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Paleoethnobotany of the Late Woodland Mason Phase in the Elk and Duck River Valleys, Tennessee

J. David McMahan
University of Tennessee, Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by J. David McMahan entitled "Paleoethnobotany of the Late Woodland Mason Phase in the Elk and Duck River Valleys, Tennessee." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Anthropology.

Charles H. Faulkner, Major Professor

We have read this thesis and recommend its acceptance:

Jefferson Chapman, Walter E. Klippel

Accepted for the Council:
Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Vice Chancellor
Graduate Studies and Research

PALEOETHNOBOTANY OF THE LATE WOODLAND MASON PHASE IN THE ELK AND DUCK RIVER VALLEYS, TENNESSEE

A Thesis

Presented for the

Master of Arts

Degree

The University of Tennessee, Knoxville

J. David McMahan

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ABSTRACT

A substantial sample of paleobotanical residues from two Late Woodland Mason phase components in southeastern Middle Tennessee were examined. The data were analyzed to determine what plants were available to Mason populations, which of those plants were utilized, the local geographic areas exploited, and the impact of man's procurement practices on the environment. Inferences derived from paleobotanical analysis are used to suggest a pattern of Mason plant utilization that can be integrated with other subsystems to provide definitive statements concerning the cultural whole. These statements provide a basis for comparing Mason with other cultural manifestations in the local cultural sequence of the Eastern Highland Rim.

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CHAPTER I

INTRODUCTION

A. THE MASON PHASE: DEFINING ATTRIBUTES

The Mason phase is presently one of the least understood manifestations in the prehistoric cultural sequence of the Eastern Highland Rim of Middle Tennessee. This Late Woodland cultural assemblage was first defined at the Mason site (40FR8) in the Tims Ford Reservoir on the upper Elk River in 1966 (Faulkner 1968). It was subsequently redefined on the basis of extensive fieldwork in the Normandy Reservoir on the upper Duck River from 1972 to 1975 (Faulkner and McCollough, eds. 1973, 1974, 1977, 1978, 1982; McCollough and Faulkner, eds. 1976). The Mason cultural assemblage is distinctive from preceding Middle Woodland and succeeding Early Mississippian assemblages in the Eastern Highland Rim as well as from the contemporary Late Woodland Hamilton phase that has been defined primarily in the eastern Tennessee Valley. Ceramic typology initially constituted the primary mechanism for separating the Mason phase as a discrete cultural unit but the separation has been substantiated by differences in patterns of food storage, human interment, subsistence, and settlement.

The most characteristic ceramic types found in Mason assemblages are classified in the Elk River series which was first defined at the Mason type station and constituted 87.9 percent of the total sherd count at that site. The Elk River types are distinct from Late Woodland Hamilton phase types due to different patterns of manufacture (Faulkner 1968: 58-59). These patterns include the use of chert as a tempering material, a preference for a knotted net to wrap the paddle used in shaping the vessel, and a general absence of scraping the interior and exterior vessel walls. The Elk River series, consisting of Elk River Cord Marked, Elk River Plain, Elk River Knot Roughened and Net Impressed, and Elk River Check Stamped, was initially believed to be restricted to the upper portion of the Elk River drainage. It has since been found in the middle and upper Duck River Valleys in the Columbia and Normandy Reservoir areas, respectively (Faulkner and McCollough, eds. 1973: 42-43; Faulkner, personal communication). The Elk River series was presumably related to the limestone-tempered Hamilton pottery of the eastern Tennessee Valley, this conclusion being based upon direct association of Hamilton and Elk River pottery at the Mason type site (Faulkner 1968: 58). Faulkner interpreted the occurrence of a higher percentage of limestone-tempered ceramics later in time on the Mason site to possibly represent closer contact between the two cultural groups. He further suggested on the basis of observations at the Mason site that the Mason phase was distinct from Hamilton, yet was related to it due to interareal contacts and possible development from a common Middle Woodland base. Data acquired later from the Normandy Reservoir and Elk River Valley (e.g., Butler 1980: 37-40) have done nothing to refute this conclusion.

The Mason occupation of the study area is followed by the Early Mississippian Banks phase which is marked by the predominance of shell-tempered ceramics. It is of interest that a single feature (Feature 24) at the Mason site produced shell-tempered sherds representing two or three vessels in direct association with a majority of Elk River series sherds. Although the shell-tempered sherds exhibited no characteristics that could be used as temporal indicators, Faulkner (1968: 55) suggested an Early Mississippian date based upon context and proposed that trade vessels were represented. Recently, other occurrences have been reported of shell-tempered ceramics in association with chert-tempered types at the Fayetteville By-Pass site (40LN86). At that site an admixture of shell-tempered, chert-tempered, and some shell/chert-tempered ceramics occurred over the ground surface and in 20 of 25 pottery producing features. It was of perhaps more significance that vessel form reconstructions based upon chert-tempered sherds there were suggestive of a strong Mississippian influence (Dickey n.d.). Radiocarbon dates suggest temporal overlap of the Mason phase with Early Mississippian components (see Chronology, p. 6).

Aside from differences in ceramic typology, the Mason phase is defined by a type of food storage pattern characterized by the presence of clusters of large pits. At the Mason site Faulkner (1968: 15-16) described four types of pits according to form as follows:

> The most numerous feature was Type A, a shallow, basin-shaped feature. There were 15 examples of this type. Type B pits were deeper and had moderately straight sides and a flat bottom. Five pits were placed into this category. The

> Type C pit was represented by four examples. This was a large pit with undercut sides and a flat bottom, the classic "bell-shaped" storage pit. Four Type D pits were deeper features with sloping sides and a rounded or conical bottom. This is the so-called "kettle-shaped" storage or refuse pit so commonly described on Woodland sites in the Tennessee Valley.

Type C, the bell-shaped facility, while not the most numerous, does seem to be the most characteristic feature of Mason phase derivation. In addition to the Mason site, Type C pits have been reported at the Yearwood site (40LN16) (Butler 1980: 37) and at the Fayetteville By-Pass site (Dickey n.d.). They are generally considered to be a hallmark of the Mason phase in the study area and are rarely associated with other cultural components there.

In the eastern Tennessee Valley this class of feature was first documented in Emergent Mississippian Martin phase components of which its widespread use is a hallmark (Jefferson Chapman, personal communication 1983). The Martin phase, now referred to as the Mississippian I period Martin Farm ceramic cluster, dates from A.D. 900 to 1000 (Schroedl et al. 1982: 10) and overlaps the Mason phase temporal range. What was previously identified as the Hamilton focus (Lewis and Kneberg 1946: 169-179) or phase traverses the time frame of the Mississippian I phase but is now recognized as a burial mound complex occurring in both Woodland and Mississippian contexts in East Tennessee (Schroedl 1978).

The bell-shaped pits most likely were used primarily as food storage facilities, probably for plant foods (Faulkner 1968: 23; Butler 1980: 39). Their primary functional attributes were undoubtedly altered, however, as emptied pits were used as refuse depositories or for other activities such as food processing. Faulkner has compared their function to that of the large bell-shaped cache pits of the late prehistoric and early historic Indians of the eastern Plains as described by Lowie (1954). These were used primarily for the storage of maize and other cultigens. A similar class of pit features has been described for three Late Woodland sites in the Lower Kaskaskia Valley of southern Illinois. Feature 9 at the Emge Site (21CL37) is reported to have contained carbonized Andropogon stems, the presence of which suggested to the investigator that it was used for storage (Kuttruff 1974: 117). This is of course contingent upon an assumption of in situ burning. The unique morphology of this feature class and the fact that it occurs most frequently on Late Woodland sites may suggest a distinctive type of food storage pattern. Because their widespread usage began at about the same time in the eastern Tennessee Valley as in the study area, one may presume that similar phenomena were responsible for their appearance in both areas.

Mason phase mortuary patterning, although based upon a small sample, can be distinguished from Late Woodland/Emergent Mississippian mortuary patterning in East Tennessee. Mason burials analyzed from the Normandy Reservoir consisted exclusively of a mixture of semiflexed and tightly flexed flesh interments (Brown 1982a: 169, 172). Hamilton phase burials are also generally flexed flesh interments but are distinguished from Mason phase interments by their incorporation into accretional mounds, some of which enclose log tombs (e.g., Lewis and Kneberg 1946: 136-137). No Late Woodland burial mounds are known to exist in the Eastern Highland Rim.

Mason mortuary patterning also differs from that of preceding and succeeding cultural manifestations in the local cultural sequence of the study area. Preceding late Middle Woodland Owl Hollow phase burials consist of a mixture of flexed flesh inhumations and redeposited cremations, the latter having first appeared earlier in Middle Woodland times. Mortuary patterning of the Early Mississippian Banks phase is characterized by the appearance of fully extended flesh interments for the first time in the study area (Brown 1982a: 130-135, 200). Differences between the burial practices of Mason phase populations and those of Owl Hollow phase and Banks phase populations help to substantiate the isolation of the former as a discrete cultural unit.

B. CHRONOLOGY

Uncorrected radiocarbon dates on charcoal from the Mason and Parks sites prompted Faulkner and McCollough (eds. 1974: 298) to suggest a temporal range of A.D. 600 to A.D. 900 for the Mason phase. This follows an A.D. 200 to A.D. 600 range suggested for the Owl Hollow phase and precedes an A.D. 900 to A.D. 1400 range suggested for the Banks phase. A current assessment of radiocarbon dates on 11 samples from six archaeological sites in the Duck and Elk River valleys may slightly extend the range for Mason phase occupation there (Figure 1). These samples produce a mean date of A.D. 853 with an n-1 weighted standard deviation of 188.56 years.

It is of interest that a majority of the dates cluster either above or below the mean. This disparity in the distribution of Mason component radiocarbon dates may warrant further research to evaluate its validity. The time range in question corresponds to a major change in the earth's average geomagnetic intensity ratio (Bucha et al. 1970: 111-114) which has been correlated to fluctuations in the production of atmospheric carbon-14 (Michels 1973: 150-153).

In the eastern Tennessee Valley a group of burial mounds at the McDonald site (40RH7) and Leuty site (40RH6) have yielded a series of 12 radiocarbon dates which range from A.D. 570 to A.D. 1435 (Schroedl 1973: 3-11), almost entirely encompassing the period of Mason occupation in the study area. The mounds would have traditionally been classed within the Late Woodland Hamilton focus or phase. As previously noted, however, the Hamilton phenomenon is now recognized as a burial complex occurring within both Late Woodland and Mississippian contexts (Schroedl 1978).

In the study area there is typically good temporal separation between Owl Hollow phase and Mason phase components. There is substantial evidence, however, for temporal overlapping of the Mason phase occupation with that of the Early Mississippian Banks phase. This has been suggested by DuVall (1977: 150-151) on the basis of Normandy Reservoir data. Such an overlap has been substantiated at the Fayetteville By-Pass site by the presence of Mississippian-like pottery vessel forms constructed from chert-tempered clay (Dickey n.d.).

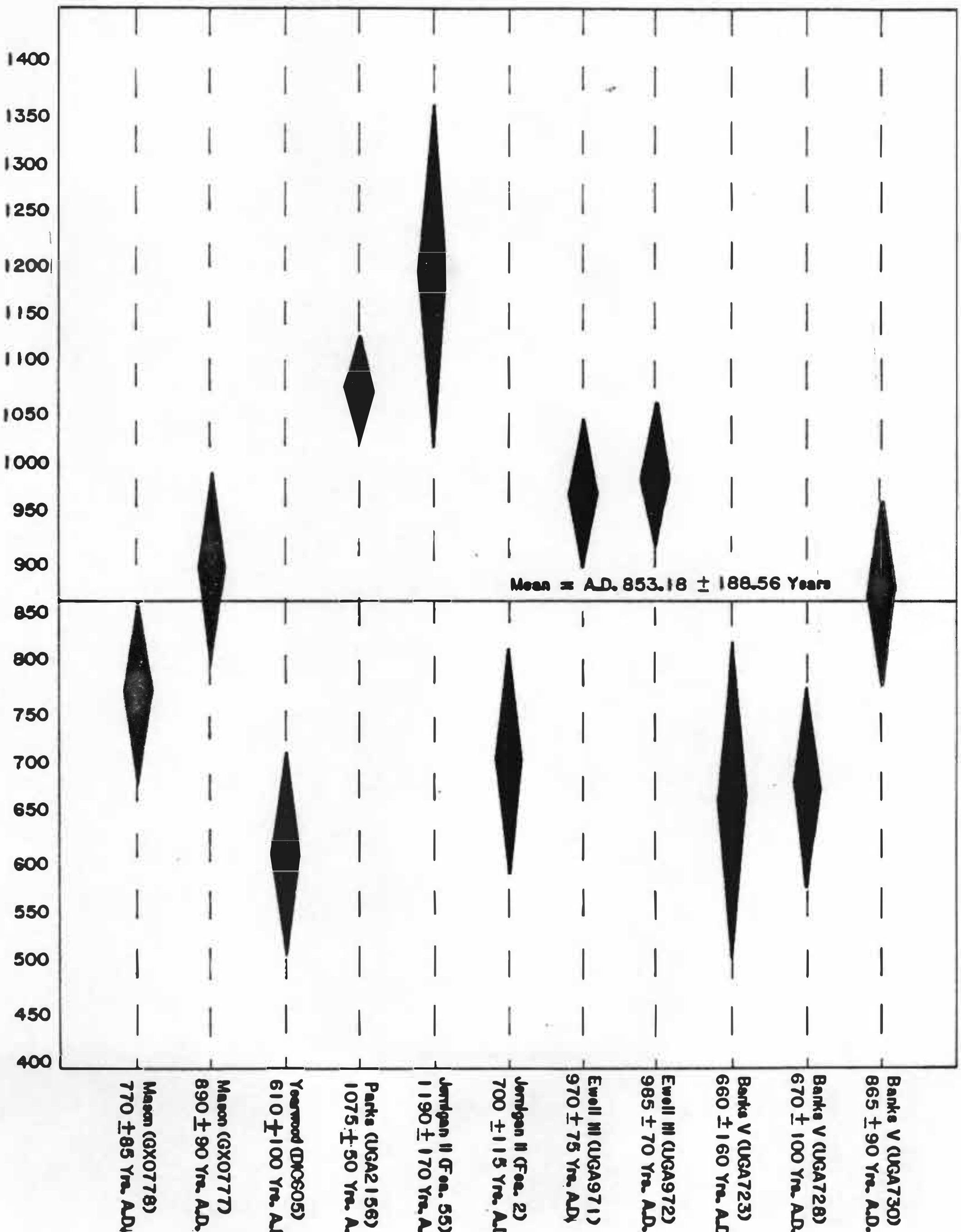

Figure 1. Mason phase radiocarbon dates.

CHAPTER II

PROBLEM ORIENTATION AND METHODOLOGICAL CONSIDERATIONS

A. PROBLEM ORIENTATION

The Mason phase occupation of the Elk and Duck River valleys poses an interesting problem to archaeologists working in the area. While there are some similarities between the Mason phase, Owl Hollow phase, and Banks phase material cultures, the picture as a whole is one of contrasts in which the Mason phase is difficult to explain in terms of an indigenous development. This is at least in part due to the sparsity of Late Woodland components in the overall cultural inventory for the study area. In reporting on the 1972 seasons at Normandy, Faulkner and McCollough (1974: 585) indicate that:

> It is . . . unfortunate that virtually no settlement data is yet available for the intervening Late Woodland Mason phase in the local sequence. Therefore, no hypothesis can be generated to account for the specific cultural changes that ushered in the Mississippian lifeway. The relationship between the Late Woodland Mason phase and Mississippian Banks phase should prove to be a most interesting problem when both of these manifestations have been better defined in the upper Duck Valley.

Investigations following the 1972 season at Normandy have proven largely unsuccessful in resolving questions concerning the Mason phase occupation of the area. Interpretations of the limited data available suggest profound qualitative differences between the Mason subsistence-settlement system and the subsistence-settlement systems of the preceding Middle Woodland McFarland and Owl Hollow phases or the later Early Mississippian Banks phase. Prescott (1978), in analyzing data from five formal surveys of the Normandy locality between 1973 and 1975, observed little surface evidence for Late Woodland occupation. Surface data where available did suggest Mason phase activity at fifteen loci, three of which may represent intense occupations. While Prescott (1978: 461) acknowledges that surface data are insufficient to suggest a Mason subsistence-settlement model, he uses projectile point/knife ratios as an indicator that Mason phase utilization of the Normandy locality was highly transient in nature and that upland areas were utilized for collecting and/or hunting. This is consistent with Faulkner and McCollough's (1973: 428) belief that family groups moved frequently to areas of seasonally available resources in the Late Woodland period.

That Mason phase settlement-subsistence represents a discontinuity in the local cultural sequence, particularly regarding plant use patterns, has been substantiated by Crites' (1978) analysis of carbonized plant remains from seven sites in the Normandy locality. While the early Middle Woodland McFarland phase plant use strategy is characterized by use of a broad spectrum of cultigens and herbaceous plants, the limited Mason phase data suggest an almost total reliance upon a restricted spectrum of arboreal nuts such as hickory, walnut, and acorn and represent an adaptive strategy more typical of Late Archaic populations in the area. The Early Mississippian Banks phase is characterized by an intense use of cultigens, particularly maize, and a spectrum of arboreal and herbaceous plant foods which has been described as "the most diverse encountered in the Normandy Reservoir" (Crites 1978: 204-205, 213, 217). The apparent similarities between Middle Woodland and Early Mississippian plant use patterns confirm previous findings by Shea (1977) as based upon her analysis of carbonized plant materials from the Banks V site in the Normandy locality. It is unfortunate that Late Woodland botanical materials were not available from that site to be included in her sample.

The Mason phase can possibly be viewed in the context of a broader regional perspective in which the Late Woodland period in most of Eastern North America is seen as somewhat of a disclimax following a disruption of the participation of many local groups in the Middle Woodland Hopewell Interaction Sphere (Caldwell 1964). While the decline is most easily observed in areas previously occupied by the Hopewellian cultures, its effect via interregional cultural intercourse can be seen over most of the East, with the only notable exception being in the Lower Mississippi Valley of the deep South (Griffin 1967: 186-187). The cultural climax following the Middle Woodland period has prompted explanations by several archaeologists, none of which are entirely satisfactory.

Prufer (1964: 66) spoke of the possibility of a plague and of invading Fort Ancient phase peoples in Ohio. He later suggested that "certain disturbances" disrupted the Hopewell exchange network and consequently caused a collapse of "the system itself, like a house of cards" (Prufer 1965: 136). Wray and McNeish (1961: 67) explained the Hopewell decline in terms of "internal political differences, or, possibly a reassertion of local tribal independence after the use of agriculture had become familiar and trustworthy." Griffin (1952: 361) suggested that Hopewell culture had reached a climax beyond which it could no further develop, essentially because of a limiting subsistence base but also influenced by "cultural fatigue," the continuing destruction and burial of their finest art products, and the growth and development of the Mississippian culture with a different cultural orientation and values. All of the above theories are largely speculative with little supporting evidence.

The first ecological explanation was offered by Griffin (1960: 21-33), who modified his previous view to suggest a minor phase of cooler climate in the northern Mississippi Valley and Great Lakes area which would have significantly contributed to a decline in the reliability of agricultural products, particularly maize, and which would consequently have resulted in the decline from "Hopewell-Woodland" to early Late Woodland cultural forms. Griffin adequately supported his views with an historic analog and climatic data generated by world-wide sea level fluctuations, dendrochronological sequences, and available faunal and floral reconstructions. An admitted problem with the explanation, then and now, is the sparsity of maize occurrences in good Middle Woodland, particularly Hopewellian, context.

Vickery (1970: 57-77) concurred with the climatic deterioration hypothesis and compiled data from a number of relevant pollen studies which were lacking at the time of Griffin's (1960) article. He also reviewed new evidence for maize agriculture in the Middle Woodland period and discussed the potential impact of slight temperature changes upon the length of the frost-free season and resultant biotic responses. Historic analogs of biotic responses to slight temperature decreases were coupled with Yarnell's (1964: 129) findings that ". . . the Indians who lived in areas where the frost-free period was less than 120 days could not depend upon maize agriculture for subsistence," to support his contention that the growing season in a particular area could be shortened sufficiently in only a few years for maize agriculture to become unreliable (Vickery 1970: 65-67). He finds, for example, that following analog conditions, the cultivation of maize by a culture located in an area of 190 frost-free days, which happens to be the present average growing season in the Mason study area, could become unreliable in a period of only 50 years.

B. METHODOLOGICAL CONSIDERATIONS

Viewed holistically, all aspects of culture are functionally interdependent upon one another, albeit not equally, and insight into one aspect of a particular culture may contribute to an understanding of that culture's dynamic properties in general. Subsistence is necessarily at the core of such a model (Steward 1955), and archaeologists are increasingly realizing the importance of subsistence patterns in explaining segments of prehistoric cultural development. One cannot fully understand subsistence without an understanding of ethnobotany, which traditionally has been viewed as the study of the interrelations among human and plant populations (Asch, Ford, and

Asch 1972: 1). The paleoethnobotanist, from the limited data available to him, endeavors to understand a given ecosystem by ascertaining,

> What plants were present, the natural environmental factors affecting each population's life cycle, and the physio-genetic information about the consequences of exploitation at any stage in its life cycle. By determining the nutritional value of the edible plants and the amount needed and used by the human population, one can determine: (1) the geographic area of exploitation and (2) the impact of man's procurement practices on plant populations. The ethnobotanist's second major objective is the explication of changing patterns of man-plant coreactions through time (Asch, Ford, and Asch 1972: 1).

Previous data indicate that the Mason phase pattern of "man-plant coreactions" differed from those of Earlier and later cultural phases in the Normandy Reservoir area (Crites 1978). While Crites (1978: 2) is well aware of the objectives of the paleoethnobotanist as outlined by Asch, Ford, and Asch (1972) and their implications towards discerning prehistoric subsistence patterns, his research priorities were necessarily directed towards a general understanding of all components in the Normandy Reservoir and, unlike the present research, could not focus primarily upon the Mason phase material. All Normandy components were interpreted under the basic premise that culture is to be treated as an adaptive system and that man's cultural development in the upper Duck Valley can be partially explained by his adjustment to local ecosystems (Crites 1978: 1; Faulkner and McCollough 1973: 2). This premise remains paramount in the present research but it is not to say that adjustments of human societies to their environments do not permit latitude for a certain range of possible behavior patterns (Steward 1955), and it is believed that the Mason phase can be interpreted within these parameters.

The Mason problem, viewed from the perspective of a deductive theoretical orientation, is twofold. First, independent data may either (1) negate the previous interpretations based upon small botanical samples that the plant use strategy utilized by the Mason people represents a discontinuity in the local sequence, or (2) substantiate such previous findings. If previous interpretations are negated, Mason subsistence patterning must be explained in terms of a continuum in man's cultural development in the local sequence. If previous interpretations are upheld and the Mason plant use strategy is taken to be qualitatively different from strategies utilized by preceding Middle Woodland and succeeding Mississippian cultural manifestations, then this difference must be addressed by testing with new data the three hypotheses proposed in the literature. These include:

1. the Mason phase represents a local population intrusion (Faulkner and McCollough 1982: 566),
2. Mason phase components investigated so far may represent seasonal utilization by small populations (Crites 1978: 217; Butler 1980: 40), and
3. indigenous populations were stimulated to change their subsistence strategy to adapt to a changing environment (e.g., Griffin 1960; Vickery 1970).

These hypotheses are not entirely mutually exclusive and are complicated by the enumerable variables which must always be accounted for when comparing archaeobotanical assemblages. Some of these variables, such as site or loci function and seasonality of occupation, are extremely difficult to control for without an appropriate data base, perhaps making absolute deductive tests shaky or untenable. Certain overall trends in the available Mason data, however, should lend or deny credibility to the hypotheses presented.

For example, if botanical data is to support the contention that the Mason phase represents a local population intrusion (Faulkner and McCollough 1982: 566), one might expect to find marked and replicable differences between the plant resources utilized by the Mason people and those utilized by people of preceding and succeeding cultural manifestations in the local sequence. This rests on the assumption that sites of similar function and location are compared, and that the inventory of available plant resources was essentially unchanged throughout the period of time in question. Intercultural differences may also be suggested by differential patterns of food preparation insofar as they can be distinguished from examining artifact inventories and botanical data.

Commensurate with the suggestion that Mason components investigated so far may represent seasonal utilization by small populations (Crites 1978: 217; Butler 1980: 30) is the assumption that habitation sites occupied during other seasons are also present in the study area. The ultimate test of this hypothesis awaits investigations of sites in the latter categories. Most Mason sites investigated thus far contain a preponderance of only a few select plant foods available in the fall and late summer which supports Crites' suggestion. To substantiate this with new data, one would expect to find only one or a few major food categories represented in the paleobotanical samples recovered from some sites, particularly foods that are only collected in one or two seasons, as contrasted to a broader range of plant foods from larger base camps or villages exhibiting substantial structural and mortuary evidence. The concept of seasonally occupied sites is not mutually exclusive of other hypotheses, of course, and is probably valid regardless of other factors influencing the Mason plant-use pattern.

The ecological hypothesis that indigenous Late Woodland populations were stimulated to change their subsistence strategies in order to adapt to a changing environment is the easiest to test objectively, given sufficient data. Several approaches may be taken to assess the paleoenvironment during the temporal span of Mason occupation and provide an inventory of available plant resources. Forest stand data for the time of European settlement in the study area can possibly be inferred from archival land survey records which have, to the author's knowledge, not been previously exploited by archaeologists. This would provide a base with which to compare forest stand data representing the Late Woodland and earlier periods. The analysis of botanical macrofossil data, particularly that provided by wood charcoal, is in itself a currently available paleoenvironmental indicator for the study area. Supplemental data are provided by two pollen cores taken from within the study area, but these investigations were designed to reflect overall biotic changes in the Quaternary and are of generally insufficient resolution to clearly reflect minor climatic phases (Delcourt 1979).

