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Continuity and Change in Upland South Subsistence Practices -- The Gibbs House in Knox County, Tennessee

Justin Samuel Elan Lev-Tov
University of Tennessee, Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by Justin Samuel Elan Lev-Tov entitled "Continuity and Change in Upland South Subsistence Practices -- The Gibbs House in Knox County, 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.

Walter E. Klippel, Major Professor

We have read this thesis and recommend its acceptance:

Charles H. Faulkner, Paul W. Parmalee

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

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CONTINUITY AND CHANGE IN UPLAND SOUTH SUBSISTENCE PRACTICES -- THE GIBBS HOUSE SITE IN KNOX COUNTY, TENNESSEE

A Thesis

Presented for the

Master of Arts

Degree

The University of Tennessee, Knoxville

Justin Samuel Elan Lev-Tov

May 1994

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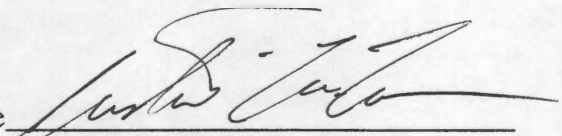
Signature 

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ABSTRACT

This report concerns the faunal remains excavated from the Gibbs House Site in Knox County, Tennessee. This site was excavated by Dr. Charles H. Faulkner of the University of Tennessee in five field seasons between 1987 and 1991. The animal bones were examined at the University of Tennessee, Department of Anthropology's Zooarchaeology Laboratory. Faunal remains were excavated from a number of deposits that dated from the late-eighteenth century up to the turn of the nineteenth century. The total assemblage was divided into, early, middle, and late period samples in order to examine changes in diet over time. The largest sample, made up of 3,310 bones, dated to the late-eighteenth century. The second faunal sample from this site dated to the early-nineteenth century, but comprised only 535 bones. The third assemblage was slightly larger, with a total of 569 bones. The latter collection was from mid-to-late nineteenth century contexts.

Species represented in the assemblages did not change very much over time, nor did their relative importance. Pigs were far and away the most important species in all time periods, followed by cattle and chickens. Domestic mammals were dominant even in the frontier period assemblage. Native fauna incorporated into the Gibbs' diet included, among others, white-tailed deer, squirrels, turkeys, opossums, raccoons, and Canada geese. Wild animals played a small role in this dietary strategy; from the early to the late times native fauna always made up only about 10 percent of the identified species. Butchering methods remained very similar over most of the time represented by the deposits, but did change around the turn of the nineteenth century. Similarly, dumping patterns remained similar in character over much of the time, but were altered late in the nineteenth century.

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CHAPTER 1

INTRODUCTION

Zooarchaeologists have over the last 30 years become increasingly interested in the analysis and interpretation of faunal assemblages excavated from historic contexts in North America. The vast majority of historic zooarchaeological research, following the intensification of historical excavations, is from sites located along the Atlantic coast (cf. Reitz 1987a; Jolley 1983). The southeastern portion of the coast has in particular benefited from extensive zooarchaeological studies. Because relatively few historical archaeological investigations have been undertaken west of the southeastern Atlantic coast, in the Upland South, we have only a limited knowledge of dietary practices there. Much of the published zooarchaeological research within the Upland South concerns plantation foodways (cf. Breitburg 1983a), rather than diets of the more typical yeoman farmer.

The term 'yeoman' is used in this report to mean a small, independent farmer. Yeomen once made up a socioeconomic class of landholding small farmers in England, ranking somewhere below the upper class gentry (The American Heritage Dictionary 1987). This class system was to some extent transferred to the English colonies when huge plantations were established by members of the immigrant gentry class, and small farms carved out by lower socioeconomic group settlers (Orser 1990:3).

Recently concluded excavations in East Tennessee provided a much-needed chance to explore historic dietary practices at a small [yeoman] farmstead within the Upland South. At the most basic level, we wish to know the character and content of such a diet. How did the isolated conditions of frontier life influence settlers' dietary strategies during the late-eighteenth and very early-nineteenth centuries? Did this foodway persist in later times? What animals were relied upon for their primary sources of meat? What other animals

contributed to the diet? Which native animals were incorporated into their diet and how important were they? How did the farm's environmental setting affect their subsistence strategy? What do the butchering marks on large mammal bones and dumping patterns within the site tell us about their culinary practices?

