramount chief of an unusually complex chiefdom, incorporating about thirty smaller chiefdoms representing over one hundred villages (Turner 1976: 123). According to the evolutionary model of deer hunting presented previously, the development of the Powhatan chiefdom should be recognizable in the archaeological remains by a shift from a stalking to a drive hunting pattern.

John Lawson's explicit statement regarding the North Carolina Indians' (particularly the Tuscaroras') motives for holding communal deer drives ("Here it is, that they get their Complement of Deer-Skins and Furs to trade with the English," Lefler 1967: 216) is rather convincing evidence that the fur trade was a source of change for less complex societies (Boyce 1971: 61). Unfortunately for archaeologists, many of the historic groups which adopted deer drive tactics, held their communal hunts at some distance from their permanent villages. But the evidence for hunting methods would not necessarily be similar at the two sites. If butchering was done at the temporary camp (some of which were quite large and should be identifiable archaeologically) and only dried meat was taken to the permanent village, there would be no archaeological evidence at the village of those deer killed in drives. Some of the historic groups which

held communal winter hunts away from their main villages were the Tuscarora (Lefler 1967: 65), Miami (Kinietz 1940: 171), Seneca (Morgan 1962: 345), and Huron (Trigger 1969: 31). The intertribal buffer zones which existed in the upper Mississippi Valley (Hickerson 1965) and Virginia Piedmont (Turner 1976: 177) in early historic times were apparently unoccupied except for seasonal communal deer drives.

Communal deer drives were still being held by the Pamunkey Indians, a coastal Virginia Algonquin tribe, in the 1930's and 40's (Speck and Schaeffer 1950). The Pamunkey were members of the Powhatan chiefdom in the early seventeenth century and practiced communal hunting at that time. By the mid-twentieth century, deer drives had lost their economic significance and had assumed largely ritual importance. According to Speck and Schaeffer's ethnographic descriptions, an informally chosen leader assembled twelve to fifteen men and boys for the annual drives. The participants, using dogs, then drove deer from a swamp toward hunters waiting in canoes.

> In 1938-39 only one deer was killed in the drive; the following season two were killed ....
> The annual deer drive at Pamunkey is an event of importance, when the hunters secure the venison which they carry to the Governor's house at Richmond in fulfillment of their treaty obligations to furnish yearly tribute in the form of flesh, fur, feathers, and scale ... The Pamunkey are justly proud of the fact that they have performed this duty without a break since

> the adoption of the treaty between them and the General Assembly of Virginia in 1677 (Speck and Schaeffer 1950: 4).

The communal drives were an opportunity for the Pamunkey to reaffirm their "Indianness". As Speck and Schaeffer (1950: 11, 14) indicate, "the Pamunkey Indians have always striven deliberately to perpetuate their separate identity as descendants of the Powhatan Confederacy in the overwhelmingly non-Indian population of the State of Virginia." In this sense, the annual drives served an integrative function for the Pamunkey. I posit that this integrative element was present in prehistoric chiefdoms which practiced communal hunting. Furthermore, those historic tribes which increased their reliance on drives would have benefited from increased social integration at a time of disruptive confrontation with Euro-American culture. Thus, I see situations of increasing socio-cultural complexity and demands spawned by the historic fur trade as equally predisposing cultures toward the adoption of communal deer drives.

Conclusions

My aim throughout this thesis has been to present a balanced view of Dan River cultural ecology, without over emphasizing either the cultural or natural aspects. This approach has been useful for better understanding the pattern of Dan River faunal exploitation, in detail and in relation to other cultures of the Eastern Woodlands.

Several specific conclusions can be drawn regarding prehistoric Dan River subsistence. It was primarily based on corn and beans agriculture and deer hunting. Several other plant and animal species were selectively utilized when available at seasonally high densities. The seasonal round emphasized deer hunting and food storage in winter, small game capture in spring, fishing and wild and domestic plant food harvesting throughout the summer and fall, and nut gathering and turkey hunting during the fall and early winter. White-tailed deer, the most important protein source, were hunted primarily by stalking in winter. This type of hunting strategy was shared with most prehistoric cultures of the Eastern Woodlands.

However, deer hunting strategies do appear to have differed under certain conditions. An evolution in hunting methods correlates with the development of chiefdom-level societies. Some examples are the Middle Mississippian cultures which relied on deer drives and other intensive exploitative techniques. The historic fur trade led to the adoption of similar strategies by tribal-level societies attempting to compete effectively for trade goods. Dan River deer hunting had become a seasonally intensive activity, but the level of socio-cultural complexity was insufficient to maintain the permanent agencies of coordination necessary to rely heavily on communal hunts.

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