CHAPTER III

ENVIRONMENTAL SETTING AND SITE DESCRIPTIONS

A. PHYSIOGRAPHY AND CLIMATE

Substantial unanalyzed Mason phase botanical samples were available from two sites, the Parks site (40CF5) in the upper Duck River Valley and the Mason site (40FR8) in the upper Elk River Valley. Both were relatively large multicomponent habitation sites situated at the western edge of the Eastern Highland Rim physiographic section of the Interior Low Plateau's physiographic province (Fenneman 1938). This is a transitional zone wherein the valley floors are a part of the Nashville Basin and the adjacent ridges are components of the Eastern Highland Rim physiographic section. The Nashville Basin was formed when the section was gently uplifted at the end of the Paleozoic Era and the resulting structural dome was eroded away leaving older and softer Paleozoic formations at the center with more resistent chert-bearing Paleozoic outcroppings on the periphery. The Eastern Highland Rim is deeply dissected by the valleys of the Elk and Duck rivers. The Duck, in the vicinity of the Parks site, is entrenched down to the Ordovician Hermitage and Bibgy-Cannon limestone formations (Wilson 1970) at an elevation of about 800 ft (244 m) above mean sea level, while that portion of the Elk in the vicinity of the Mason site has cut into the Warsaw and St. Louis limestone formations (USDA 1958: 2) at an elevation of about 790 ft

(241 m). The eastern boundary of the Highland Rim borders the escarpment of the Cumberland Plateau with its limestone and sandstone cliffs rising some 800 to 1,000 ft (244 to 305 m) above the low plateau surface of the Rim to an average Plateau elevation of 1968 ft (600 m) above mean sea level (Faulkner and McCollough 1973: 2-7; Delcourt 1979: 257).

The climate of the upper Duck and Elk valleys corresponds to Koppen's (1931) "humid, mesothermal, subtropical" category. It is characterized by a seasonal rhythm in temperature and abundant precipitation. The average yearly temperature in nearby Tullahoma at an elevation of 1,072 ft (327 m) above mean sea level is 59.30 degrees fahrenheit and the average annual rainfall is 54.17 inches based upon a 67 year record (Love et al. 1959). The average annual rainfall becomes slightly greater as the western escarpment of the Cumberland Plateau is ascended. Summer and fall are the driest seasons of the year (Faulkner and McCollough 1973: 8) resulting in a minimum of stream flow during September and October (TVA 1972). Winter and spring are the wettest seasons and average 16.47 and 14.73 inches of rainfall respectively (Faulkner and McCollough 1973: 8). Streamflow is heaviest during the first quarter of the year and all floods on the Duck River at Shelbyville since 1887 have occurred between November and May. Winters are generally mild, with an average temperature of 42.2 degrees fahrenheit and an average snowfall of 6.1 inches (TVA 1972: 18). Lindsey and Sawyer (1971) have classified the climate of the Eastern Highland Rim in accordance with the Holdridge model of world bioclimatic formation, as "warm to cool temperate," with an average biotemperature of 12.2 degrees C., a mean annual precipitation of 111.7 cm, and a mean evapotranspiration/precipitation ratio of 0.642.

B. NATURAL VEGETATION

Major vegetation boundaries in the Middle South are largely due to climatic factors but the distribution of plant species, populations, and forest types in the study area is also related to substrate, degree and exposure of slope, aspect, soil moisture, and soil-mantle stability (Delcourt 1979: 257).

The Society of American Foresters (Eyre 1980) places the entire study area within an oak-hickory major forest type which is subdivided into a number of forest cover types depending upon one or more dominant taxa. The traditional and most widely used scheme for classifying the eastern deciduous forests, however, is that of Braun (1959) and, although questioned by some botanists, it does fulfill organizational needs for the present study. The system defines ten major forest regions within the deciduous forest formation and further describes a number of sections within each region. Following Braun, the study area falls within an edge area or ecotone between two of these regions, the Mixed Mesophytic Forest region and the Western Mesophytic Forest region.

The Mixed Mesophytic Forest region is generally coextensive with the unglaciated Appalachian Plateau, including the Cumberland Plateau and dissected Highland Rim. The association which characterizes this region is the most complex and the oldest of the Deciduous Forest Formation. It develops only on moist but well-drained sites and includes beech, tuliptree, several species of basswood, sugar maple, sweet buckeye, chestnut, red oak, white oak, and hemlock (Braun 1950: 35, 39). The climax reaches its best development in the Cumberland Mountains where many variants occur. It should be added that most botanists now believe, based upon palynological studies (e.g., Whitehead 1973; Delcourt and Delcourt 1981), that the Mixed Mesophytic Forest is of more recent age than thought by Braun and postdates the last full glacial episode.

The Western Mesophytic Forest region is essentially coextensive with the Interior Low Plateaus physiographic province, including the Nashville Basin. The region is itself considered to be an ecotone between the Mixed Mesophytic Forest region to the east and the Oak-Hickory Forest region to the west. Its vegetation consists of a mosaic of unlike climaxes and subclimaxes including oak-hickory, prairie, oak-tuliptree, beech-chestnut, and many edaphic communities (Braun 1950: 35, 122). The Cedar Glades (Quarterman 1950: 234-255) and "barrens" or "prairie openings" (Lewis 1954: 11-12; DeSelm et al. 1973) which occur within the study area are interesting examples of edaphic communities.

If Braun's perception of the floral pattern is correct, that the transition between the Mixed and Western Mesophytic forests occurs at the juncture of the dissected Highland Rim and the Nashville Basin, then both the Duck and Elk River valleys are situated within an ecotone. Ecotones frequently support a greater number of species at a higher density than in either of the adjacent natural areas (Knight 1965: 251). Faulkner and McCollough (1973: 9) use this concept to suggest that the upper Duck River Valley may have had a relatively high carrying capacity for the aboriginal hunter and gatherer, a concept which is also applicable to the Elk River Valley.

Shelford describes the climax forest of the Nashville Basin and dissected Highland Rim as being tulip-oak and containing such dominants as tuliptree (Liriodendron tulipifera), beech (Fagus grandifolia), white basswood (Tilia heterophylla), yellow buckeye (Aesculus octandra), sugar maple (Acer saccharum), American chestnut (Castanea dentata), and oaks such as white (Quercus alba), northern red (Quercus rubra), and chinkapin (Quercus muehlenbergii). Other species which are not as numerous but nevertheless important include cucumbertree (Magnolia acuminata), white ash (Fraxinus americana), red maple (Acer rubrum), shagbark (Carya ovata) and bitternut (Carya cordiformis) hickories, blackgum (Nyssa sylvatica), and black cherry (Prunus serotina (Shelford 1963: 35). Of 278,400 acres of land surrounding the Parks site in Coffee County, 42 percent is in commercial forest. Of this commercial forest, 83.33 percent is oak-hickory, 8.33 percent is in eastern red cedar, and 8.33 percent is oak-gum-cypress. Franklin County, in which the Mason site is located, has a total area of 358,400 acres, of which 52 percent is forested. Oak-hickory forest again predominates, comprising 94 percent of the commercial forest with cedar and maple-beech-birch forest types each contributing 3 percent (Hedlund and Earles 1971). The percentages of forest types mentioned above are biased to exclude all but commercially profitable species, of course, and the forest coverage prior to settlement, land clearance, lumbering, and cultivation, which began in the late 1700s, consisted of a mosaic of oak and mixed hardwood forest and barrens (DeSelm et al. 1973).

Faulkner and McCollough (1973: 10), in order to better organize and interpret their Normandy Reservoir archaeological data, divided the mesophytic forests of the upper Duck Valley into several plant communities that, when co-extensive with certain topographic features, constitute four biogeographic zones. These are the flood plain, older alluvial terraces, valley slopes and bluffs, and uplands, each of which was considered to be a floral and faunal "resource zone" that would have provided aboriginal populations with a variety of natural plant and animal foods. Concomitant with the division of a deciduous forest region into biogeographic zones is the probability that each would have had a higher carrying capacity for aboriginal man during a particular season due to differences in the availability or productivity of plants and the animals that feed on them. Seasonal availability undoubtedly had a profound influence upon the settlement patterning of prehistoric populations, especially with regard to populations adapted to the exploitation of a few seasonally abundant, easy-to-collect, "first line" foods such as hickory nuts (Asch et al. 1972: 27). By defining the natural environment in terms of seasonality, production, availability, and distribution of resources, we should be better able to correlate archaeological components with particular resource zones and more accurately determine the type of settlement system.

Floral and faunal components for each biogeographic zone in the upper Duck Valley have been previously described by Faulkner and McCollough (1973: 11-51). Because their text is also applicable to the upper Elk River Valley, a detailed description of these resources is omitted here. Also omitted is an inventory of all species in the study area known to have been utilized by aboriginal populations, except where directly pertinent to archaeological data. This has been very adequately accomplished by Faulkner and McCollough (1973: 11-51) and by Shea (1977) who have synthesized data drawn from numerous ethnobotanical studies and ethnohistoric accounts by early travelers. The reader should note that while a division of the landscape into floodplain, older alluvial terraces, valley slopes and bluffs, and uplands is a viable means of describing floristic patterning, each of these zones in itself may contain a number of microenvironments as related to substrate, degree and exposure of slope, aspect, soil moisture, and soil-mantle stability.

C. SITE DESCRIPTIONS

The Mason Site (40FR8)

The Mason site, prior to the flooding of Tims Ford Reservoir, was located on a high second terrace of the Elk River at 35°12'48" N. latitude and 86°12'07" W. longitude (Faulkner 1968: 12). It was suggested that in prehistoric times the left bank of the Elk River might have been close to the south edge of the site, but at the time of excavation in 1966 the stream was situated some 700 feet away through a heavily vegetated bottomland. Although evidence of occupation was present over at least a 30 acre area, the investigators chose to intensively explore an area of about 200 square feet which showed a dense surface scatter of broken rock, flint chippage, sherds, bone fragments, and gastropod shells. The soil over the site consisted of a sandy clay covering a compact red and yellow clay subsoil (Faulkner 1968: 12). A total of 37 ten-foot square units (3700 square feet) was excavated to sterile clay at about one foot in depth. While most of the habitation material was in the top foot of soil and had been plow disturbed, the investigators excavated and recorded 40 subsurface features, 35 postholes, and four burials (Faulkner 1968: 15, 30, 35). At least 17 of the features are attributable to the Mason phase occupation, as are the four burials found during the 1966 excavations. These clustered significantly away from Early Woodland features on the site (Faulkner 1968: Table 1, Fig. 3, 23). Of the 35 postholes, ten larger examples contained Late Woodland Elk River series ceramics. Except for one linear arrangement, the postholes formed no meaningful pattern. Most of the cultural remains recovered from the site were assigned to the Mason phase. The few burials, coupled with pottery frequency differences in features, suggested that the site was intermittently occupied by Mason groups (Faulkner 1968: Fig. 3, 30, 127).

The Parks Site (40CF5)

The Parks site has been described as one of the largest prehistoric habitation sites in the Normandy Reservoir. Aboriginal cultural debris was distributed over an area of 20-25 acres on a relatively narrow first terrace above the left bank of the Duck River at mile 251. The linear occupation area was characterized by four knolls on which concentrations of cultural material were found during the survey and testing phases of the Normandy Archaeological Project (Faulkner and McCollough 1982: 319). Following a preliminary testing phase in 1973 (McCollough and DuVall 1976: 116-134), a more extensive testing program was initiated on two of the knoll areas, A and B, in order to formulate a final research design for the intensive excavation phase which commenced in the summer of 1974. Research was focused on these two areas because a higher priority had been given to the investigation of the Middle Woodland, Late Woodland, and Mississippian components in areas A and B than the principal Late Archaic component in areas C and D (Faulkner and McCollough 1982: 319, 322).

Twenty-one five foot square units and one ten foot square unit were hand excavated to subsoil in Area A, with cultural material extending below the plow zone in only one unit. The plow zone was a dark brown loam or gravelly soil representing the Armour silt loam. This was underlain by a subsoil which varied from a yellowish-brown clay loam to heavy gravel. Two features and six postholes of indeterminate cultural association were encountered during the extensive testing phase in Area A. Based upon these findings, the area was rated low priority for more extensive excavation (Faulkner and McCollough 1982: 319-322).

Area B was divided into northeast and north-central sectors corresponding to circular midden deposits visible on aerial imagery. Approximately 33 five foot square excavation units were opened in the northeast sector to an average depth of .90 feet. Three features were encountered in that sector, one of which was identified with the Mason phase (Faulkner and McCollough 1982: 324-328). A possible structure there was also suggested to be affiliated with a Middle or Late Woodland cluster of artifacts. Thirty-three excavation units were opened in the north-central sector and, as in the northeast sector, produced few diagnostic artifacts. Nine features were encountered in the north-central sector, none of which could definitely be tied to the Mason phase, as was true of fourteen postholes (Faulkner and McCollough 1982: 334, 338).

In the late spring of 1974 an extensive excavation phase utilizing a TVA Tournapull pan scraper was initiated in the northeast sector of Area B. Freshly scraped surfaces were shovel-skimmed and hand-troweled to reveal potential subsurface features. A total of 5.8 acres was stripped in this manner during the spring field season. Excavation continued throughout the summer in the northeast sector and during the fall field season the north-central midden area was stripped (Faulkner and McCollough 1982: 347-351).

The Mason component, represented by 29 features, possibly four structures, and a burial cluster, was the second largest and most extensive on the site. While interpretation of the component was considered to be problematical in several respects, burial and structural data may support the existence of a seasonal (warm months) special activity camp which was repeatedly occupied over a number of years. The presence of marine shell beads in Mason context suggested that contact and trade may have existed between contemporary Late Woodland and Early Mississippian groups in the upper Duck River Valley (Faulkner and McCollough 1982: 537-539).

CHAPTER IV

THE ARCHAEOBOTANICAL DATA BASE: MATERIALS AND PROCEDURES

A. MATERIALS

Crites' (1978) data base contained 105.5 grams of Mason phase plant remains from two sites in the Normandy upper reservoir zone and 77.72 grams of Mason phase plant remains from five sites in the lower reservoir zone. The sum of these yields a total of 183.25 grams of Mason phase botanical remains that has previously been analyzed from the Normandy Reservoir area. Carbonized botanical remains from at least 12 features at the Parks site (40CF5) were still available for analysis. These were features 19, 23, 24, 28 (burials 5 and 7), 32, 33, 36, 39, 40, 44, 106, and 150. All, however, but features 39, 44, 106, and 150 appear to be hand-sorted samples and were dealt with only in a cursory fashion due to the inappropriateness of comparing these with more reliable flotation samples (Appendix I). The four flotation samples from the Parks site weighed 49.98 grams (Table 1).

A much greater volume of material was available from four features excavated at the Mason type station (40FR8). A flotation light fraction from Feature 7, a "kettle-shaped" pit, consisted of 61.63 grams of carbonized botanical remains. Similarly recovered samples from features 9 and 10, typical Mason "bell-shaped" pits, consisted of 632.3 grams and 368.76 grams of plant remains,

Table 1. Absolute Gram Weights of Parks Site Botanical Remains

	Fea. 39	Fea. 44	Fea. 106	Fea. 150	Total	Avg.
Carya spp. shell	.28	.10	1.10	.90	2.38	.60
Carya husk			.22		.22	.06
Juglans spp. shell				.12	.12	.03
Juglandaceae	.10	.06	.40	.14	.70	.18
Quercus spp. shell			.10	.01	.11	.03
Total nuts	.38	.16	1.82	1.17	3.53	.88
Wood	.72	.50	10.10	.46	11.78	2.95
Total nuts + wood	1.10	.66	11.92	1.63	15.31	3.83
Bark	P		.55	.01	.56	.14
Indet. stalk/stem			.10		.10	.03
Peduncle receptacle			.01		.01	P*
Cucurbitaceae rind	P		.01		.01	P
Carbonized seeds	.01	P	.01	P	.02	.01
Unidentified			.01		.01	P
< 2mm residue	2.29	6.77	4.66	1.24	14.96	3.74
> 2mm contamination	.37	8.37	9.10	1.11	18.95	4.74
Residue + contamination	2.66	15.14	13.76	2.35	33.91	8.48
Total gram weight	3.80	15.81	26.37	4.00	49.98	12.50
Total gram weight residue and contamination	1.14	.67	12.61	1.65	16.07	4.02

*P = < .01.

respectively. Feature 15, another large bell-shaped pit, produced a light fraction weighing 3091.5 grams. Light fractions, consisting predominantly of carbonized plant remains, from these four features at 40FR8 weighed 4154.19 grams (Table 2). No hand-sorted samples (i.e., botanical remains extracted by means other than flotation) from the site were examined. Twenty-five percent per volume sub-samples from Features 9 and 15 were previously analyzed by Gary Crites who graciously made his unpublished data available.

The total weight of flotation light fractions utilized for this study from both the Parks and Mason sites consisted of 4204.17 grams, approximately 23 times the total sample size of Mason botanical remains previously analyzed for the upper Duck River Valley (Crites 1978). This has provided a data base substantially larger than any which have been examined thus far for the Mason phase.

This study of Mason phase botanical remains is both handicapped and strengthened by inherent sampling implications. The relatively small number of features from which flotation samples were available for examination could not possibly accurately represent the total range of behavioral activities associated with food processing on the sites. The fact that 100 percent of available samples were analyzed, however, insured that infrequent botanical components in individual samples were not eliminated by subsampling. This, of course, cannot correct for the non-random collection of raw fill from within features in the field over a decade ago. One of the research questions posed at the initiation of this study involved the aboriginal use of

Table 2. Absolute Gram Weights of Mason Site Botanical Remains

	Fea. 7	Fea. 9	Fea. 10	Fea. 15	Total	Avg.
Carya spp. shell	10.22	60.83	25.67	1335.39	1432.11	358.03
C. cordiformis shell				.35	.35	.09
Juglans spp. shell		143.20	.37	4.45	148.02	37.01
J. cinerea shell		41.31		1.30	42.61	21.31
Juglandaceae	.58	31.92	5.34	143.59	181.43	45.36
Quercus spp. shell	.12	8.19		24.37	32.68	8.17
Q. alba cap				P*	P	P
Castanea dentata		1.84			1.84	.46
Corylus spp. shell		.01	.04		.05	.01
Nutmeats, Indet.		.50	.16		.66	.17
Total nuts	10.92	290.31	31.58	1509.45		
Wood	4.66	56.03	42.17	395.14	498.00	124.50
Total nuts + wood	15.58	346.33	73.75	1904.59	2340.25	585.06
Bark	.05	4.31	.13	.45	4.94	1.25
Indet. stalk/stem			.01		.01	P
Arundinaria spp.				.20	.20	.05
Root/tuber fragments		P			P	P
Stem/twig fragments		1.07			1.07	.27
Asteraceae seedheads	P	P		P	P	P
Cucurbitaceae rind		.02		P	.02	.01
Cucurbita rind		P		P	P	P
Lagenaria rind		P		P	P	P
Zea mays kernel			.01	.05	.06	.02
Carbonized seeds	.05	.95	.18	.35	1.53	.38
Unidentified		.15	.09	.15	.39	.10
< 2mm residue	29.95	215.95	210.83	927.71	1384.44	346.11
> 2mm residue	16.00	61.15	83.76	257.88	418.79	104.70
Residue + contamination	45.95	277.10	294.59	1185.59	1803.23	450.81
Total gram weight	61.63	632.30	368.76	3091.50	4154.19	1038.55
Total gram weight excluding residue and contamination	15.68	355.20	74.17	1905.91	2350.96	587.74

*P = < .01.

cultigens, particularly maize, for which little or no evidence had been turned up by Crites' (1978) examination of Mason phase materials. It was felt that if the remains of cultigens were infrequent, total analysis of samples would be necessary to establish their presence. Remains that are both infrequent and small in size cannot be estimated with accuracy unless a large number of individually large samples are taken (Treganza and Cook 1948: 287-297; Schaaf 1981: 222-223). Greenwood (1961: 416-420), in her analysis of shell from a 45 percent midden sample, demonstrated the risk in subsampling of missing rare components completely. A test of the reliability of subsampling in the case of Mason material was made possible by totally analyzing two samples from the Mason site from which 25 percent subsamples had previously been analyzed. As expected, the 25 percent subsamples accurately represented the major sample constituents but rare components were not found.

B. PROCEDURES

Field procedures involved water flotation of either all or a sample of the fill in a particular feature. At the Parks site standard one bucket (2.5 gallon) samples were generally taken. No field notations were made as to the size of samples taken at the Mason site. The emersion technique described by Struever (1968) was employed on both sites and involved pouring the sample into a partially submerged tub with window screen size mesh (1.5 mm) in the bottom. The tub was agitated up and down by hand in the near-by river causing botanical remains, organic contaminants, and some bone to float while the heavier particles settled to the bottom to be collected and further separated by hand. The light fraction was skimmed off with a kitchen strainer. This process was repeated until all flotable material was removed. The Parks site samples of feature fill were in a less than desirable condition at the time of field processing due to the compact, hardened state of the clay-loam soil. This condition resulted from their storage in bags for several months between the time of extraction and flotation (Dr. Charles H. Faulkner, personal communication 1982). During laboratory processing of the heavy fraction the small amount of remaining botanical materials, usually consisting of dense nut shell, was removed and combined with the light fraction. Most heavy fractions were refloated in the laboratory under more favorable conditions prior to the final analysis.

The seeds from many genera commonly recovered on archaeological sites are smaller than 1.5 mm and were undoubtedly lost during field flotation. It must be remembered, however, that the samples were collected during the incipient years of the "flotation revolution" when the use of any sort of flotation technique at all was considered to be progressive. Chapman and Shea (1981: 65, 69), in their examination of aboriginal plant remains from the lower Little Tennessee River Valley, incapsulate the frustrations of most paleoethnobotanists when they state that:

> We are the first to admit that research with carbonized plant remains is frought with problems. Differential preservation due to the physical nature of the plant parts,

> cultural treatment encouraging or hindering the introduction of the plant part into a reducing atmosphere, the carbonizing environment itself, and the post-carbonization depositional history all act to affect what is introduced into the archaeological record. These variables, combined with sampling error, sampling bias, and differential recovery techniques, do not make for a firm interpretive foundation. But be that as it may, the archaeobotanical remains are an integral and an important part of the record of the past cultures and their environments . . .

Laboratory procedures for the analysis of all botanical samples followed those utilized by Crites (1978: 36-40) so as to provide a basis for comparison. These procedures have been previously described by Yarnell (1974: 113-114) for the Salts Cave analysis and basically involve weighing each sample prior to sifting it through a series of four standard laboratory screens with mesh sizes of 4.00 mm, 2.00 mm, 1.00 mm, and .500 mm. Material greater than 2.00 mm was examined under low magnification with a binocular microscope and separated into various taxonomic categories, the gram weights of which were recorded. The weights were used to calculate a percentage of each component relative to the total, excluding non-botanical contamination.

The primary optical instrument used was a Wolfe binocular dissecting microscope with 15x ocular lenses and 1x and 2x objective lenses on a rotating platform. This was used in combination with a built-in reflective light source. When a more thorough examination of specimens was desired, another instrument was used, this being a Bausch and Lomb binocular dissecting microscope with 10x ocular lenses and a zoom 1x-7x objective lens. When magnification greater than 70x was necessary, as for distinguishing between the Cucurbitaceae and identifying some wood charcoals, the latter microscope was fitted with an additional objective lens which doubled its potential magnification. A detachable reflective light source was used with the Bausch and Lomb, sometimes in combination with an independent halogen illuminator complete with condensing lenses and an iris diaphragm.

Material passing through the 2.00 mm screen was optically scanned under low magnification for seeds and cultigens which were weighed and counted. The remainder was weighed as "sample residue." All seeds, including those greater and smaller than 2.00 mm, were identified to genus or species and quantified accordingly. Seed identifications were made primarily by utilizing published descriptions, relying most frequently upon Martin and Barkley's Seed Identification Manual (1961) and Seeds of Woody Plants in the United States (USDA 1974). Identifications were verified by examining both carbonized and uncarbonized seed collections present in the Paleoethnobotany Laboratory at the University of Tennessee Anthropology Department. On a few occasions it was necessary to consult the more extensive uncarbonized seed collection at University of Tennessee Herbarium.

The only inconsistency between the treatment of Crites' (1978: 36-40) samples and those used in this study is the author's reluctance to extract non-botanical contamination from the < 2mm fractions. While the > 2mm contamination was removed and quantified as such, the < 2mm contamination was simply weighed with the sample residue due to the vast amount of time which would have been necessary to remove it without the use of chemicals. One exception to this occurred when a 10.77 gram control sample of 1-2mm residue from Feature 15 at the Mason site was completely sorted and each of the components quantified.

The procedures for analyzing wood charcoal were identical to those utilized by Crites (1978: 36-40). The separated wood charcoal greater than 2mm in size, after being weighed, was scattered over graph paper mounted in the bottom of a shallow box. Sometimes the sample was necessarily reduced by dividing or quartering it in a riffle sampler. Twenty-five pieces of charcoal were then randomly removed from the box to eliminate size bias within the > 2mm category. This was done by using the flip of a fair coin to determine top or bottom and whether an even or odd numbered column would be chosen to begin the count. Beginning at the predetermined point a piece of charcoal from every third, fourth, or fifth graph cell, depending upon its density over the grid, was chosen until a count of 25 had been reached. Identifications were made by observing general characteristics of the wood visible in cross-section and comparing those to published photographs and descriptions, relying primarily upon Panshin and De Zeeuw's Textbook of Wood Technology (1980). Identifications were verified by comparing the archaeological specimens with known carbonized specimens in the Paleoethnobotany Laboratory and with non-carbonized specimens in the author's possession. Identifications were made to the most advanced taxonomic level possible, usually to genus, and counts were recorded for each taxonomic category. Oak charcoal was identified to the red oak or white oak group but not to the species level. Occasionally charcoal could only be given a group designation, such as Cornus/Acer or Pinus/Juniperus, when specimens were too small or eroded to identify diagnostic characters with the equipment at hand. Some specimens could only be identified as diffuse porous or ring porous. Raw counts for each category were converted into percentages of the total count (n/25x100) for comparative purposes.