A comparison of Upland South faunal data with similar materials from the Coastal South will help to answer other, broader questions concerning the process of Colonial dietary adaptation and later regional differentiation. Do the two subregions differ, and if so, then how and why? Are the different ecological zones purely responsible for any observed differences? Other than environment, what other factors might explain differences?

An extensive analysis and limited comparative study of faunal remains from several southeastern sites was designed to answer these questions. This thesis is based upon the faunal remains excavated from the Gibbs House Site, Knox County, Tennessee. Analysis and comparison of this material will contribute information concerning historic foodways to our small database of Upland South sites. Comparative material discussed here comes from several sites, both Upland and Coastal: Fort Southwest Point in Kingston, Tennessee (Bunch 1987); Fort Loudon in Monroe County, Tennessee (Breitburg 1983b); Fort Frederica on the coast of Georgia (Reitz and Honerkamp 1983); Oxon Hill Plantation on the Potomac River in Maryland (O'Steen 1986); Pettus Plantation/Utopia Cottage on the James River in Virginia (Miller 1979); and several Middle Tennessee plantations (Breitburg 1983a).

The next chapter is an overview of historical zooarchaeology and southeastern foodways. What questions have zooarchaeologists asked of their faunal assemblages? Which questions have attracted the most attention in historical zooarchaeology? To what degree have their analyses been successful in producing new information? How have they articulated the archaeological dietary data with similar documentary information?

Turning to southeastern diets in particular, what information have historians

gathered about these diets? More specifically perhaps, what foods and cooking practices were popular, and which were not? How were carcasses divided into usable portions? In the days before refrigeration, how was meat cured to prevent spoilage? Turning to the zooarchaeological evidence for southeastern dietary practices, what do animal bone assemblages have to say about diets? On a broad scale, what regional eating patterns have been identified? How do zooarchaeologists' findings compare with historians' conclusions? At a finer level, what were butchering practices like? Were native animals important parts of the diet? This chapter provides the background for the analysis of the Gibbs House Site material; a body of evidence to hold up against this enigmatic assemblage.

The Methods, Materials, and Goals chapter deals with the relevant details of site, excavation, and faunal assemblage analysis. Hypotheses and expectations for the Gibbs assemblage are then discussed. Site location, history, and a summary of the excavations are presented first. This is followed by a discussion of all of the Gibbs House Site deposits that contained faunal remains used in the following analysis. Along with this, a brief discussion of taphonomic aspects of the assemblage is presented. Methods of identifying and analyzing the animal bones are briefly discussed. Finally, initial hypotheses concerning the Gibbs House Site faunal assemblage are listed.

The Gibbs House Site faunal assemblage is divided into three separate chapters based on the dates of their depositional contexts. The first chapter deals with the earliest excavated deposits, late-eighteenth to very early-nineteenth century. This was the frontier period of Tennessee's history and these deposits contained the largest share of the faunal remains. The next distinct depositional time period is the early-nineteenth century, approximately the 1820s up until about 1850. An addtional chapter concerns faunal remains from the mid to late-nineteenth/early-twentieth centuries (from circa 1850 through 1915).

In each of these three chapters, a discussion of the specific contents of each of the

assemblages is presented. Both the range of taxa utilized and the relative importance of each is discussed. Observed butchering and dumping patterns are presented and discussed as a means of examining culinary practices and farm organization. Lastly, change over time in species used and their relative abundance are examined. One additional chapter is devoted to a comparison of the frontier period faunal remains both with other sites within the Upland South and with Coastal South sites. The latter chapter explores whether there is a distinct regional dietary pattern either in the Upland South or in the frontier. Statistical tools such as diversity and chi-square tests are employed to explore this question.

The last chapter is a summary of all of the findings presented in the analysis chapters. These chapters are tied together here to present a picture of the Gibbs' diet over a century and a half. Conclusions presented about Upland South diets in both the frontier as well as in later periods are based on the historical data intertwined with zooarchaeological evidence. These two sources together present a good anthropologically oriented beginning to an understanding of Upland South foodways.

CHAPTER 2

HISTORICAL ZOOARCHAEOLOGY AND SOUTHEASTERN FOODWAYS

Historical Zooarchaeology

Settlement of the South began with the earliest English and Spanish attempts at colonization in Virginia and Florida, respectively. With these colonial settlements came the need for people to adjust to their new environmental surroundings. As Reitz and Honerkamp (1983:4) have stated, the colonists' possession of various species of domestic animals did not preclude a process of adaptation. According to these authors, British colonial diets along the coast were far too locally variable to have been unaffected by environmental conditions. Colonial diets do reflect an extensive process of adaptation, and often include so many native taxa that they strongly resemble Native American subsistence practices (Crabtree 1990:179).