The fact that archaeological wood charcoal analysis and interpretation is problematical cannot be disputed. Interacting variables which affect the carbonization and preservation of firewood in archaeological contexts include fire intensity, wood density, oxidation reduction environment, wood moisture content, wood size, and wood structure (Sheldon 1976; USDA 1961). The data are further modified by differential self pruning abilities of trees and by potential cultural selection for particular species. It has also been justly argued that the species composition within different size ranges in the same sample will vary due to the differing fracturing properties of woods. To test this the author attempted to analyze samples of wood charcoal between 1 and 2mm in size, but this was soon abandoned as being too difficult without more sophisticated laboratory equipment. Despite the problems, it is indisputable that archaeological wood charcoal is an invaluable ecofact which must be dealt with in whatever manner possible.

CHAPTER V

RESULTS OF THE ANALYSIS

A. THE MASON SITE (40FR8)

Feature 7

This was a shallow type D or "kettle-shaped" pit with an interior depth of .45 foot and diameters of 2.0 feet x 3.0 feet. The investigators indicated that ash, gastropods, and charred material were contained within the fill, the latter having been extracted by flotation (Faulkner 1968: 17). All ceramics contained within the feature were Late Woodland Elk River series and there were no diagnostic lithic tools recovered (Faulkner 1968: Tables 2 and 7).

Hickory (*Carya* spp.) nutshell accounted for over 65 percent of the > 2mm botanical remains with another 3.70 percent probably being hickory but identifable only to the family Juglandaceae (Table 3). Acorn shell made up less than 1 percent but this is probably largely due to factors influencing preservation. The abundance of fragmentary nutshell is indicative of food processing and it seems likely that these waste products were tossed into the fire either for fuel or as a convenient means of disposal. Hickory nut shell is dense and tends to preserve very well.

The other major constituent of the Feature 7 sample was wood charcoal, which comprised about 30 percent of the > 2mm botanical material. Red oak and hickory made up more than 60 percent of the

Table 3. Percentage Composition of Mason Site Botanical Residues

	Fea. 7	Fea. 9	Fea. 10	Fea. 15	Total	Avg.
Carya spp. shell	65.18	17.13	34.61	70.07	60.92	46.75
C. cordiformis shell				.02	.01	P
Juglans spp. shell		40.32	.50	.23	6.30	10.26
J. cinerea shell		11.63		.07	1.81	2.93
Juglandaceae	3.70	8.99	7.20	7.53	7.72	6.86
Quercus spp. shell	.77	2.31		1.28	1.39	1.09
Q. alba cap				P*	P	P
Castanea dentata shell		.52			.08	.13
Corylus spp. shell		P	.05		P	.01
Nutmeats, Indet.		.14	.22		.03	.09
Total nuts	69.64	81.73	42.58	79.20	78.36	68.29
Wood	29.72	15.77	56.86	20.73	21.18	30.77
Total nuts + wood	99.36	97.50	99.44	99.93	99.54	99.06
Bark	.32	1.21	.18	.02	.21	.43
Indet. stalk/stem			.01		P	P
Arundinaria spp.				.01	P	P
Root/tuber fragment		P			P	P
Stem/twig fragment		.30			.05	.08
Asteraceae	P	P		P	P	P
Cucurbitaceae rind		P		P	P	P
Cucurbita rind		P		P	P	P
Lagenaria rind		P		P	P	P
Zea mays kernel			.01	P	P	P
Carbonized seeds	.32	.27	.24	.02	.07	.21
Unidentified		.04	.12	.01	.02	.04
Total gram weight	15.68	355.20	74.17	1905.91	2350.96	587.74

*P = < .01.

wood charcoal sampled and other hardwoods accounted for at least another 30 percent (Table 3).

Carbonized seeds accounted for less than 1 percent of the Feature 7 botanical sample. One honeylocust (Gleditsia triacanthos) seed fragment is probably a waste product from food processing. The pulp of the honeylocust pod is edible and was most likely the portion consumed. The other two seeds retrieved from Feature 7 were unidentified wild legumes and were probably incidental products of carbonization rather than representing food or economic plants. The only other constituents of Feature 7 were trace amounts of the seed-heads of flowering composites (i.e., Asteraceae family).

Feature 9

This type C facility was a classic "bell-shaped" pit with a flat bottom and undercut sides. Features of this variety have traditionally been regarded as storage pits, although they seem to have frequently been reused as refuse repositories. Feature 9 measured 4.0 x 3.4 feet at the orifice and 9.4 x 7.2 feet at the base. Its interior depth was 4.9 feet and its point of origin was .70 feet below the surface (Faulkner 1968: 17). Digging implement marks were noted in the lower pit walls running from the upper right to the lower left. These marks, which were also gouged into the clay floor of the pit, were evidently made by a stick or narrow implement with a flat bit about .25mm wide (Faulkner 1968: 24).

The pit was filled in four stages with the bottom .70 feet consisting of a light brown midden soil. Above that was a

.30-inch-thick ashy band which contained shell and much charcoal, a sample of which was taken for radiocarbon dating. A thin layer of sterile brown silty sand at the edges of the deposit indicated to the investigators that the pit was open for some time prior to being rapidly filled with brown midden soil (2.7 feet thick) containing many sherds. The top 1.2 feet consisted of a compact grey ashy midden (Faulkner 1968: 24-25).

The vast majority (95 percent) of pottery sherds recovered from Feature 9 were of the Elk River series although the inventory included three clay-grit-tempered plain sherds and 100 limestone-tempered sherds of various diagnostic varieties. Diagnostic chipped stone artifacts from Feature 9 included three Hamilton projectile points and four of Provisional Type 11a which is considered to be closely related to the Hamilton type. Two Provisional Type 1 projectile points were recovered and were of a straight-stemmed undifferentiated variety which is most probably Early Woodland or Late Archaic. An additional 1,914 non-diagnostic chipped stone artifacts of various classes were removed from the feature (Faulkner 1968: 87, 89, Tables 2, 5, and 7).

Hickory (*Carya* spp.) nutshell constituted only 17 percent of the > 2mm botanical remains from Feature 9 (Table 3). The bulk of the sample (52 percent) was comprised of carbonized walnut shell. It is likely that a majority of the walnut remains are butternut (*Juglans cinerea*) although most of the shell fragments were only positively identified to the genus level (*Juglans* spp.). About 9 percent of the nutshell was identified only to the family Juglandaceae but it seems reasonable that the proportion of hickory to walnut probably favors the latter. A small amount of unidentified nutmeat (.50 g; 14 percent) from the pit is probably also walnut. Acorn (Quercus spp.) shell accounted for only a little more than 2 percent of the > 2mm botanical remains, but again, this is probably due to quick oxidation and reduction to ash of the fragile shells relative to hickory and walnut. American chestnut (Castanea dentata) shell fragments were present in the sample (1.84 g; .52 percent) but are probably underrepresentative of the amount that was actually used due to the fragility of the thin shells and quick oxidation to ash. Ethnographic references to the aboriginal use of chestnuts are numerous (e.g., Yanovsky 1936: 17; Brereton 1966: 37, 39, 43; Hakluyt 1966: 178) but its former distribution within the study area is difficult to assess due to its eradication by the chestnut blight in the first half of this century. Hazelnut (Corylus americana) shell was also present in the sample but only in trace amounts. Nutshell accounted for almost 82 percent of the > 2mm botanical remains from Feature 9. As with the previous feature, this is indicative of the processing of large quantities of plant food, the by-products of which probably were secondarily deposited in the pit. The excavators felt that the fill zone containing the most charcoal probably represented the "remains of spring and summer housekeeping after the pit was finally denuded for its winter stores" (Faulkner 1968: 25). This being the case, the botanical sample most likely is comprised of secondarily deposited waste representing food processing activities which occurred at several times and localities in the vicinity of Feature 9.

Wood charcoal from Feature 9 accounted for approximately 16 percent of the > 2mm sample and may also have been secondarily deposited. Of the wood sampled, oak (red and white oak groups combined with Quercus spp.) and walnut (Juglans spp.) were most abundant and constituted 20 percent and 8 percent, respectively. Another 20 percent of the wood was ring-porous but was too eroded for more specific identifications. The other types represented, consisting of southern yellow pine (Pinus spp.), southern yellow pine/red cedar (Pinus spp./Juniperus virginiana), American elm (Ulmus americana), persimmon (Diospyros virginiana), and indeterminate diffuse-porous, each contributed 4 percent to the total composition.

Carbonized seeds and cultigens (all size classes) made up only .27 percent of the > 2mm sample but included quite a diversity of species, probably due to the large size of the overall sample. Individual weights of seeds were not recorded as available scales were insufficient to deal with weights less than .01 gram. Cultigens in Feature 9 included 17 gourd (Lagenaria siceraria) rind fragments, 31 squash (Cucurbita pepo) rind fragments, 13 rind fragments which could only be identified to the Cucurbitaceae family, and two seeds of the domesticated sunflower (Helianthus annuus). These will be addressed in more detail in the section dealing with cultigens.

Seventy-five whole and fragmentary wild seeds were recovered. They consisted of grape (Vitis spp.) (n=40 whole, 19 fragmentary), unidentified wild legumes (n=4 whole), pondweed (Potamogeton spp.) (n=1 whole, 1 fragmentary), heliotrope (Heliotropium spp.) (n=1 whole), croton (Croton spp.) (n=1 whole), unidentified grass seed (n=1 whole), honeylocust (Gleditsia triacanthos) (n=22 whole, 21 fragmentary), viburnum (Viburnum spp.) (n=1 whole), and unidentified seeds (n=6 whole and fragmentary). Several of these types were probably incidental products of carbonization rather than of economic importance.

Other constituents of Feature 9 included small quantities of bark, unidentified stalk or stem fragments, a root or tuber fragment, a woody stem or twig fragment, and minute portions of flowering composite (Asteraceae family) seedheads.

Feature 10

Feature 10 was a small bell-shaped (Type C) pit measuring 2.2 x 2.2 feet at the orifice and 2.5 x 2.6 feet at the base. Its interior depth was only 1.4 feet with a point of origin .65 feet beneath the ground surface (Faulkner 1968: Table 1). The excavators noted two distinct layers consisting of a fill of dark midden-bearing soil, presumably quickly deposited, at the bottom and a distinct half-foot-thick layer of ash and gastropod shells at the top. A radiocarbon sample was collected from charcoal scattered within the fill. Over 90 percent of the ceramics contained within the pit were of the Elk River series but there were two Mulberry Creek Plain sherds and four limestone-tempered residual sherds (Faulkner 1968: 25, Table 2). Two Hamilton projectile points were recovered from the fill, along with one Provisional Type 11a which also falls within the

Hamilton cluster. The inventory included 197 non-diagnostic chipped stone artifacts (Faulkner 1968: Tables 5 and 7).

The Feature 10 botanical sample differs somewhat in composition from the other 40FR8 features sampled and may reflect a difference or reorientation of the primary function of the pit (Table 3, p. 40). Only 42 percent of the > 2mm material was comprised of nutshell, mostly hickory (*Carya* spp.) but with traces of walnut (*Juglans* spp.) and hazelnut (*Corylus americana*). Seven percent was identified only to the Juglandaceae family level.

The bulk of the sample (57 percent) consisted of wood charcoal, which may indicate that the feature functioned as a hearth or cooking facility. It is at least conceivable that the .50-foot-thick ash/ gastropod zone at the top of the pit may represent the remains of a fire that was built after it ceased to function as a storage facility and was partially refilled with surrounding soil. Because the feature fill was floated as a single unit, composition differences between the two zones could not be assessed. The fact that the wood charcoal sample was comprised of relatively few species, all hardwoods, may suggest a single fire-building episode. Oak (both red and white oak groups) and hickory (*Carya* spp.) accounted for 84 percent of the sample with hard maple (*Acer* spp.) making up another 12 percent. The only other wood represented was chestnut (*Castanea dentata*) which accounted for 4 percent.

Twenty-four seeds (all size classes) of wild species were recovered from the Feature 10 sample. These were identified as goosefoot (Chenopodium spp., probably C. album) (n=10), honeylocust (Gleditsia triacanthos) (n=4 fragments), muscadine grape (Vitis rotundifolia) (n=1), knotweed (Polygonum spp.) (n=1 fragment), canary grass (Phalaris caroliniana) (n=1), poison ivy (Rhus radicans) (n=1), and bayberry (Myrica spp.) (n=1). In addition, there were two unidentified legumes and three seeds of indeterminate identity. The feature produced three maize (Zea mays) kernel fragments and, along with Feature 15, shares the distinction of having yielded the only Mason phase maize yet recovered from good context.

The only other constituents of Feature 10 were a small quantity of bark, an unidentified stalk or stem fragment, and a few minute fragments of unidentified plant residues.

Feature 15

Like Feature 9, this was a large Type C pit with undercut sides and a flat bottom. It measured 4.0 x 4.6 feet at the orifice and 5.6 x 5.7 feet at the base. Its interior depth measured 4.4 feet from a point of origin .65 feet beneath the ground surface (Faulkner 1968: Table 1, 25-27). Feature 15 contained distinct stratified layers, the best description of which is drawn from the original text:

> It appears to have been filled rapidly after final abandonment. The bottom-most layer was a dark clayey soil containing lumps of subsoil clay from caving side walls after the pit was emptied. After this initial caving it was used for a trash receptacle. A trash deposit of ash and gastropods was thrown in forming a distinct layer .30-.40 feet thick. The pit was then filled to a depth of 1.8 feet below the point of origin with undifferentiated soil and some midden. The remaining hollow was again used as a household trash dump and an ashy shell-filled midden accumulated to about a foot below the point of origin in the plow zone. The basin-shaped cavity

> still remaining was filled with a lens of gastropod shells and a dark brown soil accumulating from domestic activities around the feature (Faulkner 1968: 25,27).

Two radiocarbon samples were taken from the feature, one from the top ash layer and one from the bottom ash layer. The undifferentiated fill was floated to provide the largest botanical sample available from a Mason phase feature. As in Feature 9, the investigators noted several digging gouges in the tough clay of the pit walls running perpendicular to the base. It was deduced that digging sticks or narrow bitted implements were used from right to left to dig away the clay (Faulkner 1968: 27).

The large ceramic assemblage from Feature 15 was comprised of over 95 percent Elk River series sherds, 3.5 percent various limestone-tempered wares, and 1.2 percent clay-grit-tempered sherds. Thirteen Hamilton projectile points were recovered, and 15 other types were placed in provisional categories. Eight of these (P-11a and P-11b), and possibly others (P-11c and P-11d), were thought to fit within the Hamilton cluster. A total of 1,853 chipped stone artifacts in various non-projectile point categories was also recovered from the fill (Faulkner 1968: 89-90, Tables 2 and 5).

As in features 7 and 9, the bulk of the Feature 15 botanical sample consisted of nutshell, particularly hickory (Carya spp.) (Table 3, p. 40). A small amount was identifiable as bitternut hickory (Carya cordiformis) but it seems likely that shagbark hickory (Carya ovata) or others would have been exploited more frequently due to sweeter kernels. It is usually impossible to delineate the identity of a particular species of hickory nut without a sizable portion of the shell. A small amount of walnut shell (Juglans spp.) was recovered from the sample, some of which was identifiable as butternut (Juglans cinerea). The 7.5 percent of the > 2mm sample which was identifiable only to the family Juglandaceae is probably mostly hickory nut shell. About 1.3 percent of the sample consisted of acorn shell, of which one specimen was identified as white oak (Quercus alba) due to its size and cap configuration. The white oak acorns are generally sweeter and contain less tannic acid than those of the red oaks. Approximately 79 percent of the total > 2mm sample consisted of nutshell fragments and is indicative of the processing of large quantities of that resource on the site.

The remainder of the > 2mm sample was composed primarily of wood charcoal (20.73 percent) which, when combined with the nutshell, made up 99.93 percent. The wood charcoal sample was quite diverse as it contained 12 categories, mostly hardwoods. Thirty-six percent was comprised of oak (red oak group, white oak group, and Quercus spp.) and another 4 percent is probably oak but was identified only to the Fagaceae family. Walnut (Juglans spp.) made up 16 percent of the sample while hickory (Carya spp.), chestnut (Castanea dentata), and southern yellow pine (Pinus spp.) each contributed 8 percent. Also contributing 8 percent were specimens in the ring-porous, indeterminate, category. Sycamore (Platanus occidentalis), and grape-vine (Vitis spp.) each comprised 4 percent of the sample, as did diffuse-porous, indeterminate, specimens. It seems likely that such a diverse and well distributed inventory would have been derived from a number of firings, either within Feature 15, or in its general vicinity.

Eleven whole seeds and 18 seed fragments (all size classes) were recovered from the Feature 15 fill and constitute only .02 percent of the > 2mm sample. Seeds of woody plants consisted of persimmon (Dyospyros virginiana) (n=1 whole, 2 fragments), honeylocust (Gleditsia triacanthos) (n=2 whole, 14 fragments), and grape (Vitis spp.) (n=2 whole). Herbaceous seeds included goosefoot (Chenopodium spp., probably C. album) (n=2 whole, 1 fragment), cleavers or bed-straw (Galium trifidum) (n=1 whole), knotweed (Polygonum spp.) (n=1 whole), and maypop or passion flower (Passiflora incarnata) (n=2 whole, 1 fragment).

Tropical cultigens included a corn (Zea mays) kernel, a possible kernel, and trace amounts of both gourd (Lagenaria siceraria) and squash (Cucurbita pepo) rind. The significance of the corn in features 10 and 15 is addressed in the ensuing section concerned with cultigens.

Seventeen seedheads and 50 seedhead fragments of flowering composites (Asteraceae family) were recovered from the > 2mm sample. This seems to be a significant quantity relative to the other samples examined. Also present was a leaf bud that was unidentifiable. Other constituents, represented in minute quantities, included bark, unidentified plant residues, and river cane (Arundinaria gigantea).

Feature 15 was the only facility from either 40FR8 or 40CF5 from which a < 2mm sample was drawn for complete analysis (Table 4).

Table 4. Archaeobotanical Residues from Feature 15 at the Mason Site, 1-2mm Subsample

	Absolute Gram Wt.	% of 1-2mm Sample	% of > 2mm Sample for Comparison
Carya spp. shell	1.25	11.58	43.19
Juglandaceae	1.31	12.14	4.64
Juglans spp. shell	.01	.09	.14
Quercus spp. shell	.33	3.06	.79
Total nuts	2.90	26.88	48.82
Wood charcoal	1.20	11.12	12.78
Nuts + wood	4.10	38.00	61.61
Bark	.01	.09	.01
Asteraceae seedhead	.01	.09	P*
Cucurbitaceae rind	.01	.09	P
Carbonized seeds	P	P	.01
Unknown	.02	.19	P
Contamination	6.64	61.54	8.34
Total	10.79 grams	99.99%	3091.50 grams

*P = < .01.

This was done primarily for comparative purposes in order to assess the biases present in data derived only from > 2mm materials. Approximately 10 grams of sample "residue" which passed through the 2mm screen but not the 1mm screen was sorted into categories established for the > 2mm samples. The non-botanical contamination was removed and percentages were calculated for the remaining components.

Hickory (Carya spp.) nutshell accounted for only 30 percent of the sample but, as expected, nutshell identified only to the Juglandaceae family increased substantially to 31.6 percent. Walnut (Juglans spp.) was present in the percentages similar to those in the > 2mm sample but no identifications to species were possible. Acorn (Quercus spp.) shell increased substantially to almost 8 percent in the 1-2mm sample. This is due to the tendency for the fragile shells to fracture into smaller pieces, a bias which should be considered. Total nutshell comprised approximately 70 percent of the sample, about 10 percent less than in the > 2mm sample. The difference was made up by wood charcoal which constituted 29 percent of the 1-2mm material and only 21 percent of that in the > 2mm category. This is of course due to the high relative density of the Juglandaceae nutshell which tends to preserve it intact. A comparison of the two samples with regard to wood charcoal composition would have been desired but was not possible with the equipment at hand. An increased amount of bark in the smaller sample reflects its fragility. Bark in the > 2mm sample was frequently not completely carbonized on one side, a phenomenon which is presumed to have occurred when the bark was expelled to the periphery of the hearth by expanding gases underneath, particularly in green woods.

The only other constituents of the 1-2mm sample were Asteraceae seedhead fragments (.24 percent) and unidentified plant residues (.48 percent), the latter being slightly increased as expected. Seeds and identifiable cultigens had been removed prior to analysis and were included with the > 2mm sample.

B. THE PARKS SITE (40CF5)

Feature 39

Feature 39 (Burials 9A, 9B, and 10) was described as a deep, circular pit with vertical sides and a flat bottom. It was 1.5 feet deep with the orifice measuring 3.55 feet north-south by 3.60 feet east-west. The primary fill was characterized as being black in color, but mottled with yellow clay subsoil and plow zone. Near the base of the pit, the fill color changed to a dark red-brown, with yellow-brown mottling. An apparent burial pit, containing three individuals, had intruded the central portion of the primary pit fill and contained a large amount of limestone in the upper portion (Brown 1982b: 435).

The fill contained six limestone-tempered sherds (60 percent), three chert-tempered sherds (30 percent), and one clay-tempered sherd (10 percent) (Brown 1982b: Appendix A). While the component attribution of the feature has been interpreted as Mason phase, it has been suggested that a Mason burial may have intruded an earlier Middle

Woodland storage/refuse pit (Brown 1982b: 435-436). Because no indication was made as to where within the feature the flotation sample was extracted, the botanical material was analyzed under the assumption that it was Mason as based upon the initial component attribution. Lithic material from the fill included an end retouched Morrow Mountain projectile point, a Late Archaic/Early Woodland stemmed projectile point, two unidentifiable distal portions of projectile points, a knife, and several classes of debitage (Brown 1982b: Appendix A).

The botanical material from Feature 39, as indicated in Table 5, consisted largely of wood charcoal (over 63 percent). Hickory (*Carya* spp.) nutshell accounted for about 25 percent of the > 2mm sample and nutshell identified as Juglandaceae, probably hickory, for another 9 percent.

Of the wood charcoal, hickory (*Carya* spp.) accounted for over a third (36 percent) which may indicate selection for that genus due to its burning properties. Maple (*Acer* spp.) and the honeylocust/Kentucky coffeetree (*Gleditsia triacanthos/Gymnocladus dioeca*) group were next abundant and each constituted 12 percent of the sample. Walnut (*Juglans* spp.), southern yellow pine (*Pinus* spp.), and specimens identified only as diffuse-porous each made up 8 percent. The remaining groups, with each comprising 4 percent of the sample, consisted of the red oak group, mountain laurel (*Kalmia latifolia*), and the ring-porous group.

Table 5. Percentage Composition of Parks Site Botanical Residues

	Fea. 39	Fea. 44	Fea. 106	Fea. 150	Total	Avg.
Carya spp. shell	24.56	14.93	8.72	54.55	14.81	25.69
Carya husk			1.74		1.37	.44
Juglans spp. shell				7.27	.75	1.82
Juglandaceae	8.77	8.96	3.17	8.48	4.36	7.35
Quercus spp. shell			.79	.61	.68	.35
Total nuts	33.33	23.88	14.48	70.91	21.97	35.64
Wood	63.16	74.63	80.10	27.88	73.30	61.44
Total nuts + wood	96.49	98.51	94.53	98.79	95.27	97.08
Bark	P*		4.36	.61	3.48	1.46
Indet. stalk/stem			.79		.62	.20
Ped. receptacle**			.08		.06	.02
Cucurbitaceae rind	P		.08		.06	.24
Cucurbita rind	P		P		P	P
Carbonized seeds	.88	P	.08	P	.12	.39
Unidentified			.08		.06	.02
Total gram weight	1.14	.67	12.61	1.65	16.07	4.02

*P = < .01.

**Probably cucurbitaceae.

Remaining constituents of the Feature 39 botanical sample includes a squash (*Cucurbita pepo*) rind fragment, three honeylocust (*Gleditsia triacanthos*) pod fragments, and a single croton (*Croton* spp.) seed.

Feature 44

Feature 44 was described as a deep circular pit with abruptly sloping sides and a flat bottom. It was 1.43 feet in depth with orifice dimensions of 3.86 feet northwest-southeast by 3.73 feet north-south. Vandalism was evidenced by shovel gouging on one side and the presence of a recent posthole digger disturbance in the bottom. The primary fill of the pit was a black matrix mottled with red clay and containing a large volume of burned limestone in addition to charcoal and faunal remains. The investigators felt that the feature may have functioned as a storage pit initially, but that the organically enriched primary fill suggested a subsequent refuse pit function. The final phase of the feature's use, probably simultaneous with refuse deposition, was for the primary flesh inhumation of an infant (Burial 11). The pit's component attribution was to the Mason phase. This was presumably based in part upon its location, along with Feature 39, within a cluster of Mason burial pits (Brown 1982b: 440, Appendix A).

The ceramic inventory of Feature 44 consisted of only eight limestone-tempered residual sherds. Lithic materials recovered from the fill included various classes of waste flakes, utilized flakes, a side scraper, and the non-diagnostic distal portion of a projectile point/knife (Brown 1982b: Appendix A).

As in the previous feature, the bulk of the Feature 44 botanical material consisted of wood charcoal (Table 5). Hickory (Carya spp.) nutshell accounted for only 15 percent of the > 2mm sample while 9 percent more consisted of nutshell probably attributable to hickory but identified only to the Juglandaceae family.

The wood charcoal sample, consisting of 12 categories and dominated by hardwoods, was diverse. This may suggest that the sample represents multiple firings. Hickory (Carya spp.) and hard maple (Acer spp.) were most abundant and comprised 24 percent and 20 percent, respectively. Walnut (Juglans spp.) was next abundant and made up 12 percent of the sample. Southern yellow pine (Pinus spp.) comprised 8 percent while the white oak group, the red oak group, dogwood (Cornus florida), beech (Fagus grandifolia), osage orange (Maclura pomifera), and the pine/eastern red cedar (Pinus spp./ Juniperus virginiana) group each made up 4 percent. Ring-porous and diffuse-porous specimens accounted for 8 percent and 4 percent of the sample, respectively.

The only other constituents recovered from the Feature 44 botanical sample were an unidentifiable stalk or stem fragment and a single canary grass (Phalaris spp.) seed.

Feature 106

Investigators described this feature as a deep, roughly circular pit with straight, steep sides and a slightly rounded bottom. Its orifice measured 3 feet northwest-southeast by 2.7 feet east-west with an interior depth of 1.13 feet. The fill was stratified into three distinct zones, the bottom of which consisted of a .25-foot-thick black charcoal lense which propably resulted from *in situ* burning. This was overlain by a dark red-brown friable loam that extended .95 feet to the top of the pit. The third stratum consisted of a .30-foot-thick gravel lense contained entirely within the central portion of the friable loam. The investigators suggested a Mason phase component attribution for the feature (Brown 1982b: 388, Appendix A).

Ceramics contained within Feature 106 consisted of 13 limestone-tempered simple-stamped sherds and four chert-tempered plain sherds. The only lithic material recovered from the fill were four debitage flakes (Brown 1982b: Appendix A).

The bulk of the botanical material from Feature 106 was wood charcoal (Table 5). Total nut remains represented less than 15 percent of the > 2mm sample. Of these, hickory (*Carya* spp.) nutshell accounted for 8.7 percent and hickory husk fragments for another 1.7 percent. Nutshell which is probably hickory but was identified only to the Juglandaceae family made up 3.2 percent of the sample. Acorn (*Quercus* spp.) shell comprised only .8 percent of the > 2mm sample but is undoubtedly underrepresented due to poor preservation.

Wood charcoal, which made up more than 80 percent of the > 2mm sample, consisted largely of hickory (*Carya* spp.) (68 percent). Walnut (*Juglans* spp.) and the ring-porous category were next abundant and accounted for 8 percent each of the wood charcoal. The red oak group, the white oak group, chestnut (*Castanea dentata*), and sassafras (*Sassafras albidum*) each comprised 4 percent. This small group of hardwoods, consisting mostly of hickory, would be expected of an *in situ* firing where only a few hot-burning species were selected.

Ten carbonized seeds were recovered from Feature 106. Two of these were identified as canary grass (*Phalaris* spp.). The other eight were small spheroids which were tentatively identified as American pennyroyal (*Hedeoma pulegioides*). The seeds are types which could have been incidental products of carbonization.

Other constituents of the sample included two squash (*Cucurbita pepo*) rind fragments and one peduncle receptacle, probably from a cucurbit.

Feature 150

Feature 150 was described as a deep amorphous pit with sloping sides and a flat bottom. The portion of the feature which remained after truncation to subsoil was 1.05 feet deep and measured 2.6 feet north-south x 2.78 feet east-west. Investigators attributed the pit to the Mason occupation of the site.

The ceramic inventory from Feature 150 was comprised of 16 limestone-tempered residual sherds, two limestone-tempered check stamped sherds, and one chert-tempered residual sherd. Lithic artifacts within the fill included three varieties of waste flakes and a thick biface (Brown 1982b: 394).

The Feature 150 botanical sample (Table 5) was more in line with those from the Mason site in that it was composed primarily of nutshell (71 percent). Hickory (Carya spp.) was most abundant and comprised 54.6 percent of the sample. Another 8.5 percent was identified to the Juglandaceae family and is probably mostly hickory. Walnut (Juglans spp.) made up 7.3 percent of the sample and acorn (Quercus spp.) shell .6 percent.

Wood charcoal made up only about 28 percent of the sample, of which a third was hickory (Carya spp.). Groups second in abundance were ash (Fraxinus spp.) and ring-porous specimens, each of which contributed 14.3 percent. Maple (Acer spp.) and the honeylocust/Kentucky coffeetree (Gleditsia triacanthos/Gymnocladus dioeca) group each comprised 9.5 percent of the sample while the red oak group, white oak group, diffuse-porous group, and wild cherry (Prunus serotina) each made up 4.8 percent. The entire wood charcoal sample in this instance consisted of only 21 specimens rather than the usual subsample of 25.

Carbonized seeds from the feature consisted of one goosefoot (Chenopodium spp.) seed and three spheroids which were again tentatively identified as American pennyroyal (Hedeoma pulegioides).

The only other constituent of the > 2mm sample was a small quantity of bark.

C. 40FR8 ARCHAEOBOTANICAL DATA: SYNTHESIS AND IMPLICATIONS

Carbonized botanical remains recovered from the four features at the Mason site are probably a result of activities which took place throughout the settlement. It seems likely that most of the material was deposited secondarily when denuded storage pits were either left open for extended periods or specifically reused for refuse disposal. One possible exception is evidenced by an organic-enriched zone near the top of Feature 10 which contained a preponderance of wood charcoal from only a few species. This may be indicative of an in situ fire-building episode that occurred after most of the pit had been filled by surrounding soil and refuse.

The vast majority of plant remains sampled consisted of nutshell fragments (Table 3, p. 40). These comprised approximately 80 percent of all > 2mm botanical residues and about 98 percent of all > 2mm plant food residues (Table 6) from the Mason site. The abundance of fragmentary nutshell is indicative of the processing of large amounts of plant foods on the site and it seems likely that these waste products were burned either for fuel or as a convenient means of disposal. For reasons outlined earlier, the features in question have traditionally been interpreted as storage facilities. While the presence of secondarily deposited nutshell in the pits cannot absolutely suggest the foodstuffs which were stored there, it would not be likely that these waste products were transported very far. It seems more reasonable in terms of labor expenditure that the remains would have been dumped back into the pits from whence they had come.

Table 6. Percentage Composition of Identifiable Plant Food Remains from the Mason Site

	Fea. 7	Fea. 9	Fea. 10	Fea. 15	Total
Hickory Nut Shell	93.16	21.10	81.21	88.47	77.82
Black Walnut Shell		P*			P
Butternut Shell		14.33		.09	2.31
Walnut (<u>Juglans</u> spp.) Shell		49.68	1.17	.29	8.04
Juglandaceae Shell	5.29	11.07	16.89	9.51	9.86
Acorn Shell	1.09	2.84		1.61	1.78
Hazel Nut Shell		P	.13		P
Chestnut Shell		.64			.10
Carbonized Seeds	.46	.33	.57	.02	.08
Squash Rind		P		P	P
Gourd Rind		P		P	P
Cucurbitaceae Rind		P		P	P
Maize			.03	P	P
Total Gram Weight	10.97	288.27	31.61	1509.85	1840.70

*P = < .01 or unquantified.

Of the nutshell identified in the > 2mm samples, the most abundant was hickory (_Carya_ spp.) at 62 percent. The shell of the hickory nut is extremely dense and tends to preserve well in archaeological contexts. A very small amount of the shell was identified as bitternut hickory (_Carya cordiformis_) but most was conservatively identified only to genus and it seems likely that hickories with sweeter kernels would have been exploited most frequently.

Hickory fruits were an important food source to the aboriginal inhabitants of the Southeast due to the sweet, edible embryo (Hudson 1976: 286). Oil was extracted from the nuts by pounding them in mortars and mixing them with water to make a "milk or broth" while the woody shells would sink to the bottom of the pot (Swanton 1946: 273-367; Battle 1922: 173-182; Shea 1977: 33). Swanton (1946: 365) indicated that hickory nuts, along with acorns and walnuts, were used chiefly for their oil. Hickory fruits, along with adhering pieces of shell, were sometimes pounded into a coarse meal and consumed without further preparation. The Choctaw "parched the nuts until they cracked to pieces and then beat them up until they were fine as coffee grounds" (Swanton 1931: 48). Lawson (Swanton 1946: 365) further noted that the Indians expectorated the shell fragments which were encountered while eating dry hickory meal. Hally (1981: 731-733) has investigated the distribution of various size classes of hickory shell scattered in prehistoric Mississippian houses at the Little Egypt site in northern Georgia. His data were used in an attempt to identify from the ethnographic record some of the processes which contributed to its carbonization. Asch et al. (1972: 27) have called the hickory nut a "first line" wild plant food due to seasonal abundance, a high protein content, a high caloric value, and storability. Watt and Merrill (1963) have indicated that the nuts are a good source of energy with 13.7 percent crude protein, 71.0 percent fat, 11.3 percent carbohydrates, 2.0 percent fiber, and 2.1 percent ash.

The nuts of the various hickory species generally reach maturity and are dispersed from September through December (USDA 1974: 271). They can be, and presumably were, stored for winter use. The remains would therefore have been deposited in the fall but would not negate a seasonality of occupation determination for any other part of the year. Shea (1977: 35) lists six species which would have been available to prehistoric populations in the study area. These consist of bitternut (*Carya cordiformis*), pignut (*C. glabra*), shagbark (*C. ovata*), shellbark (*C. laciniosa*), red hickory (*C. ovalis*), and mockernut (*C. tomentosa*). All of these but *C. laciniosa* were identified as whole charred nuts by Crites in a Middle Woodland feature on the Hamby site (Shea 1977: 34).

Carya cordiformis occurs on a variety of sites within its extensive range but is generally restricted to moist sites in the southern portion where the study area is situated (USDA 1965: 112). The other hickories within the study area occupy sites ranging from bottomlands to dry uplands depending upon the species. Unfortunately, the great majority of the nutshell could only be identified to the genus level due to its fragmentary condition.

The second most abundant food plant represented in the combined > 2mm samples was walnut (Juglans spp.), the shell of which accounted for 10.49 percent of the food plants and 8.35 percent of all botanical residues. Virtually all of the walnut remains were from Feature 9. About 29 percent of the shell was identified as butternut (Juglans cinerea) and it is likely that the bulk of the remainder, which was conservatively identified only to the genus level, is also butternut. The Southeastern Indians relied upon walnuts both as a food source and for their oil (Swanton 1946: 373-387). Their preparation was probably similar to that of hickory nuts. Because the shell and kernel of Juglans is more readily separated than is the case with Carya, it is probable that the former would have had a lesser chance of exposure to fire during processing. This may have contributed to an underrepresentation of walnut shell in the samples. Hally (1981: 734) encountered walnut shell, along with hickory, in a burned structure at the Little Egypt site in Georgia and postulated that it had been stored as fuel.

The caloric value of both butternut (Juglans cinerea) and black walnut (Juglans nigra) falls short of that of hickory (Carya spp.) but is similar. Butternut is comprised of 24.8 percent crude protein, 64.1 percent fat, 3.1 percent ash, and 8.0 percent combined carbohydrates and fiber (Asch et al. 1972: 11). The fruits generally reach maturity and are dispersed during September and October (USDA 1974: 456). Butternut grows best near stream banks and on well-drained, gravelly soil. It must be regarded as a minor species in the mesophytic climax forests due to its spotty distribution. Undisturbed stands generally occur only by occupying openings that develop in the crown canopy because of its intolerance to shade (USDA 1965: 209). Both black walnut and butternut produce a toxic material in the vicinity of the roots which inhibits the growth of other plants.

The third most abundant category in the 40FR8 sample consisted of arboreal nutshell fragments which could be identified only as Juglandaceae. These fragments were generally small with none or little of the outer surface left intact. Assuming a similar propensity for fragmentation into non-diagnostic portions between walnut and hickory, one can assume that within the Juglandaceae category the ratio of walnut to hickory should be equivalent to that actually discerned. In other words the ratio of hickory shell to walnut shell, including Juglandaceae, in the total > 2mm botanical category would be 68.2:9.4.

Acorn shell comprised about 1.44 percent of the overall 40FR8 sample and was not abundant in any of the features examined. The quantity observed in the sample, however, is undoubtedly limited by differential preservation. Acorn shell is not as dense as hickory or walnut shell, nor as thick. This frequently results in complete oxidation to ash whenever acorn remains are exposed to fire. Chapman (1974: 228) has suggested "that to derive the food equivalence of acorn to hickory nut in the archaeological sample, the weight of the acorn shell must be multiplied by a factor of 10-20." This adjustment would indicate that acorn shell constituted 14 to 29 percent of the total > 2mm plant remains, second only to hickory shell. The underrepresentation of acorn remains in the > 2mm sample was substantiated by the analysis of a ten gram subsample of 1-2mm material from Feature 15 (Table 4, p. 51). Acorn shell constituted about 3 percent of that sample as opposed to .79 percent in the > 2mm sample from the same feature.

Due to its fragmentary condition, virtually all of the acorn shell was only identifiable to the genus level (Quercus spp.). The one exception consisted of a whole acorn cap from Feature 15 which was identified as white oak (Quercus alba) based upon platelet configuration and general morphology (USDA 1974: 696-697).

Many of the white oaks are reputed to produce sweet, palatable nuts. The red and black oaks, however, produce nuts which are bitter due to a high tannic acid content. The Indians successfully removed the acid by leaching or boiling the acorns several times, or by parching them. Acorns were ground in the same manner as hickory nuts to extract the oil or bread was made from the pounded, boiled nuts (Swanton 1946: 273-366). The Choctaw relied upon acorn meal in years when the corn crop was poor (Hudson 1976: 308). While acorns produce more meat per shell than hickory nuts or walnuts, they contain only a third of the food energy. Asch et al. (1972: Table 5) record white oak acorns as containing 5.3 percent protein, 6.3 percent fat, 83.2 percent carbohydrates, 2.5 percent fiber, 2.6 percent ash, and 5.6 percent tannin. They suggested that hickory nuts were a primary plant food source supplemented only by acorns.

Oaks are dominants throughout the study area and occupy a number of habitats, the specifics of which have been summarized by Shea (1977: 37-40) for the upper Duck River Valley. The red oak group (subgenus *Erythrobalanus*) is comprised of black oak (*Quercus velutina*), bur oak (*Q. macrocarpa*), chestnut oak (*Q. prinus*), chinquapin oak (*Q. muhlenbergii*), northern red oak (*Q. rubra*), pin oak (*Q. palustris*), scarlet oak (*Q. coccinea*), blackjack oak (*Q. marilandica*), swamp chestnut oak (*Q. michauxii*), dwarf chinquapin oak (*Q. prinoides*), shumard oak (*Q. shumardii*), southern red oak (*Q. falcata*, var. *falcata*), and water oak (*Q. nigra*). The white oak group (subgenus Lepidobalanus) consists of white oak (*Q. alba*), willow oak (*Q. phellos*), post oak (*Q. stellata*), and overcup oak (*Q. lyrata*). The ripening and dispersal of the fruits occurs from late August to early December although the oaks vary widely in the initiation of seed bearing and the frequency of large crops. Acorns of the white oak group germinate quickly and must be collected soon after they have fallen (USDA 1974: 695, 698). Acorns are sometimes heavily infested with weevils (*Curculio* spp.) in years when light crops are produced and the collection of large quantities of sound seed is difficult (USDA 1974: 698). While storage by the aborigines is likely to have occurred, its success would have depended upon elimination of the weevils either by boiling, parching, or carefully avoiding contaminated nuts.

A small amount of American chestnut (*Castanea dentata*) shell was recovered from Feature 9 and constitutes only .08 percent of the total

> 2mm sample from the Mason site. This is not surprising as chestnut remains are noted rarities in archaeological assemblages. Its absence or underrepresentation is attributed to the same factors which limit acorn remains. The extremely thin pericarp of the fruit is easily oxidized to ash when burned. If chance carbonization did occur, breakage could restrict the remains to unsorted small size categories where they could be confused with acorn shell except under more rigorous examinations. The method of aboriginal processing may also have contributed to its scarcity in the samples.

The fruit of the chestnut was roasted and marketed for human consumption during historic times. Hudson (1976: 286) has indicated that they were one of the most important nuts to the Southeastern Indians who either used them for bread or ate them raw. A number of early ethnographers noted the significant food value of the chestnut (e.g., Yanovsky 1936: 17; Brereton 1966: 37, 39, 43; Hakluyt 1966: 178), but its former distribution within the study area is difficult to assess due to its eradication by the chestnut blight (_Endothia parasitica_) in the first half of this century. The tree's range encompassed the study area where it would have been found occupying sandy loams with other hardwoods, although less abundant than to the east (Harlow and Harrar 1958: 320-322). Chestnuts would have provided a large amount of meat per nut but would have been difficult to store due to their perishable nature.

The only other arboreal nut represented, and also a very minor constituent of the sample, was hazelnut (_Corylus americana_). It was present only in Feature 9 and made up only a trace amount (< .005 percent) of the total > 2mm sample from 40FR8. Its shell properties are very similar to acorn, with which it is sometimes confused by inexperienced persons, and would be underrepresented due to similar limiting factors in archaeological contexts.

Indians along the Missouri River consumed hazelnuts raw with honey or used them as a body for soup (Gilmore 1977: 22). Nutritionally, hazelnuts are similar to walnuts but with slightly more food energy. They are comprised of 22.5 percent crude protein, 61.4 percent fat, 11.2 percent carbohydrates, 2.2 percent fiber, and 2.8 percent ash (Asch et al. 1972: 11).

American hazelnut is a small shrub which grows in either dry or moist woods and thickets (Gleason and Cronquist 1963: 244). The fruits mature in the late summer or early fall but may be eaten by rodents, birds, and larger animals before they are fully mature. To reduce such losses the fruits should ideally be picked as soon as the edges of the husks begin to turn brown, sometimes as early as mid-August. Large seed crops are produced at irregular intervals, usually every two to three years (USDA 1974: 343).

Aside from the arboreal nuts previously described, food plant remains from the Mason site may be placed into three categories for convenience of description. These are (1) root and tuber fragments, (2) carbonized seeds, and (3) tropical cultigens. Of the first category it can only be said that trace amounts were present in Feature 9. Due to the difficulty in recognizing roots and tubers when they are fragmented into minute pieces, some may be represented in the "unknown" category. Even so, they would comprise a minor portion of the sample.

Carbonized Seeds

Carbonized seeds made up .06 percent of the sorted botanical remains (Table 3, p. 40) from the Mason site, and .08 percent of the sorted food plant remains (Table 6, p. 62). With regard to prehistoric consumption, many of the seeds represent the actual kernel which would have been eaten. It is reasonable to assume, then, that if these represent by-products of man's utilization, they would have been most likely deposited accidentally during the course of parching or other means of preparation. Other seeds, such as persimmon or grape, represent waste products and could have been intentionally expectorated or otherwise placed into the fire after the fleshy portions of the fruits were removed. It is likely that many of the seeds recovered were present due to natural seed dispersion and accidental burning in aboriginal fires. This is substantiated by the large number of modern seeds which are usually extracted from archaeobotanical samples as "contamination."

Mature seeds are almost exclusively produced by plants during the summer and fall seasons, and can also be stored by their human collectors. It seems most inappropriate, then, to use them as a sole basis for the determination of seasonality of occupation, particularly when better indicators are available in the faunal record and elsewhere. As mentioned previously, the large quantities of arboreal nut shell on the site most certainly suggest an autumn occupation. It seems likely that the bulk of the seeds would also have been deposited at the approximate time of natural dispersion, although dormant seeds in the soil or elsewhere could have become carbonized during any time of the year. It is also conceivable, if not probable, that carbonized seeds were redeposited during various times of the year. In short, if a substantial number of fish, amphibian, and turtle elements from the Mason site (Parmalee 1968: 256-258) can be taken to indicate a summer exploitation, and the botanical remains suggest a late summer or fall exploitation, then it can only be stated that the site was occupied during these two seasons but conceivably could have been occupied throughout the year.

Because of the minute weights of many of the herbaceous seeds discussed in the ensuing test, it was generally found to be more appropriate to quantify them by number. They are presented alphabetically by genus, or by family if that is the only taxonomic unit used, both in Table 7 and in the text.

Asteraceae family. Seedhead fragments of flowering composites were recovered in trace amounts from all features except Feature 10 at the Mason site. Most appear to have been immature with the seeds not fully developed. The petals are missing, probably as a result of carbonization, but due to the apparent small sizes of the heads it is suggested that the specimens probably belonged to the genus *Aster* or a genus comprised of similarly small plants. While aboriginal uses of flowers both as food and as medicinal sources have been documented (Shea 1977: 45), it is likely that some of the remains were incidental

Table 7. Absolute Frequencies (Whole/Fragments) of Seeds from the Mason Site

	Fea. 7	Fea. 9	Fea. 10	Fea. 15	Total
Asteraceae family	P	P		17/50	17/50
Chenopodium spp.			10/0	2/3	12/3
Croton spp.		1/0			1/0
Diospyros virginiana				1/2	1/2
Fabaceae family	2/0	4/0	2/0		8/0
Galium trifidum				1/0	1/0
Gleditsia triacanthos	0/1	22/21	4/0	2/14	28/35
Helianthus annuus		2/0			2/0
Heliotrophium spp.		1/0			1/0
Myrica spp.			1/0		1/0
Passiflora incarnata				2/1	2/1
Phalaris caroliniana		1/0	1/0		2/0
Polygonum spp.			1/0	1/0	2/0
Potamogeton spp.		1/1			1/1
Rhus radicans			1/0		1/0
Viburnum spp.		1/0			1/0
Vitis spp.		40/19		2/0	42/19
V. rotundifolia			1/0		1/0
Zea mays			0/3	0/2	0/5
Unknown		6/0	3/0		9/0
Total	2/1	78/41	24/3	28/72	149/167

products of carbonization, perhaps from usage as dried tinder or pit linings. Most of the composite species occupy habitats at the edges of woods or in waste places where they flower during the summer and fall.

Chenopodium spp. Twelve whole goosefoot (Chenopodium spp.) seeds and one seed fragment were recovered from features 10 and 15. The species which would have been available in the study area were *C. album*, *C. stanleyanum*, and *C. hybridum*. The specimens in question are somewhat smaller than the 1.5 to 2.5mm seeds of *C. hybridum* and were probably products of one of the other two species. *Chenopodium album* inhabits fields, gardens, waste grounds, and dry fields and barrens (Gleason 1958: 89) while *C. stanleyanum* is found in dry open woods (Gleason and Cronquist 1963: 274). Certainly a large number of waste or open areas would have been co-extensive with the aboriginal settlements.

Moderate numbers of goosefoot seeds could easily have been produced by a single inadvertently carbonized stalk growing as a weed on the site. Direct evidence for human consumption in the Southeast, however, has been derived from coprolites recovered from an Early Woodland component at Salts Cave, Kentucky (Yarnell 1969: 42-47). Hudson (1976: 287) has indicated that the Southeastern Indians either cooked chenopodium greens as a potherb or ground the seeds for meal.

Croton spp. A single croton (Croton spp.) seed recovered from Feature 9 is the only one in the Mason site sample. Three species

(*C. glandulosus*, *C. monanthogynus*, and *C. capitatus*) are found in the study area, all of which occupy either dry soil or waste places. No ethnographic accounts for their utilization in the Southeast could be found, but the leaves of a western species (*C. texensis*) had medicinal applications among the Pawnee (Gilmore 1977: 47). It is probable that the Mason specimen was a product of natural dispersal and accidental carbonization.

Diospyros virginiana. Only one whole persimmon seed and two seed fragments were recovered from the Mason site samples—all from Feature 15. Their sparsity is surprising given the density of the seeds and the large number of seeds per fruit but it is possible that processing occurred on another part of the site. Hudson (1976: 295-296) indicates that the persimmon was the most important fruit among the Southeastern Indians, of which they made bread, cakes, and candy. It is possible to make a type of beverage from roasted seeds or a tea from the dried leaves (Fernald and Kinsey 1943: 320-321). The specimens from Feature 15 might have been expectorated into a fire or accidentally burned during roasting.

Persimmon trees grow best on alluvial soils. In upland areas they are usually restricted to light, sandy, well-drained soil, but their development there is poor (USDA 1965: 168). The fruits, plum-like berries .75-2.0 inches in size, ripen from September to November. Ripe fruits are particularly abundant right after the first frost and must be gathered quickly to avoid losses to opossums and other animals. Good crops are produced about every two years, with light crops in the intervening years (USDA 1974: 373).

Fabaceae family. Eight small wild legumes which could only be identified to the family level were present in all samples except that from Feature 15. The bean family consists of a very large number of taxonomic units, many of which are of some economic importance. The larger specimens in question were within the general size range of *Strophostyles* spp., while the others were smaller, but all were too eroded for more specific identifications.

Galium trifidum. One bedstraw (*Galium trifidum*) seed was recovered from Feature 15. The plant generally inhabits moist places at various altitudes (Gleason and Cronquist 1963: 651) and thrives on disturbed soil (Asch et al. 1972: 13). The seeds are available from June through September and, when roasted, can be used to prepare a beverage (Fernald and Kinsey 1943: 342). The dried plant is also used to prepare a tea in some countries (USDA 1969: 126). The sprouts are available from March through July and can be eaten raw or cooked (Shea 1977: 48). Gilmore (1977: 63) reports that Indians of the Missouri River region referred to another species (*G. triflorum*) as "woman's herb" and used it as a perfume. *Galium aparine* is listed by the United States Dispensatory as an anti-scorbutic. It is also a diuretic, tonic, astringent, anti-spasmodic, and is used to treat inflammation of the kidneys and bladder (USDA 1969: 126). The single seed from the Mason site is most likely a product of natural dispersion.

Gleditsia triacanthos. Honeylocust seeds were present in all features examined and were second in abundance only to grape. A total of 24 whole and 39 fragmentary seeds was recovered from the Mason site samples.

The fruits of the honeylocust consist of long, flat pods which contain seeds in a matrix of sweet palatable pulp. The Indians of the Southeast dried and ground the pulp for use as a sweetener or to prepare a drink (Hudson 1976: 287; Yanovski 1936: 36). The seeds are not edible but their presence in quantity probably suggests use of the pods.

Honeylocust is typically a bottomland tree, most commonly found on alluvial flood plains, but also found on soils of limestone origin. It is rarely a major component of forest stands. The fruits generally ripen from about September 15 to October 20 and seed dissemination often continues through late winter. Abundant crops occur every year or two (USDA 1965: 199).