Zooarchaeologists have done an extensive amount of work with faunal assemblages from historic contexts since the emergence of historical archaeology as a distinct subdiscipline with its own journal and conference some 25 years ago. When Parmalee (1960) authored his analysis of some of the Fort Loudon faunal material he started an enduring area of study for zooarchaeologists: it was the first North American historic European animal bone collection so analyzed (Jolley 1983:64). Faunal analysts have no doubt been drawn to historic collections for the same reasons as have other types of archaeologists: the existence of supporting documents and histories makes it possible to conduct a fine-grained analysis and interpretation of observed patterns.

Faunal studies on historic sites have in fact predominately focused on the types of detailed social questions seldom attempted with prehistoric material. It is not surprising

therefore that many studies choose to tackle subjects like socioeconomic status (Reitz 1987b; Schulz and Gust 1983) and ethnicity (Langenwalter 1980; Stewart-Abernathy 1989). Many other zooarchaeological studies have been devoted to studying a question related to both of the above topics: slave diets as an indication of their treatment by white masters and how their African-rooted culture may have survived in their foodways (McKee 1988).

Socioeconomic Status

Socioeconomic status has not only been the focus of several zooarchaeological reports, but also the center of a continuing methodological debate concerning how best to rank cuts of meat in economic purchasing power models (cf. Schulz and Gust 1983; Lyman 1987; Huelsbeck 1989, 1991). Studies of socioeconomic differentiation in meat diets have been approached in several ways. The simplest and most common way has been to analyze frequencies of species utilized and to examine how broad a range of animals were eaten (see Crabtree 1990 for an extensive review of the subject). Most of these studies involved plantation collections (cf. Otto 1975). The latter approach necessitates making certain assumptions about the relative value of meat cuts as well as the types of meat themselves. For instance, Harrington (1989:11) used, among other evidence, the presence of juvenile cow bones and correlating them with documents noting that veal was a favorite meat of eighteenth century elite. He concluded that the site's occupants belonged to the upper class.

Schulz and Gust (1983) used a price-ranking system for cuts of beef based on period prices. Through the use of this ranking system, the authors were able to associate the dietary strategies at each of four Sacremento sites with particular socioeconomic classes. Lyman (1987) later published a critique of Schulz and Gust's model, pointing out that their model might be more profitably analyzed by predicting meat purchasing strategies based on cost-efficiency models and optimal foraging theory. Other studies of

socioeconomic status have failed to find evidence of the class differences so well documented by historical records. Faunal collections from such studies did not exhibit patterning along socioeconomic class lines that was separable from taphonomic and recovery technique biases (Reitz 1987b; Miller 1979).

Ethnicity

Ethnicity does not attract quite as much attention from zooarchaeologists as does socioeconomic status. Perhaps this subject has received less attention because of its perplexing nature. Schuyler (1980:viii), noting the ephermeral nature of archaeological ethnicity, has asked whether the "ethnicity, especially the ethnicity of of minorities, [is] recognizable in the archaeological record." Ethnic eating patterns are usually identified by examining what species were used or avoided, as well as what carcass portions were favored. As such, it is often difficult to separate ethnic from socioeconomic influences on diet; ethnicity can easily be confused with the culture of poverty.

Two studies of ethnic foodways on historic sites produced polar results. Langenwalter's (1980) study of nineteenth century Chinese immigrant subsistence in California successfully identified the maintenance of a traditional foodway. Pig bones displayed butchering marks made by a Chinese-style cleaver while cuttlefish bones signified the use of a species traditionally eaten in China (Langenwalter 1980:105-106). Stewart-Abernathy and Ruff (1989) analyzed the faunal remains from a nineteenth century Jewish home in Arkansas and discovered that this ethnic foodway was abandoned. Soon after this religious family moved from New Orleans to Washington, Arkansas, the Jewish dietary laws of *kashrut* were abandoned; forbidden species of animals like pigs and catfish were identified in the faunal assemblage (Stewart-Abernathy and Ruff 1989:103-105).