Helianthus annuus. Two domesticated sunflower seeds were recovered from the Mason site—both from the Feature 9 sample. These are significant in that they suggest that the Mason people were practicing horticultural pursuits even though the bulk of the botanical samples consist of wild plant food remains.

Current thought concerning sunflower domestication is that the plant was originally a probable "camp follower" which thrived on disturbed ground and was eventually given to an increase in size, a decrease in the number of flowers produced, and a decrease in natural seed dispersal due to selective seed planting by man. Such profound genetic changes could only have been maintained beyond the native range of the species to prevent their loss by crossbreeding with wild forms (Heiser 1976: 82). Three varieties of H. annuus have been established—lenticularis, the "wild" sunflower; annuus, the weedy or ruderal sunflower; and macrocarpus, the giant domesticated sunflower with which most people are familiar (Heiser 1951: 432). Helianthus annuus var. lenticularis is a Southwestern endemic centered on the Colorado Plateau and not found east of the Mississippi River, although the eastern periphery of its range varies somewhat among different sources (Heiser 1951: 432; DeWit 1967: 198; Small 1933: 1435). Helianthus annuus var. macrocarpus presently has a worldwide distribution but is confined archaeologically to the Eastern and Midwestern states, not occurring in the Southwest at all (Heiser 1976: 34). Situated geographically between these two varieties and centered somewhat in the Midwestern region is the variety annuus which intergrades and may be a feral form of macrocarpus. From the respective distributions of these three varieties Heiser (Heiser 1951: 432, 445) has deduced "either primary or secondary centers for the diversity of the cultivated sunflower" in either North Dakota or Kentucky, and has since suggested an origin in "temperate North America," seemingly favoring the Kentucky center due to an earlier context there.

That selection was taking place in historic times among the Indians is well documented (Heiser 1976; Gilmore 1919; Swanton 1946). Selection has also been noted in the archaeological record, as manifest by an increase in achene size from a Terminal Archaic component at the

Higgs site to the late Middle Woodland Owl Hollow phase at the type site in the Elk River Valley (Cobb and Shea 1977: 197). The increase in achene size is consistent with trends in the archaeobotanical record elsewhere in the eastern United States (Yarnell 1978: Table 1; Chapman and Shea 1981).

The Mason site specimens measured 7.2 x 3.6 mm and 9.3 x 4.0 mm, respectively, with regard to length and width. To convert measurements of the carbonized sunflower seeds to estimates of their original achene size, it was necessary to increase length by 30 percent and width by 45 percent (Yarnell 1978: 296), resulting in converted measurements of 9.4 x 5.2 mm (LW = 48.9) and 12.1 x 5.8 mm (LW = 70.2), respectively. The mean of the two reconstructed achenes is 10.75 x 5.5 mm (LW = 59.1). This is larger than the mean of Terminal Archaic specimens from the Higgs site (LW - 24.3) (Brewer 1973) and larger than that of specimens from the late Middle Woodland component at the Owl Hollow site (LW = 36.5) (Cobb and Shea 1977: 197). Interestingly, the Mason mean is smaller than that of historic Cherokee specimens from two sites in the Little Tennessee Valley (40MR2 and 40MR24, LW = 66.7) as expected, but larger than the mean of Early Mississippian Martin and Hiwassee Island phase specimens from 40MR20 in the same area (LW = 25) (Chapman and Shea 1981). This unexpected difference in the latter incidence may reflect diversity due to geographic or other factors. Generally speaking, the measurements of the Mason sunflower seeds, albeit based upon an insufficient sample size and further biased by the necessity of using reconstruction formulae, fall within an expected size frame for the time in question.

The cultivation of the sunflower outside of its present natural range seems to have been favored by several advantages. First, its temperature optimum is below that for maize and beans, thus giving more flexibility to its extended range (Jensma 1970: 19). It has also been noted that sunflowers grown in cool to warm weather have a greater ability to compete with weeds than those grown in hot weather (Johnson 1970: 237). Among the weeds commonly associated with the domesticated sunflower are *Amaranthus retroflexus, Chenopodium album, Polygonum persicaria* (Enns et al. 1970: 166), and *Ambrosia artemisiifolia* (Johnson 1970: 237).

The importance of the sunflower to aboriginal populations is suggested by the presence of seed or achene remains in 90 of the 100 human paleofeces specimens examined from Salts Cave (Yarnell 1969: 42-43). Ethnohistoric sources indicate that the seeds were ground into a meal or boiled to extract the oil (Gilmore 1977: 78, 84).

Sunflower seeds have excellent nutritional value relative to other aboriginal cultigens and possible cultigens. An analysis of sunflower meal by Cater et al. (1970: 91-106) yielded 54 percent protein (equal to soybean protein) which was highly digestible (90 percent) and contained all but two essential amino acids. A major shortcoming of the plant is poor storability of the seeds which are ruined by even 10 percent moisture in modern facilities (Hayenga 1970: 74).

Heliotrophium spp. A single heliotrope seed was recovered from Feature 9 and was probably a product of natural dispersal and incidental carbonization. Of the two species which are native to the study area, H. indicum and H. tenellum, the former is most widespread (Sharp et al. 1960: 79). It is now pantropic, although it is considered to be native to Brazil, and its former range is questionable. Heliotrophium tenellum is a small branched annual which is native to dry soil, upland woods, prairies, and barrens (Gleason and Cronquist 1963: 572). No economic significance is presently attributed to either species.

Myrica spp. One seed, which was tentatively identified as belonging to the bayberry family and genus (Myrica spp.) was recovered from the Feature 10 sample. Two shrubby species, sweetfern (M. asplenifolia) and sweet Gale (M. Gale), have ranges which encompass the study area (Sharp et al. 1960: 3). Sweet fern grows on dry, especially sandy, soil while sweet Gale occupies swamps and shores (Gleason and Cronquist 1963: 241). No economic importance has been assigned to either of these but a coastal plain species, M. cerifera or bayberry, is noted as a source of candle wax and for medicinal purposes (USDA 1969: 180).

Passiflora incarnata. Two passionflower (Passiflora incarnata) seeds were recovered from the Mason site samples—both from Feature 15. The smooth, ovate fruits of the plant are 2-3 inches long and contain seeds surrounded by an edible citrus-tasting pulp. Various other parts of the plant are reported to have medicinal properties, including an aphrodisiac effect (USDA 1969: 188). The seeds are not uncommon constituents of archaeobotanical assemblages and are most likely products of disposal or accidental burning as they have no use in themselves. Because passionflower fruits are not storable, some have taken the presence of the seeds as an indication of summer habitation (Wilson 1977: 85).

The passionflower plant grows best in open areas such as fields, roadsides, thickets, and open woods (Gleason and Cronquist 1963: 241).

Phalaris caroliniana. A single maygrass seed from Feature 10 is the only one identified from the 40FR8 samples. It is at least conceivable that small seeds such as maygrass or chenopodium are underrepresented because they passed through the retrieval sieves of 1/16 inch (1.59mm) window screen during field processing of the samples.

Maygrass seeds are relatively common constituents of archaeobotanical assemblages and occurred abundantly to very abundantly in 21 of 100 human paleofecal specimens analyzed from Salts Cave (Yarnell 1969: 42-47). Because a small volume of grass seed would consist of a very large number of grains, the single seed from the Mason site is believed to be fortuitous and not regarded to be evidence for economic significance.

Phalaris caroliniana may properly be termed a "camp follower" as it most frequently occurs in waste places, roadsides, and wet fields (Gleason and Cronquist 1963: 96). Use of the seeds as food has been documented among historic Indian groups (Fernald and Kinsey 1943: 90-107).

Poaceae family. One seed from the Mason site samples (Feature 10), due to its eroded condition, could only be identified as belonging to the grass family. Many members of the poaceae have edible grains and tubers, and two genera, *Phalaris* and *Panicum*, were recovered from the Salts Cave paleofeces (Yarnell 1969: 47).

The various grass taxa occupy a multitude of habitats depending upon the particular species. Shea (1977: 46-47) has reported that in the Normandy Reservoir area "grasses grow in disturbed areas, along stream banks and in low woodlands in all Normandy Reservoir zones." Seeds mature and are available throughout the summer and autumn.

For the same reasons outlined for *Phalaris caroliniana*, it is felt that the occurrence of this single grain is probably related to natural rather than cultural phenomena.

Polygonum spp. Two features at 40FR8 produced knotweed (*Polygonum* spp.) seeds. A seed fragment was recovered from the Feature 10 sample and whole seed from the Feature 15 sample. Carbonized polygonum seeds are frequently encountered in archaeological contexts (e.g., Asch et al. 1972: 13; Shea 1977: 82; Dye 1977: 72). Eleven of the 100 human paleofecal samples from Salts Cave contained knotweed seeds, albeit in "scarce" amounts (Yarnell 1969: 42-43). The plant grows voluntarily in garden plots and there has been some suggestion that it may have been grown intentionally (Yarnell 1976: 269).

The occurrence of 27 native species of *Polygonum* has been reported in Tennessee, five of which were collected in Coffee County.

These consist of P. aviculare, P. hydropiperoides var. adenocalyx, P. hydropiperoides var. hydropiperoides, P. pensylvanicum var. pensylvanicum, and P. sagittatum (Shea 1977: 82). Although seed morphology generally permits the identification of Polygonum seeds to species (Martin and Barkley 1961: 631-642), those in question could only be identified to genus due to generally poor condition. All of the Coffee County species are weeds which inhabit waste places, fields, marshes, and shallow water (Gleason and Cronquist 1963: 269-270). The plants would have been available to the aborigines from the early spring to late fall and the seeds throughout most of the summer and fall.

The plant's consumption by historic Indian tribes is well documented (Densmore 1974: 291; Yanovski 1936: 20; Fernald and Kinsey 1943: 173-176). Fernald and Kinsey noted that various Indian tribes used the seeds of P. aviculare as grain, and that the leaves and seed of Polygonum spp. were used as potherbs and grain.

Potamogeton spp. Two pondweed seeds, one whole and one fragment, were recovered from the Feature 9 sample. Although seed morphology differs somewhat between the various species of Potamogeton (Martin and Barkley 1973: 78-79), the differences are often minute and it was felt that a conservative identification to the genus level was most appropriate. The ten species that have ranges which encompass the study area consist of P. natans, P. amplifolius, P. epihydrus, P. nodosus, P. illinoensis, P. perfoliatus, P. zosteriformis, P. foliosus, P. pusillus, P. diversifolius, and P. pectinatus (Gleason and Cronquist 1963: 35-38). All are aquatic and occur in ponds and slow streams. Seeds would have been available throughout the summer and fall. Although no economic use could be ethnohistorically documented for the plant, the seeds would most likely have been introduced into the fire by means other than natural dispersal.

Rhus radicans. A single poison ivy (Rhus radicans; also Toxicodendron radicans) seed was encountered in Feature 10. For obvious reasons it is judged to have been a product of accidental carbonization, perhaps having been derived from a vine attached to firewood. The fruits of poison ivy appear from August to November and persist through the winter. The plant may occur as a large vine on trees or as an erect shrub in open areas (Niering and Olmstead 1979: 325-326).

Virburnum spp. One Viburnum seed, from Feature 9, was identified from the Mason samples. Although the specimen in question was conservatively identified only to the genus level, twelve species have been reported for Tennessee and three specifically for the study area. The latter species include V. acerifolium, V. nudum, and V. recognitum (Sharp et al. 1960: 91-92). Of these, possumhaw (V. nudum) is reported to have medicinal value, the bark of the root or stem being used as a uterine sedative, diuretic, antispasmodic, and tonic (USDA 1969: 270). The Chippewa made a tea from the bark of arrow-wood (V. acerifolium) to relieve stomach cramps (Densmore 1974: 346-347). Another species (V. prunifolium), which has been reported in counties adjacent to the study area (Sharp et al. n.d.: 92), is reputed to have the same qualities as possumhaw with the root tea used as a tonic in Appalachia (USDA 1969: 272). Sheepberry (V. lentago), whose range includes Tennessee (Gleason and Cronquist 1963: 652), produces drupes of fruits which were eaten raw by several Indian tribes of the Missouri River area (Gilmore 1977: 63).

The many species of Viburnum grow in a variety of habitats ranging from moist to dry. The fruits mature from late summer through the fall. The single specimen in question may well be the result of natural rather than cultural phenomena.

Vitis spp. Grape (Vitis spp.) was more abundant than any other category of seeds identified from the Mason site. Forty whole seeds and 19 seed fragments were recovered from Feature 9. While these were conservatively identified only to the genus level, they are not muscadine (V. rotundifolia), and most exhibit morphological attributes of the fox grape (V. labrusca). Two whole seeds were recovered from Feature 15 and are similar in appearance to those from Feature 9. A single seed, recovered from the Feature 10 sample, was identified as muscadine (V. rotundifolia).

Seven species of grape have been reported for the study area, many of which occupy forests and thickets in all the biogeographic zones (Shea 1977: 45-46). These consist of V. aestivalis Michx. (summer grape), V. cinerea Engelm. (winter grape), V. labrusca L. (fox grape), V. riparia Michx. (frost grape), V. rotundifolia Michx.

(muscadine), *V. rupestris* Scheele (sand grape), and *V. vulpina* L. (frost grape).

Grape seeds are common constituents of archaeobotanical assemblages (e.g., Shea 1977; Wilson 1977: 102; Asch et al. 1972: 17) and are well documented ethnohistorically (Byrd 1929: 196-197; Densmore 1974: 294; Gilmore 1977: 50). The fruit was either consumed fresh or dried for winter use, and in the spring sap was extracted from the large grapevines to drink fresh (Gilmore 1977: 50). Grape seeds were identified in nine of the 100 human paleofeces analyzed from Salts Cave (Yarnell 1969: 42-43).

The fruits of the various grape species ripen from August through October. The seeds in the Mason features are probably a result of disposal, either by expectoration into the fire or by some other means.

Tropical Cultigens

The "tropical cultigens" are those which were apparently domesticated in Mesoamerica and include maize (*Zea mays*), squash or pumpkin (*Cucurbita pepo*), bottle gourd (*Lagenaria siceraria*), and beans (*Phaseolus* spp.). All but beans, which were relatively late arrivals (Struever and Vickery 1973: 1205), were recovered in small quantities from the Mason site samples.

Zea mays. Maize was recovered from two of the four features at the Mason site from which botanical samples were analyzed. Feature 10 produced three kernel fragments (.01 grams), none of which were of sufficient size for pertinent measurements to be taken. Feature 15 yielded a somewhat larger kernel fragment, which measured 7 mm from proximal to distal end, and one small specimen that could only be identified as a possible kernel fragment. In addition, one of the Feature 15 "unknown" categories consisted of minute fragments of a fleshy substance, some of which may be kernel portions. Andrea Shea (personal communication 1979) indicated that the large kernel fragment from Feature 15 was morphologically reminiscent of the Eastern Flint varieties which she had examined from Mississippian contexts.

It is interesting that only kernel fragments and no cupules were encountered in the samples as the latter usually tends to preserve better due to relative density. It seems that the kernels would most likely represent food scraps which were accidentally carbonized, unlike cobs and cupules which were often burned intentionally either as fuel or for disposal after the grains were removed.

These few kernel fragments represent the only indisputable evidence, to date, for maize from a Mason phase context. While unanticipated, the discovery of maize was not entirely a surprise as small amounts had been previously recovered from Middle Woodland contexts in the study area (Crites 1978: 118, 159). The presence of maize is also a hallmark of Mississippian assemblages for which there seems to be some evidence for temporal overlap with the Mason phase. Whether the Mason people were growing maize, or received it through trade with contemporary Mississippian groups, the data at hand would not suggest that it played any significant role in their diet. Even if it were being prepared as a mush or in some other way as to preclude its identification in archaeobotanical assemblages, one would expect to recover cupules and cob fragments.

The occurrence of maize in two other possible Mason phase features in the Normandy Reservoir area should be noted. Feature 40 at Banks III site (40CF108) consisted of a tip-up/cradle knoll which had been used as a trash repository and contained maize (Duggan 1982: Table VII-1, p. 220). The component attribution of that feature was given by the investigators as "Late Middle Woodland-Mississippian?" (Faulkner and McCollough 1974: 382-383, Table 45). They further indicate that "none of the features in the TABLE 45 inventory can be attributed to the Late Woodland with much confidence" (Faulkner and McCollough 1974: 337). The other feature in question is Feature 18 at the Eoff I site (40CF32) from which abundant charred maize was recovered. The feature, a small shallow basin, contained a single chert-tempered plain pottery sherd, but was attributed to a Mississippian occupation based upon a radiocarbon date of A.D. 1155 ± 55 years (Faulkner 1977: 170).

The sparsity of Late Woodland maize is not peculiar to the study area. Cutler and Blake (1973), in reviewing the evidence for maize east of the Rockies, report that very little has been found in association with Late Woodland components that date before about A.D. 900. There are numerous instances, however, of maize having been recovered from Late Woodland and Mississippian components which date after about A.D. 1000. In examining the Late Woodland plant-use data for the Lower Kaskaskia River Valley in Southern Illinois, Kuttruff reported only two identifications each of maize kernels and maize cupules, these being from Feature 1 at the Emge site. From this it was suggested, as at the Mason site, that although maize was present, it was relatively unimportant in the overall subsistence base (Kuttruff 1974: 162-167).

Cucurbita pepo. Squash or pumpkin rind fragments were recovered in small quantities from features 9 (n=31; wt.=.02g) and 15 (n=4; wt.=<.005) at the Mason site. All were recovered from the smaller laboratory screens as the rind is extremely fragile when carbonized, and tends to fragment into minute portions.

Cucurbita has been recovered from a number of prehistoric components in the Normandy Reservoir area, the earliest dating to 90 B.C. ± 95 years (Shea 1977: 49). Elsewhere in the Southeast, cucurbit remains have been recovered from archaeological components dating as early as the third millenium B.C. These include the Carlston Annis and Bowles sites (Watson 1976: 87), the Phillips Spring and Green River shell mound sites (Chomko and Crawford 1978; Kay, King, and Robinson 1980), and the Bacon Bend site (Chapman 1981: 129-134). Crites (1978: 105) has previously reported the occurrence of Cucurbita rind in the Feature 53 sample, identified as Mason phase, at the Parks site. Both roasted seeds and pollen of the squash plant were recovered from human paleofeces at Salts Cave (Yarnell 1969: 42-43, 51). Cutler and Blake (1973: 7) reported that all the squash and pumpkin they had examined from pre-Columbian sites east of the Rockies were Cucurbita pepo, the species that includes Halloween pumpkin, acorn squash, summer crookneck squash, zuchini, white bush scallop squash, and similar squashes, along with the small, yellow-flowered ornamental gourd. They felt that the squashes from Salts Cave, Kentucky, were developments of the small seeded gourds and are related to small eastern squashes like the summer squash (Cutler and Blake 1973: 7). The historic Indians of the Missouri River region had at least eight varieties of squash and pumpkins (Gilmore 1977: 84).

The aboriginal use of cucurbits in the Southeast and elsewhere in the United States is well documented ethnohistorically. Hudson (1976: 307) reports that the squash and pumpkin rind was cooked by boiling or broiling, after which it was preserved by cutting it into round slices which were peeled and dried. Densmore (1974: 319) relates a similar mode of preparation among the Chippewa:

> Pumpkins and squashes were cultivated in gardens and either eaten fresh or cut in pieces or in strips for drying. These were laid on frames or were strung on long pieces of basswood cord and hung over the fire where the drying was slowly accomplished. They were stored in bags and sometimes kept for two years. Dried squash and pumpkin were boiled with game, or boiled alone and seasoned with maple sugar. The flowers of the latter were dried and used in broth for seasoning and also for thickening.

The seeds of the cucurbits were roasted and eaten also (Hudson 1976: 307).

Lagenaria siceraria. Bottle gourd (*Lagenaria siceraria*) rind fragments were recovered, in small amounts, from the same features which had yielded squash remains. Feature 9 yielded 17 fragments and Feature 15 produced two others (combined wts.=<.01g), all of which were in the smaller laboratory screens.

Cutler and Blake (1973: 8) suggest that the bottle gourd may be the oldest cultivated plant. It probably reached the Southeast, along with squash, sometime in the third millenium B.C. In the Midwest-Riverine area it has been reported from a number of Early Woodland and Middle Woodland contexts (Cutler and Whitaker 1961; Struever and Vickery 1973: 1204-1205). Chapman and Shea (1981: 70) recovered gourd rind fragments from a feature radiocarbon dated to 1255 B.C. at the Iddins site. While gourd was not specifically identified in paleobotanical samples from the Normandy Reservoir area, Crites (1978: 105, 118) does include a Cucurbitaceae category which may consist partially of unidentifiable Lagenaria remains. Roasted gourd seeds were recovered from six of the 100 human paleofecal samples analyzed from Salts Cave, Kentucky (Yarnell 1969: 42-43).

It has been traditionally suggested that the bottle gourd was raised primarily for use as a vessel or container (Funkhouser and Webb 1929: 57; 1930: 301). An effigy pottery container in the form of a bottle gourd was recovered from a Havana-Hopewell phase mound of the Brangenberg group in Illinois (Griffin et al. 1941: 42). At Salts Cave a number of both squash and gourd containers were recovered (Yarnell 1969: 50-51). Historic Indian tribes of the Missouri River region raised Lagenaria siceraria primarily to provide shells of which to make rattles (Gilmore 1977: 65).

Cucurbitaceae. Several cucurbit rind fragments which could only be identified to the family Cucurbitaceae were recovered from features 9 (n=13) and 15 (n=3). These are either Cucurbita pepo or

Lagenaria siceraria. Additionally, a small cucurbit peduncle was recovered from the Feature 15 sample.

In summary, 31 categories of plant residues, excluding wood charcoal, were recovered from the Mason site. The bulk is comprised of food plants, but some of the smaller herbaceous seeds were probably fortuitous pit inclusions in spite of documented economic uses. An examination of the distribution of categories of plant residues (Table 8) suggests that taxa from the flood plain, older alluvial terraces, and disturbed or cultivated ground were utilized most frequently. Because the site was situated on an older alluvial terrace, a heavy utilization of plants growing there would be expected. A high representation of cultigens and weedy plants which thrive on disturbed ground would be expected on a site which was occupied intensively throughout most of the year. The seemingly high utilization of floodplain taxa is probably erroneous due to the fact that many also occur in disturbed ground habitats.

40FR8 Wood Charcoal Summary

Nineteen types of wood, encompassing a minimum of 14 genera, were identified in the wood charcoal from the four Mason site features (Table 9). Subsequent to analysis, the distribution of these categories was determined with regard to biogeographic zones and moisture tolerances (Tables 10 and 11; Figures 2 and 3). Most genera occur in all or several of the biogeographic zones, although particular genera are clearly more abundant in some zones than in others. Moisture tolerances were assigned in order to ascribe the

Table 8. Distribution of 40FR8 Taxa by Biogeographic Zone

	Flood Plain	Older Alluvial Terraces	Valley Slopes and Bluffs	Uplands	Disturbed or Cultivated Ground
Asteraceae family	X	X	X	X	X
Carya cordiformis	X	X			
Carya spp.	X	X	X	X	
Castanea dentata				X	
Chenopodium spp.	X				X
Corylus americana					X
Croton spp.					X
Cucurbita pepo					X
Cucurbitaceae family					X
Diospyros virginiana		X	X		
Fabaceae family	X	X	X	X	X
Galium trifidum	X				X
Gleditsia triacanthos	X	X			
Helianthus annuus					X
Heliotrophium spp.				X	X
Juglans cinerea			X		
Juglans spp.	X	X	X		
Lagenaria siceraria					X
Myrica spp.	X	X			
Passiflora incarnata	X	X			X
Phalaris caroliniana	X				X
Poaceae family	X	X	X	X	X
Polygonum spp.	X				X
Potamogeton spp.	X				
Quercus alba		X	X	X	
Quercus spp.	X	X	X	X	
Rhus radicans	X	X	X	X	
Virburnum spp.	X	X	X	X	
Vitis rotundifolia	X	X			
Vitis spp.	X	X	X	X	
Zea mays					X
Number of Taxa Present	19	16	12	11	16
Percentage of All Taxa	61.3	51.6	38.7	35.5	51.6

Table 9. Distribution of 40FR8 Wood Charcoal Taxa by Feature

	Fea. 7		Fea. 9		Fea. 10		Fea. 15		Total	
	n	%	n	%	n	%	n	%	n	%
Acer spp.					3	12			3	3
Carya spp.	5	20	8	32	9	36	2	8	24	24
Castanea dentata	1	4			1	4	2	8	4	4
Cornus florida	2	8							2	2
Diffuse-porous group			1	4			1	4	2	2
Diospyros virginiana			1	4					1	1
Fagaceae group							1	4	1	1
Fraxinus spp.	1	4							1	1
Juglans spp.	2	8	2	8			4	16	8	8
Pinus spp.	1	4	1	4			2	8	4	4
Pinus/Juniperus group			1	4					1	1
Platanus occidentalis							1	4	1	1
Quercus (Red Oak group)	11	44	1	4	9	36	5	20	26	26
Quercus spp.			1	4			1	4	2	2
Quercus (White Oak group)			3	12	3	12	3	12	9	9
Ring-porous group	1	4	5	20			2	8	8	8
Sassafras albidum	1	4							1	1
Ulmus americana			1	4					1	1
Vitis spp.							1	4	1	1
Total	25	100	25	100	25	100	25	100	100	100

Table 10. Distribution of 40FR8 Wood Charcoal Taxa by Biogeographic Zone*

	Floodplains	Older Alluvial Terraces	Valley Slopes and Bluffs	Uplands
Acer spp.	X	X	X	X
Carya spp.	X	X	X	X
Castanea dentata				X
Cornus florida	X	X	X	X
Diffuse-porous group	X	X	X	X
Diospyros virginiana	X	X	X	
Fagaceae group	X	X	X	X
Fraxinus spp.	X	X	X	
Juglans spp.	X	X	X	
Pinus spp.		X	X	X
Pinus/Juniperus group		X	X	X
Platanus occidentalis	X	X		
Quercus (Red Oak group)	X	X	X	X
Quercus spp.	X	X	X	X
Quercus (White Oak group)	X	X	X	X
Ring-porous group	X	X	X	X
Sassafras albidum	X	X	X	X
Ulmus americana	X	X	X	
Vitis spp.	X	X	X	
Total	16	18	17	14

*Derived from Faulkner and McCollough (1973: 11-34) and Shea (1977: 63-73).

Table 11. Moisture Tolerance Classifications of 40FR8 Wood Charcoal Taxa*

	Hydric	Hydromesic	Mesic	Submesic	Subxeric	Xeric
Acer spp.		X	X			
Carya spp.		X	X	X	X	X
Castanea dentata					X	
Cornus florida				X		
Diffuse-porous group	X	X	X	X	X	X
Diospyros virginiana				X		
Fagaceae group	X	X	X	X	X	X
Fraxinus spp.			X			
Juglans spp.			X			
Pinus spp.					X	X
Pinus/Juniperus group						X
Platanus occidentalis	X					
Quercus (Red Oak group)		X	X		X	X
Quercus spp.		X	X	X	X	X
Quercus (White Oak group)		X		X	X	X
Ring-porous group		X	X	X	X	X
Sassafras albidum					X	
Ulmus americana		X				
Vitis spp.		X	X	X		
Total	3	10	10	9	10	9

*Derived subjectively from various sources.

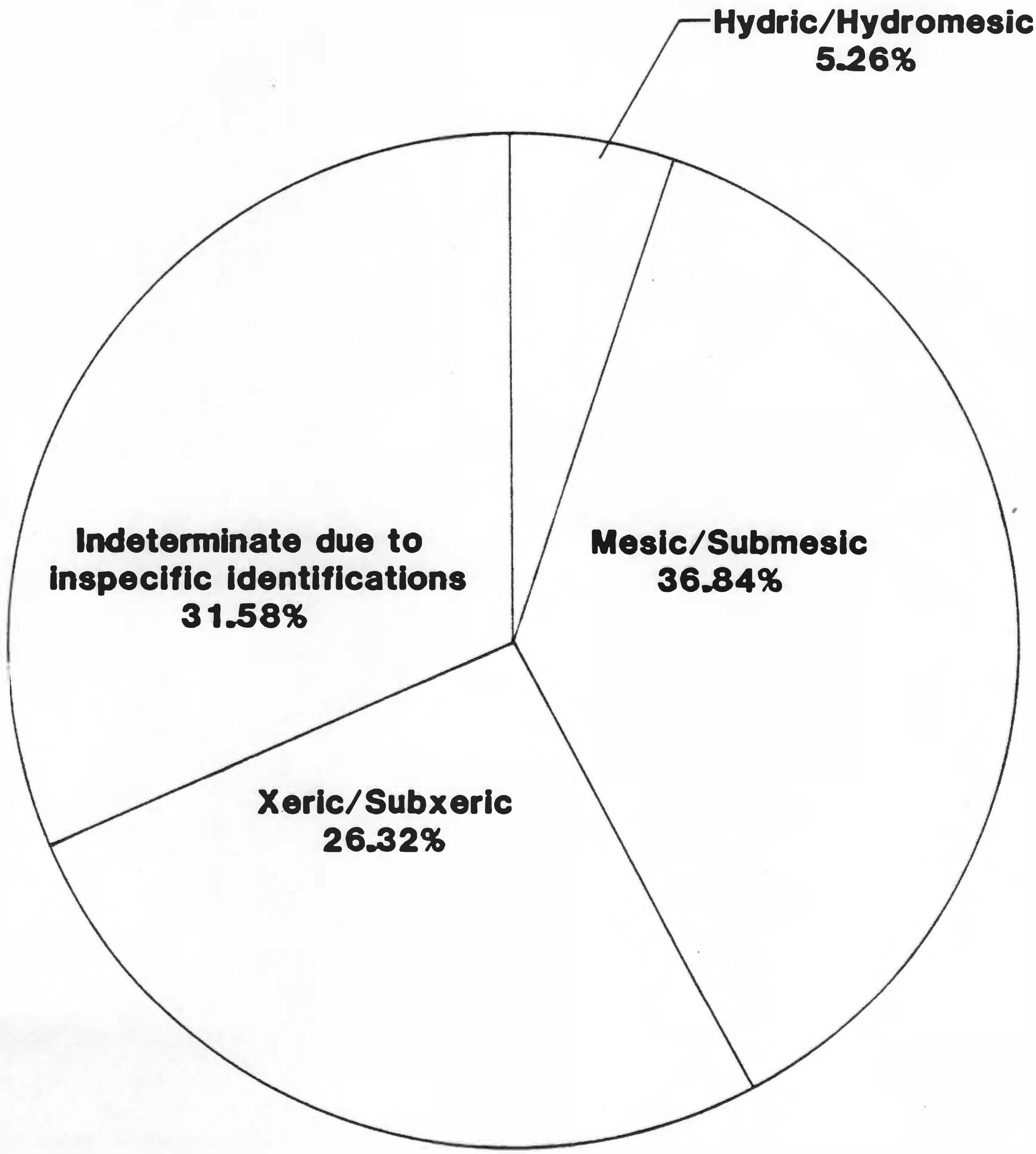

Figure 2. Moisture tolerance distribution of 40FR8 wood charcoal calculated as a percentage of the total number of taxa identified (n=19).

Source: Derived subjectively from various sources.

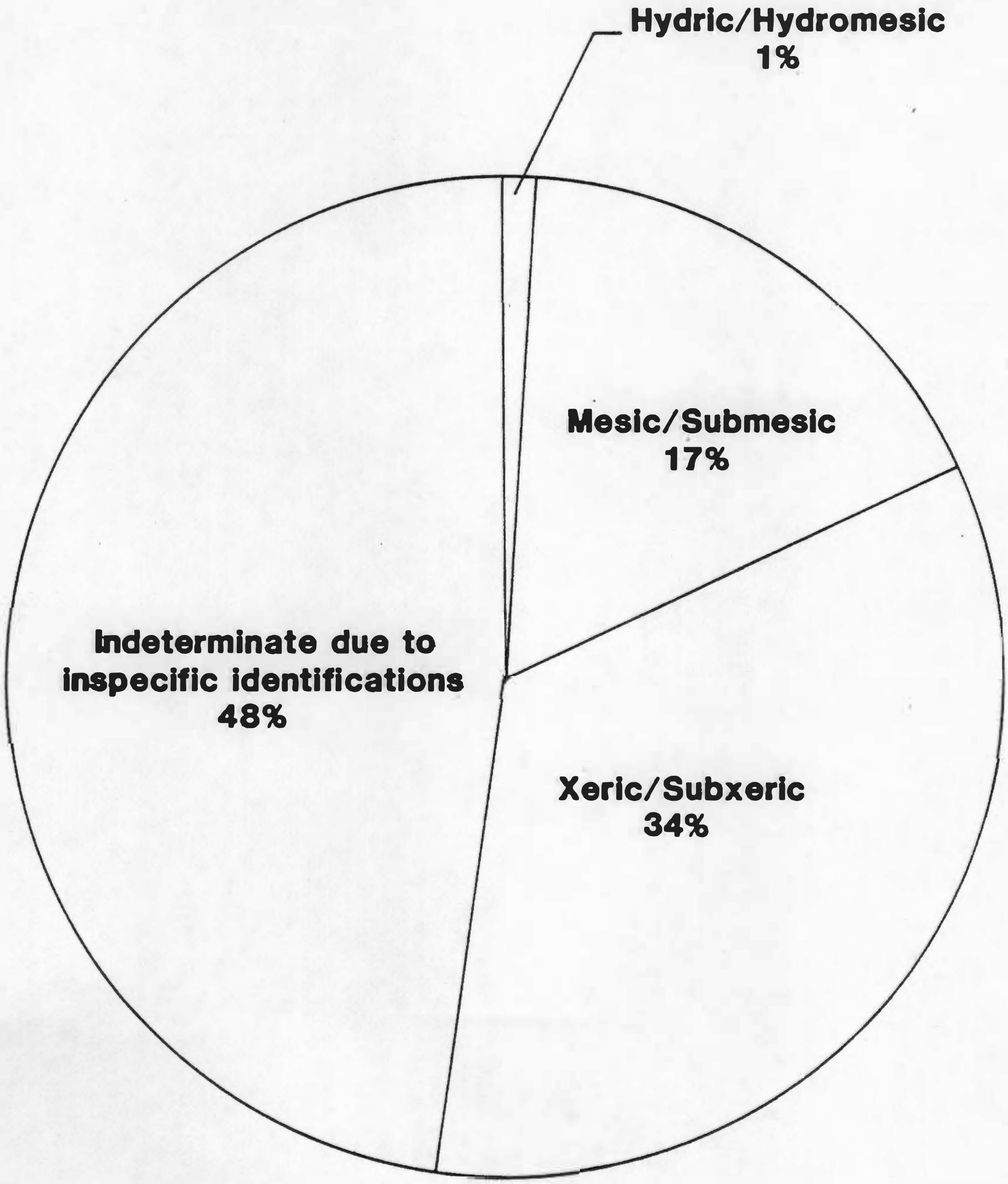

Figure 3. Moisture tolerance distribution of 40FR8 wood charcoal calculated as a percentage of all the wood charcoal in the sample (n=100).

Note: Derived subjectively from various sources.

wood charcoal groups to more easily defined categories. Because the frequencies of occurrence of the various categories can be incorporated into this scheme (Figure 3), it enables us to better determine which of the categories was most exploited by the aborigines. Generally speaking, the hydric taxa occur in the flood plain zone, the mesic taxa occur in the older alluvial terraces and valley slopes and bluffs zone, and the xeric taxa occur in the uplands zone. Moisture tolerance determinations could not be assigned to wood charcoal groupings, such as the oaks, which included species in more than one category.

The many analytical problems which affect archaeological wood charcoal interpretation have been previously outlined in this volume. With regard to these, the best founded implications are those derived from the presence, rather than quantity, of taxa. Because the majority of charcoal in the Mason site samples is thought to have been secondarily deposited from various activity loci over the site, it is suggested that the bulk was derived from ordinary cooking and heating fires. Paleoethnobotanists disagree over the amount of cultural patterning which has been interjected into the overall composition. Some (e.g., Asch et al. 1972: 7) have found little evidence for strong cultural selection of species, at least for activities which produced the most charcoal, while others (e.g., Ford 1979) suggest that the wood charcoal record is typically biased in favor of a few preferentially selected forest taxa.

Sycamore (Platanus occidentalis) is the only species identified from the charcoal sample which is unquestionably considered a hydric species. It represents 5.26 percent of the total number of taxa identified (Figure 2) and only 1 percent of all the wood charcoal in the sample (Figure 3). The sparsity of hydric species, those which are primarily restricted to the floodplain zone, may be attributed to several factors. First, the typically high moisture content of the wood would make it undesirable for burning. Secondly, if the suggestion is correct that the river might have been close to the south edge of the site in prehistoric times (Faulkner 1968: 12), there probably would not have been an extensive floodplain habitat. Lastly, it seems likely that the immediate area surrounding the aboriginal habitation, including the floodplain, would have been cleared and devoid of woody vegetation.

Mesic taxa, as expected, comprised the bulk of the total number of categories identified. These included Acer spp., Cornus florida, Diospyros virginiana, Fraxinus spp., Juglans spp., Ulmus americana, and Vitis spp. The Mason site was situated on a high second terrace of the Elk River Valley and would correspond to the older alluvial terraces biogeographic zone. Thus, one might anticipate a preponderance of mesic taxa if the aborigines were exploiting species growing adjacent to the habitation.

Mesic taxa made up only 17 percent of all the wood charcoal in the sample (n=100) while xeric taxa comprised the bulk, or 34 percent. This is largely due to the inclusion of hickory (Carya spp.) in the latter category. Other xeric taxa identified consisted of Castanea dentata, Pinus spp., Pinus/Juniperus, and Sassafras albidum. The only grouping that can unquestionably be considered xeric is American chestnut (Castanea dentata). Hickory is generally considered to be xeric but may also be included in the hydric or mesic categories, depending upon the particular species. The large amount of hickory identified (n=24), its presence in all features sampled, and its desired burning qualities may imply that it was preferentially selected. Only the red oak group was more abundant and also present in all features, probably as a result of similarly desirable burning qualities and its abundance in the surrounding forest habitats.

The pines native to the study area, while considered xeric in their natural habitats, occur in other zones as successional species wherever forest openings are present. Pinus spp. was a minor constituent in three of the four features sampled at the Mason site and might conceivably be attributed to aboriginal clearing of the site area. The extensive aboriginal modification of presettlement forests has been well documented ethnographically (Guffey 1977: 121-137). Even if horticultural pursuits were not a contributing factor at the Mason site, forest areas would likely have been cleared for fuel, for raw materials, and to stimulate the growth of herbaceous annuals.

In summary, most of the taxa represented by wood charcoal would likely have been available in the older alluvial terraces biogeographic zone in which the aboriginal habitation was situated or in the adjacent valley slopes and bluffs zone. The presence of small amounts of sycamore (Platanus occidentalis) and American chestnut (Castanea dentata) may suggest at least a limited exploitation of the floodplain and upland zones, respectively.

D. 40CF5 ARCHAEOBOTANICAL DATA: SYNTHESIS AND IMPLICATIONS

The overall composition of botanical remains from the four features at the Parks site (40CF5) is markedly different from that of the Mason site material and probably reflects differences in the nature of aboriginal activities emphasized there (Table 5, p. 55). Only one of the features, Feature 150, produced botanical materials similar in general composition to the 40FR8 samples. The suggestion that different activities were emphasized at the two sites, at least with regard to the features sampled, is strengthened by concurrent dissimilarities in feature morphology. The four features sampled at the Mason type station have all been categorized as "kettle-shaped" or "bell-shaped" and exhibit undercut sides and other morphological traits traditionally attributed to storage facilities. Three of the Parks site features (features 39, 44, and 106) were described as circular pits with vertical or abruptly sloping sides and flat bottoms. The fourth (Feature 150) was described as a "deep amorphous pit with sloping sides and a flat bottom" (Brown 1982b: 394).

Unlike the Mason site botanical sample which consisted largely of woody nutshell, the > 2mm sample from the Parks site was comprised primarily of wood charcoal. As at the Mason site, it is likely that much of the material was inadvertently redeposited in features originally intended for other purposes. The overall composition of the Parks site botanical sample suggests that it is representative of ordinary domiciliary activities whereas the Mason site material is more representative of specialized plant food processing activities.

Woody nutshell accounted for 22 percent of all > 2mm botanical residues at the Parks site, and about 96 percent of all > 2mm plant food residues (Table 12). Hickory (Carya spp.) nutshell was the most abundant identified in the > 2mm samples and comprised approximately 15 percent of all > 2mm botanical remains from the site. Additionally, a small quantity (1.37 percent) of hickory nut (Carya spp.) husk was identified in the samples. It is likely that the nuts were prepared for consumption as was previously described for the Mason site specimens. With the exception of Feature 150, however, the botanical sample of which was comprised of about 71 percent nutshell, less emphasis was devoted to the processing of arboreal nuts.

The second most abundant category of nutshell, at just over 4 percent, was that which could only be identified to the Junglandaceae family due to the state of preservation. It is probable that this category consists mostly of hickory (Carya spp.) nutshell.

Walnut (Juglans spp.) shell comprised only .75 percent of the > 2mm botanical sample at the Parks site, as opposed to over 8 percent at the Mason site. This small amount of walnut shell, due to surface erosion, could only be identified to the genus level and was recovered exclusively from Feature 150. The plant's uses and habitat conditions were previously described with regard to the Mason site sample.

Acorn (Quercus spp.) was the least abundant nutshell category in the Parks site botanical samples and made up only .69 percent of the total > 2mm plant residues. Its sparsity is due at least in part to the fragile nature of acorn shell and its propensity for fragmentation. If multiplied by a factor of 10-20 (Chapman 1974: 228), acorn

Table 12. Percentage Composition of Identifiable Plant Food Remains from the Parks Site*

	Fea. 39	Fea. 44	Fea. 106	Fea. 150	Total
Hickory Nut Shell	71.79	62.50	71.35	76.92	72.83
Walnut (Juglans spp.) Shell				10.26	3.36
Juglandaceae Shell	25.64	37.50	21.62	11.97	19.61
Acorn Shell			5.41	.85	3.08
Carbonized Seeds	2.56	P*	.54	P	.56
Cucurbitaceae Rind	P		1.08		.28
Total Gram Weight	.38	.16	1.85	1.17	3.57

*P = < .01 or unquantified.

shell may constitute 6.9 percent to 13.8 percent of the sample, almost as much as hickory shell. Again, the plant's uses and habitat conditions have been previously discussed.

Aside from woody nutshell, two other categories of food plant remains were recovered from the Parks site features. These are (1) carbonized seeds and (2) tropical cultigens, respectively. One category of non-food plant remains is represented by several stalk or stem fragments which make up .62 percent of the total > 2mm botanical residues. While the taxonomy is uncertain, these may represent broomsedge (*Andropogon virginicus*) stems. Broomsedge is said to have been used for storage pit linings (Kuttruff 1974: 159) and may have served other purposes as well. This interpretation, however, is contingent upon an assumption of *in situ* carbonization.

Carbonized Seeds

Seventeen carbonized seeds of all size classes were recovered from the Parks site samples and comprised .12 percent of the sorted botanical remains (.04 percent of the total sample and .54 percent of plant food residues). While fewer seeds and varieties of seeds were recovered from the Parks site samples than from the Mason site samples, the former make up a greater percentage of the overall botanical remains due to a much reduced sample size. Some of the seeds undoubtedly represent either intentional or accidental by-products of species used for human consumption while others probably resulted from accidental carbonization due to natural dispersal. The reader is referred to the previous comments directed towards the Mason site specimens for a summary of the biases and consequences of carbonized seed analysis. An interesting bit of negative evidence in the 40CF5 seed assemblage is the complete lack of asteraceae seedhead fragments. Trace amounts were recovered from three of the four samples from the Mason site and appeared to represent immature inflorescences. The various asters flower throughout the summer and fall but seedhead immaturity might suggest the former. It is of note that these elements of the summer flora were not being exploited at the Parks site.

Seeds recovered from the 40CF5 samples are listed alphabetically by genus and are quantified by number rather than gram weight due to the insufficiency of available laboratory scales to handle minute weights (Table 13).

Chenopodium spp. A single goosefoot (*Chenopodium* spp.) seed from Feature 150 is the only specimen from the Parks site. While it could only be identified to the genus level, it is probably *C. album* or *C. stanleyanum*, both of which inhabit open areas and waste areas (Gleason 1958: 89; Gleason and Cronquist 1963: 274). *Chenopodium* is a well known constituent of both the ethnographic and archaeological record as was indicated previously in this volume.

Croton spp. One croton (*C.* spp.) seed was recovered from the 40CF5 samples, the specimen in question being from Feature 39. Three species (*C. glandulosus*, *C. monanthogynus*, and *C. capitatus*) are found in the study area, all of which occupy either dry soil or waste

Table 13. Absolute Frequencies of Seeds from the Parks Site

	Fea. 39	Fea. 44	Fea. 106	Fea. 150	Total
Chenopodium spp.				1	1
Croton spp.	1				1
*Eleusine indica**			1		1
Gleditsia triacanthos	3**				3
Hedeoma pulegoides			8		8
Phalaris spp.		1	2		3
Unknown				1	1
Total	4	1	11	2	18

*Probably a recent contaminant.

**Pod fragments.

places (Gleason and Cronquist 1963: 430). No ethnographic accounts for the plant's utilization in the Southeast could be found, but the leaves of a western species (C. texensis) had medicinal applications among the Pawnee (Gilmore 1977: 47). It is likely that the Parks site seed was a product of natural dispersal and accidental carbonization.

Eleusine indica. A single yard grass seed was recovered from Feature 106 but is probably a recent contaminant. Eleusine indica is said to be a native of the Old World but is now pantropical and a common weed in lawns, gardens, and waste areas (Gleason and Cronquist 1963: 91). The grains are naturally black with a silicious texture and fresh seeds frequently appear to be carbonized even when broken. The seed in question was not tabulated with the other carbonized specimens.

Gleditsia triacanthos. This species was represented at the Parks site by three pod fragments which were recovered from Feature 39 (wt. = .01g). The fruits of the honeylocust consist of long, flat pods which contain dense seeds in a matrix of sweet palatable pulp. The specimens in question are fragments of carbonized pulp and represent the actual portion of the fruit which normally would have been consumed. This is in contrast to the honeylocust remains from the Mason site which consisted entirely of seeds, the by-products from processing the ripe pods. Ethnographic usages and habitat conditions of the plant were presented previously with regard to the Mason site material.

Hedeoma pulegoides. Eight small spheroidal seeds, tentatively identified as false pennyroyal (Hedeoma pulegoides) (Martin and Barkley 1973: 37), were recovered from Feature 106 at the Parks site. The plant, a branched annual of the mint family, generally inhabits upland woods, pastures, and meadows where it disperses its seeds during the late summer and early fall (Gleason and Cronquist 1963: 598; USDA 1969: 138-139). It may have grown as a weed on open areas of the site where the soil was sufficiently dry.

While no specific usages by the Southeastern Indians could be documented by ethnohistoric reference, the herb is known to have value as an antispasmodic, rubifacient, and stimulant. The peoples of Appalachia harvest the plants just before flowering and use the leaves, flowering tops, or small stems in full bloom to brew a tea for the treatment of pneumonia (USDA 1969: 138). A similar plant, rough pennyroyal (Hedeoma hispida), was used in several medicinal applications among the Indians of the Missouri River region (Gilmore 1977: 60).

Phalaris spp. Three maygrass (Phalaris spp.) seeds, probably canary grass (P. caroliniana), were identified in the Parks site samples—one from Feature 44 and two from Feature 106. Due to the large number of seeds per volume of grass, these few grains may be fortuitous inclusions. Their utilization, however, is well documented both ethnohistorically and from archaeological contexts in the Southeast. This type of information has been previously discussed regarding Phalaris from the Mason site samples. The plant is a "camp follower" as it most frequently occurs in waste places, roadsides, and wet fields (Gleason and Cronquist 1963: 96).

Unknown. One seed which was too eroded for identification was recovered from the Feature 150 sample.

Tropical Cultigens

The "tropical cultigens" are those which were apparently domesticated in Mesoamerica and include maize (*Zea mays*), squash or pumpkin (*Cucurbita pepo*), bottle gourd (*Lagenaria siceraria*), and beans (*Phaseolus* spp.). Whereas all of these but the latter were recovered from the Mason site, only a small quantity of cucurbit rind was identified in the Parks site samples.

The absence of beans (*Phaseolus* spp.) in the 40CF5 samples, as at the Mason type station, was expected due to the plant's relatively late arrival in the Eastern United States (Struever and Vickery 1973: 1205). The absence of maize and gourd remains, however, is probably a function of infrequent occurrences on the site combined with a small sample size. Because all the tropical cultigens were stored throughout the year, the presence of some cultigens and absence of others probably is not related to the seasonality of occupation.

Cucurbita pepo. A total of three squash or pumpkin (*Cucurbita pepo*) rind fragments, one from Feature 39 and two from Feature 106, was recovered from the Parks site samples (total wt. = < .005g). The reader is referred to comments directed towards the Mason site cucurbits for a summary of archaeological occurrences and ethnohistoric usages.

Cucurbitaceae. A peduncle receptacle from the Feature 106 sample at the Parks site is probably from a small cucurbit but could only tentatively be identified to the Cucurbitaceae family. That family includes all of the squashes and pumpkins (Cucurbita spp.), along with the bottle gourd (Lagenaria siceraria).

In summary, ten categories of plant residues, excluding wood charcoal, were recovered from the Parks site. Most are food plants but Phalaris spp. and Hedeoma pulegoides may have been fortuitous pit inclusions. As at the Mason site, taxa from the floodplain, older alluvial terraces, and disturbed or cultivated ground were utilized most frequently (Table 14). Because the site was situated on an older alluvial terrace, a high representation of plants which grow there is not out of place. The heavy utilization of disturbed ground plants, including cultigens and weedy "camp followers," would be expected of a site which was occupied intensively during most of the year. As at the Mason site, many of the floodplain species are also adapted to disturbed ground habitats and may be overrepresented.

40CF5 Wood Charcoal Summary

Nineteen categories of wood charcoal, encompassing a minimum of 16 genera, were identified in the Parks site samples (Table 15). As with the Mason site specimens, the distribution of these was determined with regard to both biogeographic zones and moisture tolerances (Tables 16 and 17; Figures 4 and 5). To avoid repetition, the reader

Table 14. Distribution of 40CF5 Taxa by Biogeographic Zone

	Floodplain	Older Alluvial Terraces	Valley Slopes and Bluffs	Uplands	Disturbed or Cultivated Ground
Carya spp.	X	X	X	X	
Chenopodium spp.	X				X
Croton spp.					X
Cucurbita pepo					X
Cucurbitaceae					X
Gleditsia triacanthos	X	X			
Hedeoma pulegoides				X	X
Juglans spp.	X	X	X		
Phalaris spp.	X				X
Quercus spp.	X	X	X	X	X
Number of Taxa Present	6	4	3	3	7
Percentage of All Taxa	60	40	30	30	70

Table 15. Distribution of 40CF5 Wood Charcoal Taxa by Feature

	Fea. 39		Fea. 44		Fea. 106		Fea. 150		Total	
	n	%	n	%	n	%	n	%	n	%
Acer spp.	3	12	5	20			2	9.5	10	10.4
Carya spp.	9	36	6	24	17	68	7	33.3	39	40.6
Castanea dentata					1	4			1	1.0
Cornus florida			1	4					1	1.0
Diffuse-porous group	2	8	1	4			1	4.8	4	4.2
Diospyros virginiana	1	4							1	1.0
Fagus grandifolia			1	4					1	1.0
Fraxinus spp.							3	14.3	3	3.1
Gleditsia/Gymnocladus group	3	12					2	9.5	5	5.2
Juglans spp.	2	8	3	12	2	8			7	7.3
Kalmia spp.	1	4							1	1.0
Maclura pomifera			1	4					1	1.0
Pinus spp.	2	8	2	8					4	4.2
Pinus/Juniperus group			1	4					1	1.0
Prunus spp.							1	4.8	1	1.0
Quercus (Red Oak group)	1	4	1	4	1	4	1	4.8	4	4.2
Quercus (White Oak group)			1	4	1	4	1	4.8	3	3.1
Ring-porous group	1	4	2	8	2	8	3	14.8	8	8.3
Sassafras albidum					1	4			1	1.0
Total	25	100	25	100	25	100	21	100.1	96	102.6

Table 16. Distribution of 40CF5 Wood Charcoal Taxa by Biogeographic Zone*

	Floodplain	Older Alluvial Terraces	Valley Slopes and Bluffs	Uplands
Acer spp.	X	X	X	X
Carya spp.	X	X	X	X
Castanea dentata				X
Cornus florida	X	X	X	X
Diffuse-porous group	X	X	X	X
Diospyros virginiana	X	X	X	
Fagus grandifolia		X	X	X
Fraxinus spp.	X	X	X	
Gleditsia/Gymnocladus group	X	X	X	X
Juglans spp.	X	X	X	
Kalmia spp.			X	X
Maclura pomifera		X	X	
Pinus spp.		X	X	X
Pinus/Juniperus group		X	X	X
Prunus spp.	X	X	X	X
Quercus (Red Oak group)	X	X	X	X
Quercus (White Oak group)	X	X	X	X
Ring-porous group	X	X	X	X
Sassafras albidum	X	X	X	X
Total	13	17	18	15

*Derived from Faulkner and McCollough (1973: 11-34) and Shea (1977: 63-73).

Table 17. Moisture Tolerance Classifications of 40CF5 Wood Charcoal Taxa*

	Hydric	Hydromesic	Mesic	Submesic	Subxeric	Xeric
Acer spp.		X	X			
Carya spp.		X	X	X	X	X
Castanea dentata					X	
Cornus florida				X		
Diffuse-porous group	X	X	X	X	X	X
Diospyros virginiana				X		
Fagus grandifolia			X			
Fraxinus spp.			X			
Gleditsia/Gymnocladus group		X				
Juglans spp.			X			
Kalmia spp.					X	X
Maclura pomifera			X			
Pinus spp.					X	X
Pinus/Juniperus group						x
Prunus spp.			X			
Quercus (Red Oak group)		X	X		X	X
Quercus (White Oak group)		X		X	X	X
Ring-porous group		X	X	X	X	X
Sassafras albidum					X	
Total	1	7	10	6	9	8

*Derived subjectively from various sources.

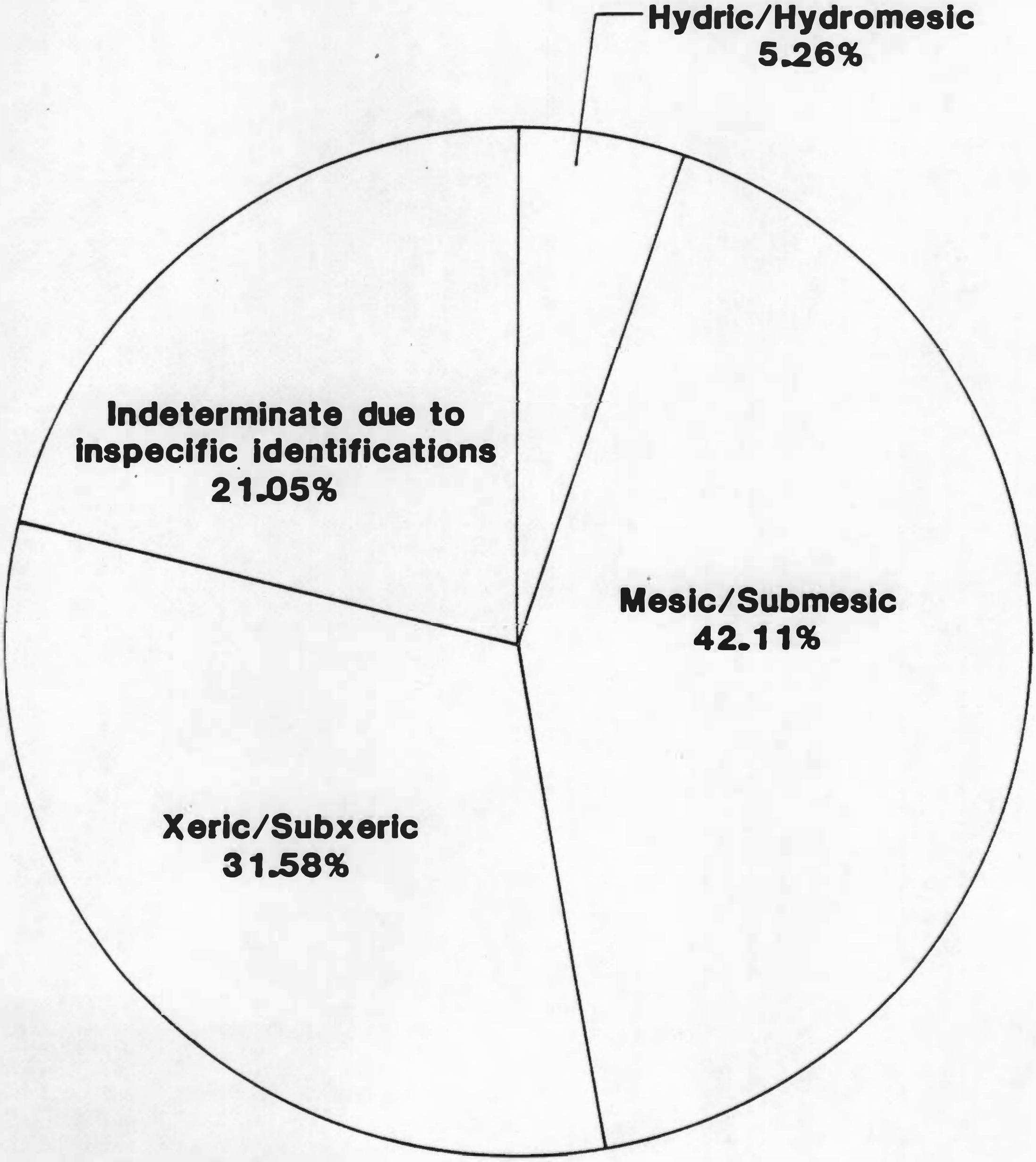

Figure 4. Moisture tolerance distribution of 40CF5 wood charcoal calculated as a percentage of the total number of taxa identified (n=19).

Source: Derived subjectively from various sources.

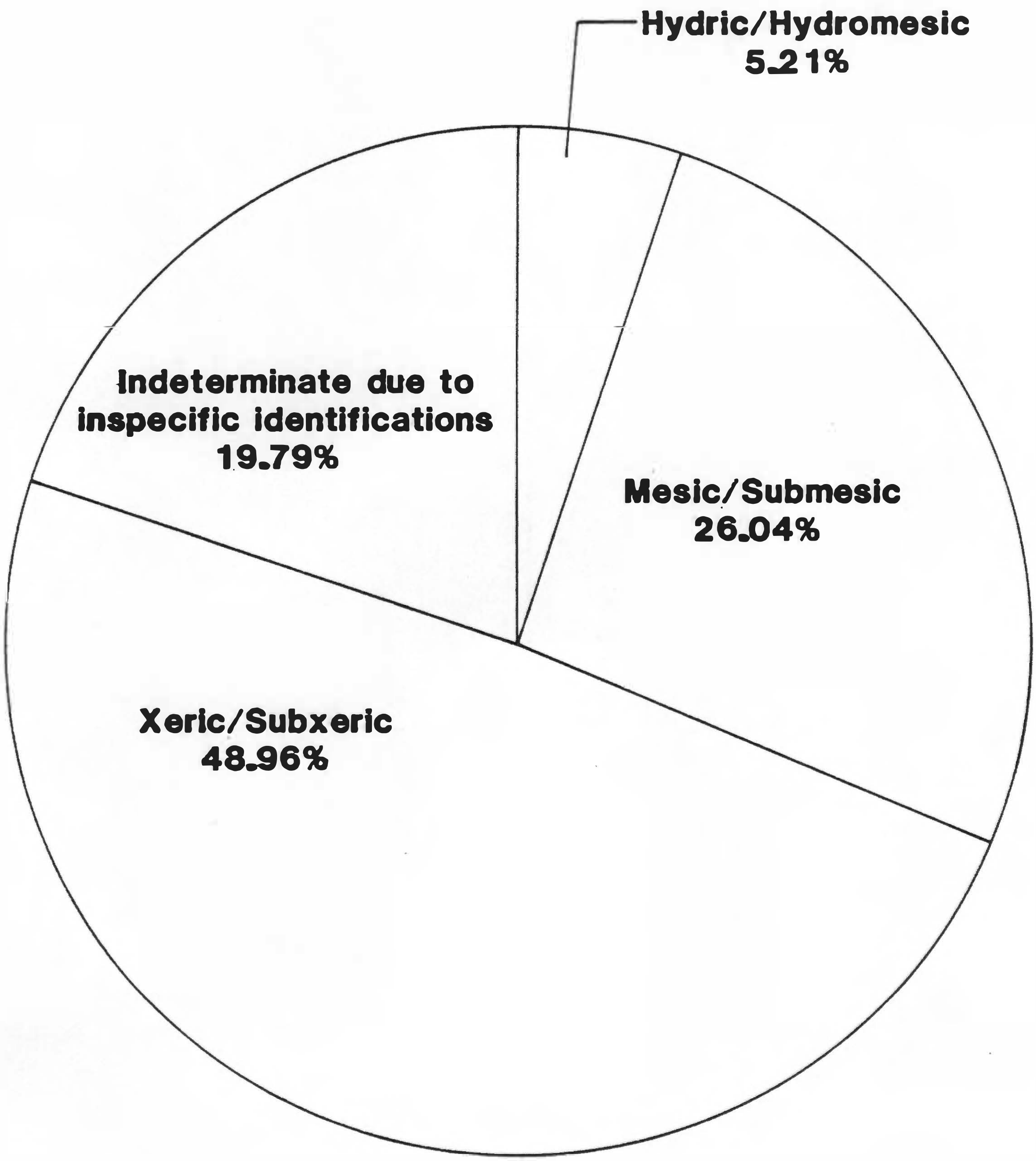

Figure 5. Moisture tolerance distribution of 40CF5 wood charcoal calculated as a percentage of all the wood charcoal in the sample (n=96).

Source: Derived subjectively from various sources.

is directed to the introductory comments in the "40FR8 Wood Charcoal Summary" presented previously in this volume.

While thirteen of the Parks site taxa may be associated with a floodplain habitat, all grow in other biogeographic zones as well. Only the Gleditsia/Gymnocladus group can be considered truly hydric or subhydric and would be most abundant in the floodplain, but both species grow in appropriate microhabitats in all zones. The group made up 5.26 percent of all taxa (Figure 4, p. 51) and 5.21 percent of all the wood charcoal in the sample (Figure 5, p. 55).

As expected, more taxa occurred in the older alluvial terraces and valley slopes and bluffs zones than in the other two zones. This is also reflected in the moisture tolerance distributions with a preponderance of the taxa being considered mesic. As with the Mason site material, this is thought to reflect the presence of a narrow and/or cleared floodplain and an effort to expend less labor by exploiting zones nearest to the site for firewood.

While the percentage of taxa represented in the sample largely favored mesic species (Figure 4), the bulk of all wood charcoal (Figure 5) consisted of xeric and subxeric species. This is largely due to the inclusion of hickory in the latter category and may be inaccurate because of the inability to determine the actual species of Carya represented, some of which are more mesic. Hickory (Carya spp.) does seem to have been culturally favored as it made up over 40 percent of all the wood charcoal sampled. Excluding hickory, xeric and subxeric taxa made up only about 8 percent of the total sample. Only chestnut (Castanea dentata) and mountain laurel (Kalmia latifolia) are species which would have been restricted exclusively to the uplands zone. Pine (*Pinus* spp.), pine/eastern red cedar (*Pinus/Juniperus*), and sassafras (*Sassafras albidum*) are all naturally xeric and subxeric taxa of the uplands zone but are opportunists in all zones, particularly where clearing has occurred. The extensive aboriginal modification of presettlement forests has been well documented ethnohistorically (e.g., Guffey 1977: 121-137) and would have provided openings for these species. Areas surrounding the site are likely to have been cleared for horticultural pursuits, fuel, raw materials, or to encourage the growth of herbaceous annuals.

In summary, the bulk of taxa represented by the Parks site wood charcoal would likely have been available in the older alluvial terraces biogeographic zone where the site was situated or in the adjacent valley slopes and bluffs zone. None of the taxa are associated exclusively with the floodplain zone, although the *Gleditsia/Gymnocladus* group is considered hydromesic. Utilization of woody taxa of the floodplain was minimal if it occurred at all. The presence of chestnut and mountain laurel in the sample suggests at least a limited exploitation of the uplands zone.

CHAPTER VI

AN ASSESSMENT OF THE EARLY SETTLEMENT AND PRESETTLEMENT VEGETATION OF THE STUDY AREA: ENVIRONMENTAL IMPLICATIONS

An understanding of the prehistoric vegetation which existed during the Mason phase occupancy, and a comparison of this to more recent floristic data, is critical to an evaluation of any short term ecological differences. Because forest composition was quickly and effectively altered in most areas by generations of European settlers, modern forest stand data is usually biased to either over-represent or exclude commercially important species, and to over-represent opportunistic and successional taxa. Such data have already been reviewed in the environmental section of this volume. As a viable alternative, archaeologists often seek to extract forest stand data from early land survey records (e.g., Zawacki and Hausfater 1969). These have been most effectively used in the Midwest and other areas where systematic federal surveys were commissioned to lay out townships. Botanical data extracted from such records are evenly distributed at land boundary corners over the landscape and can easily be incorporated into statistical analyses. In the study area, and the Southeast in general, property was usually surveyed in a "crazy quilt" fashion with only random references being made to forest taxa. Not only is such data difficult to deal with statistically, but it is often impossible to collect at all. Most property in the study area was first placed into private ownership as Revolutionary War Land Grants given to veterans of Tennessee and North Carolina. Land grant records for particular parcels of land located in the field are incomplete and difficult to trace without knowledge of the grant number. If the parcels can be traced, it usually involves locating grant numbers through county deed records and then matching the numbers to descriptions on microfilm at the State Archives. Such endeavors were largely beyond the scope of this study.

One set of unique early land survey records, however, which applies directly to the study area, constitutes an exception to the aforementioned land grant data. Dr. H. R. DeSelm (personal communication 1983) of The University of Tennessee Botany Department, while doing research at the Tennessee State Archives in the 1950s, discovered records which documented a series of linear transects that were surveyed within the first two decades of the nineteenth century. While the records seem to be incomplete, there are at least seven north-south oriented transects and three perpendicular east-west oriented transects spaced from about four to seven miles apart. Along each transect survey stations were located at one mile intervals, most of which were marked by reference to forest taxa. These taxa were interpreted and graphically represented on a 1/250,000 scale map overlay by Drs. Paul and Hazel Delcourt of The University of Tennessee Departments of Geology and Botany, respectively (Figure 6). The transects, crossing what are now Franklin, Coffee, Lincoln, Moore, and Bedford counties, are largely located within the dissected Eastern

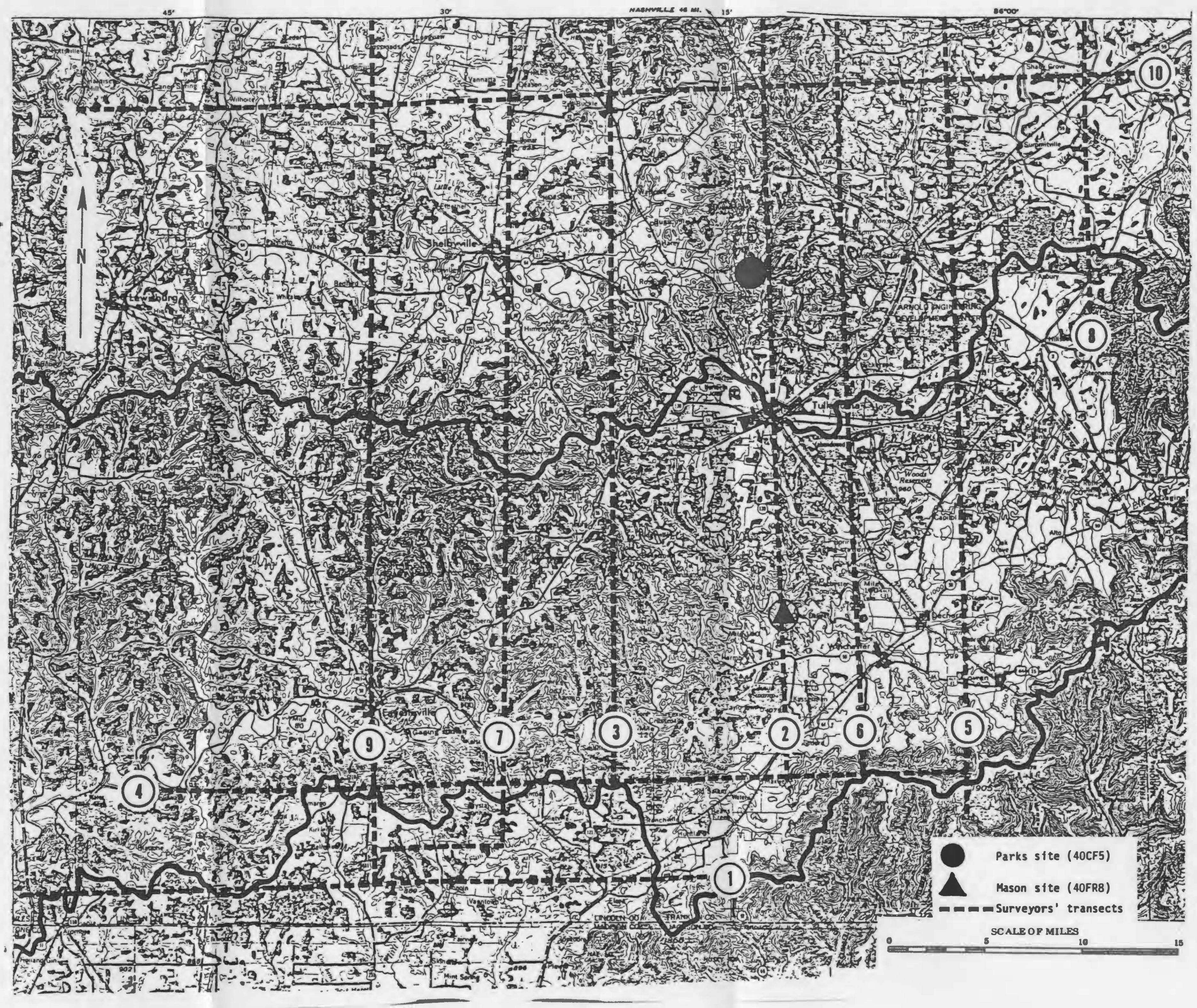

Figure 6. Locations of early nineteenth century land survey transects.

Source: Based upon a map overlay derived from H. R. DeSelm's personal notes by Paul and Hazel Delcourt.

Highland Rim and the southeastern portion of the Central Basin. It is of particular interest that one of them, Transect 2, passes within close proximity to both the Parks and Mason sites. Unfortunately, the original survey records could no longer be located in the State Archives and research connected with them is as yet unpublished. A few inferences, however, are possible as based upon an examination of the Delcourts' overlay. This was derived from DeSelm's notes and primarily documents forest dominants.

Nine taxonomic groupings were identifiable from the data accessible to the author. One additional category, comprised of survey stations where no taxa were recorded, was included. Some taxa could not be assigned to a particular species and others could not be identified at all without access to the original data base. A total of 420 identifications, however, was assigned to the ten discernible categories and serve as the basis of percentage calculations.

Eastern Red Cedar (*Juniperus virginiana*)

Red cedar identifications in the survey records (n=14) made up 3.33 percent of the total sample. The species was confined to the Central Basin portion of the area surveyed although it undoubtedly occurred in other areas in small quantities. None was reported in the transects which crossed Coffee and Franklin counties.

No positive identifications of red cedar were made in the archaeological wood charcoal samples from either the Mason site or the Parks site. Two possible identifications (*Pinus*/*Juniperus* group), one from each site, were made but are more probably pine (*Pinus* spp.).

Beech (*Fagus grandifolia*)

Sixty-one identifications of beech were taken from the survey records, comprising 14.52 percent of the total sample. Four of these were in Franklin County and 21 in Coffee County (5.95 percent of the total). The trees were located primarily along creeks and tributaries in dissected terrain. They may be slightly overrepresented due to surveyor preference.

Only one identification of beech, from the Parks site sample, was derived from the archaeological wood charcoal record.

Oaks and Hickories (*Quercus* spp. and *Carya* spp.)

The category consisting of combined oaks and hickories (n=241) made up 57.38 percent of taxa identified in the survey record. Sixty-one and 53 identifications were made in Franklin and Coffee counties, respectively. Little can be said of habitat preference without more specific identifications. Constituents of the category were reported in all types of environs that the transects crossed and appeared to be slightly more abundant in the dissected Rim than in the Central Basin. As a group they were not as restricted to moist areas as some of the other categories.

In the archaeological record, 61 identifications of the group were made in the Mason site sample (61 percent and 46 in the Parks site sample (47.92 percent) for a total of 107 (54.59 percent).

Ash, Elm, and Maple (*Fraxinus* spp., *Ulmus* spp., and *Acer* spp.)

Constituents of this group accounted for 46 identifications in the survey records and made up 10.95 percent of the total sample.

Five occurred in Franklin County and seven in Coffee County. The genera, as a group, were most abundant along streams and tributaries, although some occurred on valley slopes in the dissected uplands.

In the archaeological wood charcoal inventory, the category comprised 5 percent of the Mason site samples and 13.54 percent of the Parks site samples. The average for the two sites (9.18 percent) is roughly equivalent to the early settlement survey record average (10.95 percent).

Ironwood (*Ostrya virginiana*)

Nine incidences of ironwood were reported in the survey records for a percentage composition of 2.4 percent. Four of these occurred along transects passing through Coffee County but none were reported in Franklin County. This is possibly due to a smaller overall sample from Franklin County. These small trees appeared to be most abundant on dry valley slopes in dissected terrain.

No identifications of *Ostrya* were made in the archaeological wood charcoal samples.

Sourwood (*Oxydendrum arboreum*)

Sourwood identifications in the survey records (n=4) accounted for only .95 percent of the total. Two incidents were reported in Coffee County and none in Franklin County. The small trees occurred primarily on valley slopes where they would have most likely been found as an understory component in association with other hardwoods.

No identifications of sourwood were made in the archaeological wood charcoal samples from either the Mason or Parks sites.

Dogwood (Cornus florida)

Twenty-three identifications of dogwood were taken from the survey records and comprised 5.48 percent of the total sample. It was reported at three stations in Coffee County but at none in Franklin County. The small understory tree occurred in various types of habitats in both the Central Basin and dissected Highland Rim.

Dogwood was identified in small amounts in the wood charcoal samples from both the Mason (n=2) and Parks (n=1) sites.

Mulberry (Morus spp.)

One occurrence of mulberry was reported by the surveyors and comprised .24 percent of the sample. This was most likely red mulberry, the only species native to the area. It occurred along a stream in a finger-like extension of the Central Basin.

Mulberry was not identified in the wood charcoal samples from either the Mason or Parks sites.

Sycamore (Platanus occidentalis)

A single example of sycamore was reported in the survey records and made up .24 percent of the overall sample. It occurred along a tributary stream in the Central Basin portion of the area surveyed.

One identification was made of the species in the wood charcoal samples from the Mason site and none in the Parks site samples.

No Trees Recorded

This category is used to describe surveyors' stations along the transects where no plant taxa were noted. A total of 20 such incidences existed and made up 4.76 percent of the total sample. This included three occurrences each in Franklin and Coffee counties. Without access to the original surveyors' notes it could not be determined whether these were areas devoid of woody taxa due to natural or aboriginal phenomena, or whether the surveyors simply chose to use other landmarks.

Despite inherent biases and poor resolution, there is a rough positive correlation between percentages of archaeological wood charcoal and percentages of woody taxa reported in the early nineteenth century surveyors' records (Table 18). Oaks and hickories comprise the most abundant category in every sample and reflect the importance of these taxa in the forest overstory. The conspicuous absence of chestnut (*Castanea dentata*) identifications in the early settlement record might be expected, particularly in the western portion of the area surveyed (Hazel Delcourt personal communication 1983). Beech (*Fagus grandifolia*) seems to be abundantly represented in the surveyors' records, a factor which may be related to the tree's conspicuousness amongst other hardwoods. Although somewhat of an equivalency in rank-ordering exists between samples, the quantitative resolution is insufficient to reflect any ecologic differences which may have existed between the time of Mason occupation and the early nineteenth century.

Another viable, albeit locally imperfect, means of assessing ecological variation through time is provided by pollen analysis. Pertinent data have been compiled from the analyses of two sediment cores which were taken from sinkholes within the study area. While both were from the Eastern Highland Rim of Middle Tennessee, the

Table 18. Percentage Composition of Archaeological Wood Charcoal Taxa and Early Settlement Surveyors' Taxa

	40FR8	40CF5	40FR8 + 40CF5	Franklin Co. Survey Records	Coffee Co. Survey Records	Franklin + Coffee Co. Survey Records	Total Inventory of Survey Records
Red Cedar	1 ?	1 ?	1.02 ?				3.5
Beech		1	.51	5.71	23.33	15.63	15.25
Oaks and Hickories	61.00	47.92	54.59	87.14	58.89	71.25	60.25
Ash, Elm, and Maple	5.00	13.54	9.18	7.14	7.78	7.5	11.5
Ironwood					4.44	2.5	2.25
Sourwood					2.22	1.25	1.00
Dogwood	2.00	1.00	1.53		3.33	1.88	5.75
Mulberry							.25
Sycamore	1.00		.51				.25
Total in "n"	100	96	196	70	90	160	400

Anderson Pond sample was from White County near the western escarpment of the Cumberland Plateau and the Mingo Pond sample was from Franklin County well within the dissected Rim (Delcourt 1979). The latter core was extracted from a swamp only about five miles south of the Mason type station.

Palynological arguments regarding climatic changes in the Eastern United States have been discussed in previous chapters (Griffin 1960; Vickery 1970). The Anderson and Mingo Pond pollen diagrams were examined for corroborative evidence applicable to the study area. Relative frequency diagrams representing temporal changes in both arboreal and nonarboreal pollen (Delcourt 1979: Figures 7, 10, 15, and 16) were looked at for the period of about A.D. 600-900. Note was made as to which taxa were increasing, remaining stable, or decreasing. It was reasoned that habitat changes constituted the primary controlling mechanism of such fluctuations and that an increase in a particular species could be interpreted as a concurrent increase in the habitat favored by that species. The evaluation of habitat preference is based upon several sources (e.g., USDA 1965; Harlow and Harrar 1958; and Gleason and Cronquist 1963) and is sometimes open to other interpretations.

At Anderson Pond it was found that an increase in six taxa may reflect an increase in soil moisture. These are _Polygonum hydropiperoides, Juglans_ spp., _Platanus occidentalis, Liquidambar styraciflua, Cephalanthus occidentalis,_ and _Sagittaria_ spp. Additionally, a number of taxa which increase in the plant macrofossil influx diagram (Delcourt 1979: Figure 12) may be regarded as increasing soil moisture indicators. These are Ceratophyllum echinatum, Alnus serrulata, Itea virginica, Proserpinaca palustris, Scirpus ciperinus, Juncus spp., Alismataceae family, and Sagittaria spp. Many of the taxa listed above are aquatic and may reflect a rising water level in Anderson Pond.

An increase in the relative frequencies of five species may be interpreted as an indication of a concurrent increase in cooler, more mesic habitats. These consist of Alnus rugosa, Fraxinus spp., Ostrya-Carpinus group, Betula spp., and Acer saccharum. Castanea dentata, which also increases, typically inhabited dry habitats to the northeast of the study area and may have conceivably shifted to the southwest under slightly cooler conditions.

A decrease in Salix spp. and an increase in Hypoxis hirsuta is indicative of a concurrent increase in dryer habitats. A decrease in three aquatic species, Scirpus cespitosus, S. smithii, and S. validus, in the plant macrofossil influx diagram might also be used to argue for dryer conditions. Because there is an overall increase in absolute influx during the time in question, these latter three species may be regarded as unreliable indicators. No species fluctuations suggested a trend towards warmer temperatures.

The Mingo Pond data were interpreted in a similar manner. An increase in the relative frequencies of five taxa can be interpreted to reflect a concurrent increase in soil moisture. These are Liquidambar styraciflua, Juglans spp., Myriophyllum exalbescens, Iva xanthifolia, and Sagittaria spp. A decrease in oaks and grasses may lend to a similar, albeit more questionable, interpretation.

An increase in cooler, more mesic habitats is suggested by an increase in the relative frequencies of Fraxinus spp., Ulmus spp., Ostrya-Carpinus group, and Fagus grandifolia.

Only two indicators of dryer conditions were noted. These consisted of a decrease in Polygonum hydropiperoides and an increase in Artemisia spp. An increase in Carya spp. pollen may lend to a similar interpretation, but would be dependent upon species, which is also the case with Artemisia spp. As with the Anderson Pond data, no species fluctuations suggested a trend towards warmer conditions.

In summary, the bulk of Anderson and Mingo Pond pollen taxa whose relative frequencies were changing from approximately A.D. 600-900 are suggestive of cooler, more mesic conditions. The nonarboreal species used as indicators are largely aquatics which apparently increased as a result of rising water levels in the ponds. The arboreal species are those which would increase or decrease with the encroachment of more subhydric or mesic habitats. This ecological inference therefore corroborates similar conclusions derived from pollen data in the Great Lakes region.

The interpretations of the Anderson and Mingo Pond data for the period in question, however, are frought with problems which limit their tenability. The particular conditions which would cause the various taxa to respond may be open to other interpretations. Climatic curves (Delcourt 1979: Figure 13) indicate relative stability from about 2,000 B.P. to the present. Also, if the failure of tropical cultigens is of primary concern, the response times of taxa used in the study would be unmatched to the problem. Indigenous taxa, particularly the arboreal species, would respond much more slowly under pressure from subtle climatic changes than would maize or other non-indigenous cultigens.

An additional problem with the Anderson and Mingo Pond data is its insufficient resolution for the temporal span in question. The study was of a pioneering nature and designed to identify overall climatic and vegetational changes in the past 25,000 years. There is some chronologic deficiency, then, in delineating subtle changes which would have taken place within a few decades or a few hundred years. The Mingo Pond chronology was based upon the seriation of known dramatic vegetational changes with other dated cores and the presumption of a constant rate of sedimentation after 12,500 B.P. This was necessary because the radiocarbon samples were lost by the postal service (Hazel Delcourt personal communication 1983).

While available pollen data for the study area, and for the Eastern United States in general, does not provide definitive answers concerning climatic changes during the Late Woodland period, it is certainly tantalizing enough to suggest a need for more specific problem-oriented studies. By focusing attention upon the analysis of more temporally confined sediment samples, palynologists could produce a degree of resolution compatible with archaeological problems. One such "short core" from the Eastern Tennessee Valley is currently being analyzed by Patricia Cridlebaugh, a doctoral candidate in The University of Tennessee Anthropology Department, and may provide data pertinent to small scale climatic fluctuations.

CHAPTER VII

CONCLUSIONS

After analyzing a data base of botanical residues substantially larger than any which have previously been examined for the Late Woodland Mason phase, it has become apparent that no definitive answers derived from plant-use data can presently be offered to explain cultural differences between the Mason phase and temporally adjacent phases in the study area. The data do, however, suggest modifications and additions to previous concepts pertaining to Mason phase subsistence. It must be remembered that the sample, albeit large, is of a limited nature due to its inclusion of only four features from each of two sites. The data base therefore is of sufficient resolution to finely focus upon the paleoethnobotany of the two sites sampled, or perhaps particular activity loci at those sites, but may be so restricted as to preclude meaningful implications concerning the culture over its entire range.

At the initiation of this study the author described the Mason phase as a cultural discontinuity in the local sequence and set forth a set of several hypotheses to be addressed as a basis of deductive inquiry. It was anticipated that the new plant-use data would either lend or deny credibility to one or more of the hypotheses, thus permitting the generation of statements applicable to the cultural whole.

The first objective was to confirm or negate previous assumptions concerning Mason phase subsistence as based upon an overall small botanical sample from the upper Duck River Valley. In this regard, the data suggest that differences in subsistence between the Mason phase and temporally adjacent cultural manifestations were perhaps less dramatic than previously thought. Crites (1978: 217), while acknowledging little understanding concerning the Mason phase in the upper Duck Valley at that time, noted that a change in adaptation had occurred whereby (1) arboreal fruits were providing almost all the plant food, (2) squash was still being utilized but maize was not, and (3) weedy plants such as goosefoot and knotweed were not being significantly utilized.

An examination of the data indicates that in the Normandy lower reservoir zone arboreal fruit remains comprised of hickory, walnut (both Juglans nigra and J. cincerea), Juglandaceae, and acorn made up 98.08 percent of McFarland phase plant foods, 99.75 percent of Owl Hollow phase plant foods, 64.58 percent of Mason phase plant foods, and 85.77 percent of Banks phase plant foods. Seeds in the same components made up 1.91 percent, .11 percent, 14.91 percent, and .72 percent, respectively (Crites 1978: 176, 39). In the upper reservoir zone the same arboreal fruit remains comprised 98.19 percent of the McFarland phase plant foods and 99.85 percent of the Mason phase plant foods while seeds made up 1.40 percent and .15 percent, respectively, of the two components (Crites 1978: 71, Table 9). Data from the Mason type station indicate that the same four arboreal fruit categories (hickory, walnut, Juglandaceae, and acorn) made up 99.48 percent of the plant foods while seeds comprised only .10 percent. This is consistent with Crites' upper reservoir sample. The author's Parks site data indicate that the arboreal fruit categories made up 97.25 percent of the plant foods while seeds comprised 1.10 percent. This reflects substantially more hickory remains than in Crites' lower reservoir sample which included Parks site materials.

An examination of the entire range of data suggests that four major arboreal fruit taxa made up the bulk of plant food remains in all samples regardless of temporal and cultural affinities. No great differences were seen between any of the samples with regard to the occurrence of those taxa, taken as a group. In fact, the group exhibits more variance between the author's Parks site and Mason site samples than between independent McFarland and Mason phase samples from the upper reservoir zone. The only dramatic change in the composition of the four major arboreal fruit categories through time involves a decrease in acorn remains, accompanied by an increase in walnut remains in the Mason phase samples, particularly in the upper reservoir zone (Crites 1978: 200-201). Interestingly, Crites found no increase in the amount of walnut represented in the wood charcoal record for the lower reservoir zone or the upper reservoir zone. There was a substantial increase in Kentucky coffeetree (Gymnocladus dioecus) wood charcoal, however, which may suggest that conditions were more favorable for the growth of black walnut (Crites 1978: 204). Walnut shell remains were equally well represented in the author's samples, and comprised 10.32 percent of plant foods at the Mason site and 3.31 percent at the Parks site. Walnut (Juglans spp.) was also a substantial component in the wood charcoal samples from both sites. An increase in walnut pollen from approximately A.D. 600-900 at Mingo Pond near the Mason site (Delcourt 1979) was previously discussed and attributed to a possible increase in more mesic habitats during that time.

A change even more dramatic than nut utilization in the Normandy Reservoir, as based upon previous data, was seen to be a decrease in the utilization of non-arboreal plants, particularly herbaceous species (Crites 1978: 201-202, 217). A re-examination of the Normandy Reservoir data, coupled with the author's data and viewed in the context of sample size, while not invalidating the idea, may suggest a less dramatic change. In the upper reservoir zone, the density of seeds, fruits, and grains decreased from .73 per gram in the McFarland phase sample to .07 per gram in the Mason phase sample (derived from Crites 1978: 72, Table 10). In the lower reservoir zone, seed density decreased from 1.05 per gram in the McFarland phase sample to .07 per gram in the Owl Hollow phase sample. It then increased substantially to 1.33 per gram in the Mason phase sample and decreased again to .40 per gram in the Banks phase sample (derived from Crites 1978: 176, Table 39; 184-187, Table 41). The high density of seeds, fruits, and grains in the lower reservoir Mason phase sample is attributable to a large number of honeylocust and cucurbit rind fragments from the Parks site (Crites 1978: 106, Table 20). The author's Parks site sample indicated that there were 1.43 seeds, fruits, and grains per gram of matrix, with about a third attributable to seeds which were tentatively identified as false pennyroyal (*Hedeoma pulegoides*). The sample from the Mason type station exhibited a seed, fruit, and grain density of only .10 per gram. The high percentage composition of arboreal nutshell there (99.48 percent) and relatively low seed density may be related to the sampling of specialized activity loci. At any rate, there seems to be as much variance in seed, fruit, and grain density between Mason phase components, and even Mason samples from the same site (e.g., between the author's Parks site data and Crites' 1978: 104-106, Tables 18 and 20 Parks site data from different features), as between the samples from the various cultural horizons presented. While there is a marked preponderance of herbaceous seeds, particularly *Chenopodium*, in the McFarland phase samples from the Normandy Reservoir area (Crites 1978: 72, Table 10; 184-187, Table 41), a variety of species in lesser amounts were represented in the author's samples. Thirteen herbaceous seed categories (n=36), including *Chenopodium* (n=13), were recovered from features at the Mason type station and four categories (n=13), including *Chenopodium* (n=1), were identified in the author's Parks site sample. Additionally, maize kernel fragments were recovered from two of the four features which were sampled at that site. This indicates a continual utilization of the cultigen to a small degree during the McFarland, Owl Hollow, and Mason occupancy of the study area with a dramatic increase occurring only during the Early Mississippian Banks phase. Initial observations of kernel morphology suggest that the Mason maize was an Eastern Flint variety reminiscent of that encountered in Mississippian contexts, but more conclusive statements await the discovery of better specimens.

In summary, the present data suggest to the author that a certain degree of subsistence stability existed from the time of the McFarland phase occupancy of the study area through the time of the Banks phase occupancy, with the exception of more reliance upon maize during the latter. A recent analysis of plant remains from several sites in the American Bottom of Illinois indicates that shifts in the cultural configuration between Late Woodland and Mississippian components there were not accompanied by any marked changes in subsistence (Johannessen 1983).

Changes in plant-use patterning during the time of Mason phase occupancy, although not as dramatic as previously thought, were evidenced by a higher percentage composition of walnut remains and possibly a lesser utilization of certain herbaceous seeds such as Chenopodium. The explication of these changes can perhaps best be addressed by reference to the secondary hypotheses set forth prior to data analysis in this thesis.

In the event that Mason phase plant-use patterns differed from those of preceding and succeeding phases, it was suggested that the discontinuity could be explained in terms of (1) a local population intrusion (Faulkner and McCollough 1982: 566), (2) overrepresentation in previous paleobotanical assemblages of sites seasonally utilized by small populations (Crites 1978: 217; Butler 1980: 40), or (3) a minor deviance in the climatic trend during Late Woodland times which would have resulted in human ecological changes (Griffin 1960; Vickery 1970). The concepts are not mutually exclusive and the evidence for each must be weighed proportionately.

The suggestion of a local population intrusion might be corroborated by botanical data in the event of marked and replicable differences between the plant resources utilized by the Mason people, presumably due to cultural selection, and those utilized by temporally adjacent phases. As has already been stated, any changes in Mason subsistence which might be evidenced are less dramatic than previously thought, and for the most part involve subtle quantitative changes in composition rather than absences or additions of taxa. Other corroboration of a population intrusion might involve inter-cultural differences in patterns of food preparation as evidenced either by botanical residues or by differences in artifact inventories. No such differences were noted during the examination of plant residues, although a more problem-specific methodology in future research might involve a more rigorous discrimination of residue size categories, particularly of nutshell, and displacement of particular size categories over the site (e.g., Halley 1981). Artifact inventories, in the event of a time-consuming problem-specific analysis, may eventually reveal some insight, but any indication of differential food processing techniques would probably be obscured by differences in site function. In consideration of a regional homogeneity regarding plant utilization in the ethnohistoric record, it seems doubtful that any differences in plant usage by an intrusive population would be significant enough to be discerned in the archaeological record. In short, while many aspects of the Mason phase material culture suggest a local population intrusion, the botanical data do not.

The second hypothesized explanation for a Mason phase subsistence change, the overrepresentation of seasonal or special-use sites in the botanical data base, rests upon the assumption that different types of camps were present in the settlement system. Corroboration in the paleobotanical record might be reflected by a preponderance of a few seasonal food categories from some Mason phase sites, and a broader spectrum of plant foods from others. Intersite variability in the functional categories of artifacts, insofar as it can be discerned, would also provide corroboration.

There does seem to be some suggestion of differences in the composition of botanical assemblages which have been recovered from the various Mason sites. Crites' (1978) data base of Mason plant food remains totaled 64.82 grams and was derived from six sites in the Normandy Reservoir area. There is evidence that at least three of these, Eoff I (40CF32), Jernigan II (40CF37), and Ewell III (40CF118), were seasonally occupied sites (Duggan 1982: 69, 81, 114). In addition, Ewell III and Eoff I may have been special function encampments due to the restricted range of features encountered. There is a good indication in structural and mortuary data that the Parks site (40CF5) was occupied intensively, perhaps year-round. There is also evidence that the Wiser-Stephens site (40CF81) underwent heavy utilization in several seasons as based upon the presence of two possible structures and numerous features. The Banks V site (40CF111) is considered to have been a seasonal camp at minimum, and possibly a more permanent occupation (Duggan 1982: 64, 69, 89, 127). Faulkner (1968: 127) has suggested that the Mason type site may have functioned as a base camp or as a short-term permanent habitation site for a family group who abandoned it when local resources became scarce.

The Parks and Banks V sites both exhibit ranges of botanical residues more diverse than those from the other Normandy Mason components, particularly with regard to nut/seed ratios (Crites 1978: 47, Table 2; 59, Table 6; 78, Table 13; 135, Table 31; 154, Table 36). The high ratio of arboreal nuts to seeds and narrow range of plant foods in the large Wiser-Stephens site sample (Crites 1978: 47, Table 2) may suggest a seasonal occupation despite suggestions of heavy utilization (Duggan 1982: 89). The Parks site data alone is indicative of an assemblage composition of plant foods which fits into the local continuum better than the assemblage composition of all combined Mason phase samples. The same is true of the Banks V material. This suggests to the author that the Normandy Mason phase plant food assemblage, taken as a whole, is more representative of non-permanent occupations. Substantiation has been accorded by formal surface survey data (Prescott 1978: 461).

The Parks site probably functioned as a base camp, as was indicated by the presence of structural and mortuary remains. As was discussed previously in this volume, the author's Parks site botanical data are more indicative of a total range of domiciliary activities than special tasks. The evidence of intense occupation, coupled with the presence of several cultigens, at the Mason type station suggests that it functioned as a base camp also. However, a preponderance of only a few arboreal nut species, a low percentage representation of seeds, and a more restricted inventory of wood charcoal taxa may be suggestive of a more limited range of activities. The fact that all features sampled at that site were bell-shaped or kettle-shaped pits with undercut sides may indicate a sampling bias towards specialized activity loci.

If the Parks and Mason sites are indeed base camps, and sites such as Ewell III and Eoff I are seasonal or task-specific stations (Duggan 1982: 140-141), participation in a settlement system like Faulkner's (1973: 43-44) "nucleated" model is indicated. The model entails the presence of permanent sites which would permit easy access to other temporary camps for the exploitation of seasonal resources. The Yearwood site (Butler 1980) seems to be a prime example of such a seasonal task-specific site but, unfortunately, no botanical data are available for the Late Woodland component there.

The final hypothesized reason for differences in the overall Mason phase subsistence pattern, that of climatic change, was founded upon studies designed to explain the decline of the Hopewell Interaction Sphere in the Eastern United States (e.g., Griffin 1960; Vickery 1970). Any sort of cool phase, by affecting the inventory of available taxa, would have implications not only in and of itself but also toward the other hypotheses, both of which are based upon an assumption of environmental stability throughout the time in question.

Existing data, although far from ample, are in general support of some sort of minor climatic aberration during the time of Mason occupancy. This is possibly evidenced in the wood charcoal record by a stronger representation of more mesic-adapted taxa such as walnut and Kentucky coffeetree (Crites 1978: 204). Palynological data derived from local sediment cores (Delcourt 1979), while of poor short-term resolution, corroborate a minor Late Woodland climatic deviation to some extent. They indicate a slight increase in mesic-adapted arboreal species during the time in question, accompanied by an increase in non-arboreal aquatic taxa, probably resulting from rising water levels in the sediment basins. A short-term aberrant climatic trend would probably have more implications toward the productivity of arboreal species and the percentage composition of mast crops, rather than a significant change in forest stand composition. The potential effects of a minor cool phase upon maize, particularly the earlier tropical varieties, are adequately documented (Vickery 1970; Yarnell 1964). However, based upon the general paucity of Middle Woodland maize in the study area and in the Eastern United States in general, it seems likely that its removal would have insignificantly influenced subsistence. Woodland plant-use patterns in the study area are thought to have been relatively stable prior to the widespread acceptance of cool-adapted varieties of maize. A small quantity of maize was found in good Mason phase content, and is possibly of a Eastern Flint variety, but better specimens are needed for accurate interpretation. In short, any climatic fluctuations affecting the study area in the past few millenia were probably not of sufficient magnitude or duration to effectively alter the inventory of the most important indigenous taxa available to aboriginal populations. Any impact upon subsistence practices most likely would have involved non-indigenous cultigens, especially tropical maize.

There is, in conclusion, a feeling that the discontinuity in subsistence patterning during the Mason occupancy of the study area can be attributed largely to sampling bias. As the inventory of excavated Mason components increases, our understanding of the types of archaeobotanical assemblages which are associated with the various types of sites will hopefully become clearer. At present we are still faced with the task, when dealing with special exploitative sites, of discerning the residues of specialized activities from those of normal population maintenance. As the inventory of botanical assemblages increases we should be able to associate the types of residues with particular classes of features. In order to better address these types of problems, there is a necessity to give special attention to representative sampling within the spatial contexts of both sites and features.

Certain differences between the Mason phase botanical assemblages and those of preceding and succeeding cultural manifestations were noted to exist in both the author's data and in previous data. While these differences may relate to the ecological ramifications of climatic change, there is a desperate need for more problem-specific environmental studies such as "short core" pollen analyses. A tighter chronology and the discovery of better maize specimens may eventually help us to understand the subtle changes which came to play in the replacement of tropical varieties of corn by eastern flints. There is little doubt that changes in the overall cultural configuration were occurring during the Mason phase occupancy of the study area despite an indication of subsistence stability. A better grasp of aboriginal population dynamics may eventually help us to understand how these various changes came about on a regional scale during Late Woodland times to bring about a Mississippian lifestyle.

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APPENDIX

APPENDIX I

The taxa tabulated below were sorted from their matrices by hand either during the course of field excavation or during laboratory processing of waterscreen fractions. The samples were analyzed but the data were not included with those previously discussed due to differing extractive techniques. Because of human bias, constituents of the hand-sorted samples are typically of the large size classes which would have been more visible to the naked eye. There is an overrepresentation of both the larger pieces of wood charcoal and dense woody nutshell fragments. Only three carbonized seeds were recovered from the eleven hand-sorted samples. Two of these were persimmon seeds which are large enough to have been easily visible. The third was a canary grass (*Phalaris carolinians*) seed which was probably adhered to other carbonized matter in the sample.

Table I-1. Absolute Gram Weights of 40CF5 Hand-Sorted Plant Remains

	F-19	F-23	F-24	F-28	F-28/B5	F-28/B7	F-32	F-33	F-36	F-40	F-44	F-82	Total
Carya spp. shell	4.23	1.83	5.93	14.00	7.84	1.22	.44	1.86	.08	2.59	6.86	1.29	48.17
Carya spp. husk								<.01					<.01
Juglans spp. shell				.02			.24	.23				.05	.54
Juglandaceae shell	.23	.10	.44	.42	.42		1.90	.50	.09		.37	.14	5.64
Quercus spp. shell				.01							.01	.02	.04
Total nuts	4.46	1.93	6.37	15.48	8.26	1.22	2.58	2.60	.17	2.59	7.24	1.50	54.40
Wood charcoal	1.60	.02	1.62	4.69	2.00	.23	.30	.69	1.10		3.58	.39	16.22
Nuts + Wood	6.06	1.95	7.99	20.17	10.26	1.45	2.88	3.29	1.27	2.59	10.82	1.89	70.62
Bark								.01	.03				.04
Indeterminate stalk/stem					.01								.01
Root/tuber fragments						.01							.01
Carbonized seeds									P		.05	.05	.10
Unknown			.02	.02		.04	.02						.10
< 2mm residue	.05	.06	.26	3.25	.71	.06	.07	.26	.25	.39	1.40	.10	6.86
Contamination		.01	1.26	4.40	.42		.52	1.62	1.30	.01	.07		9.61
Residue + Contamination	.05	.07	1.52	7.65	1.13	.06	.59	1.88	1.55	.40	1.47	.10	16.47
Total weight	6.11	2.02	9.53	27.84	11.40	1.56	3.49	5.18	2.85	2.99	12.34	2.04	87.35

Table I-2. Percentage (by Gram Wt.) of 40CF5 Hand-Sorted Plant Remains Classes Relative to the Total

	F-19	F-23	F-24	F-28	F-28/B5	F-28/B7	F-32	F-33	F-36	F-40	F-44	F-82	Total
Carya spp. shell	69.23	90.59	62.22	50.29	68.77	78.21	12.61	35.91	2.81	86.62	55.59	63.24	55.15
Carya spp. husk								<.19					<.01
Juglans spp. shell				.72			6.88	4.44				2.45	.62
Juglandaceae shell	3.76	4.95	4.62	1.51	3.68		54.44	9.65	3.16		3.00	6.86	6.46
Quercus spp. shell				.04							.08	.98	.05
Total Nuts	73.00	95.54	66.84	55.60	72.46	78.21	73.93	50.19	5.96	86.62	58.67	73.53	62.28
Wood charcoal	26.19	.99	17.00	16.85	17.54	14.74	8.60	13.32	38.60		29.01	19.12	18.57
Nuts + Wood	99.18	96.53	83.84	72.45	90.00	92.95	82.52	63.51	44.56	86.62	87.68	92.65	80.85
Bark								..19	1.05				.05
Indeterminate stalk/stem					.09								.01
Root/tuber fragments						.64							.01
Carbonized seeds									P		.41	2.45	.11
Unknown			.21	.07		2.56	.57						.11
< 2mm residue	.82	2.97	2.73	11.67	6.23	3.85	2.01	5.02	8.77	13.04	11.35	4.90	7.85
Contamination		.50	13.22	15.80	3.68		14.90	31.27	45.61	.33	.57		11.00
Residue + Contamination	.82	3.47	15.95	27.48	9.91	3.85	16.91	36.29	54.39	13.37	11.91	4.90	18.86
Total	100	100	100	100	100	100	100	99.99	100	99.99	100	100	100.45

Table I-3. Carbonized Seeds from the 40CF5 Hand-Sorted Samples

	F-36	F-44	F-82
Diospyros virginiana		n=1 (.05g)	n=1 (.05g)
Phalaris caroliniana	n=1 (.01g)		

VITA

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