Plantation Foodways

Historical archaeology's beginnings as a legitimate subdiscipline can be traced back to work done on the plantations of the southeastern coast beginning in the 1930s (Singleton 1990:70). Along with this trend, zooarchaeologists working with historical collections have spent a disproportionately large amount of time working with collections from plantations. The main concerns of dietary studies on plantations have been to illuminate the lifeways of the diverse groups that lived there; masters, overseers and slaves (cf. Otto 1977, 1980). Most of this research, however, converged on gathering information on the group most notably absent from historical records, the slaves.

What historical evidence there is about slave diet paints it as a rather monotonous and regionally undifferentiated institution. This diet was dominated by poorer (less meaty) cuts of pork, with the occasional addition or substitution of mutton or beef (Hilliard 1972:56-58). Crader (1984, 1990) among others has done extensive work with faunal remains from slavequarters. Her analysis of the Monticello material indicates that the historians' view of slave diet is not always the correct one. In contrast to the "heads-necks-backs-ribs-feet" (Crader 1990:699) pattern offered by historians, slaves at Monticello were eating much better. In fact, domestic mammal bones from all parts of the body -- meaty and non-meaty -- were identified at the site (Crader 1990:700). Another area of discrepancy between zooarchaeological and historical data concerns just how monolithic slave diet was. At Monticello, pork was the most frequently eaten meat, yet beef also contributed heavily to the diet (Crader 1990:704-705).

Historians also recognize that at least some slaves were able to take wild game to supplement their diets (Hilliard 1972:56). However what is not clear from the historical record is which species of animals were hunted or fished, and in what numbers. Crader's (1990) faunal analysis demonstrates that a variety of wild game, such as deer, opossums, rabbits, squirrels, and various birds was hunted. Despite the variety, native animals played only a small role in the Monticello slaves' diet. This is in contrast to coastal plantations,

where the native fauna, principally aquatic species, were much more important dietary components. Young (1993:41-44) suggests that there were regional differences in slave diets. Coastal slaves incorporated many more native animals into their diets whilst slaves living on interior plantations such as Monticello or the Hermitage relied more heavily on domestic mammals.

Southeastern Foodways

Agricultural Practices

The large body of subsistence data assembled by historians and archaeologists reveals both the general character of Southern diets as well as much in the way of specifics. Hilliard (1972) saw all of the South as a huge multifaceted farming system. The coastal areas of the South adopted a mono-cropping type of agriculture oriented almost exclusively toward surplus production. Both edible products such as rice, and inedible products like tobacco, cotton, and indigo were grown for export. In order to produce as large a crop as possible, coastal farms and plantations became reliant on slave labor. Because of this subregion's cash-cropping economy, not nearly as much time and effort was put into raising food. Shortages were made up by purchasing foods from other regions (Hilliard 1972:22-24).

When the interior area, or Upland South, was settled, the region became the major supplier of foodstuffs to the coast, especially corn, wheat, beef, and pork (Hilliard 1972:23-24; Gray 1933:840-841). In contrast to the coastal planters, the interior farmers in Kentucky and Tennessee were quite self-sufficient, either through their isolation or because the diversified agricultural system, not mono-cropping, was the only practical farming strategy for the region. In the hilly upland regions, farmers grew a variety of food crops such as corn, wheat, rye, and oats (Gray 1933:876). Livestock was very important in the uplands and animals were raised in a rather haphazard, free range system. Cattle and hogs

were equally common and both were driven in huge numbers to markets along the southeastern coast (Gray 1933:840-841). Sheep were raised to a much more limited extent than other domestic mammals. While there were substantial numbers of them raised in the uplands of Virginia, Kentucky, and Tennessee, they were rare in the Deep South . Even in the upland areas mutton was not a common food; sheep were primarily raised for wool production (Hilliard 1972:142).

Dietary Practices: Domestic Animals

Historians and zooarchaeologists have both examined Southern diets and have generally complemented one another's work. Historians and documentary sources aid zooarchaeologists in that they provide the economic and social context of historic diets, firsthand accounts of certain archaeologically recognizable practices, and a set of general expectations against which to compare the faunal data. Zooarchaeologists have added to the historic record of foodways by supplying information about the diets of the out of sight, uncounted portions of the population. This is especially apparent when slave foodways are discussed. Faunal remains have also supplied information concerning the role of various wild animals in historic diets, as well as the relative importance of the common domestic mammals.

Historians have painted the historic Southern diet as a rather monotonous, regionally undifferentiated, pork-dominated institution (Hilliard 1972). Travelers to the region often commented on or complained about how they were served "little else than pork, under all manner of disguises" (Marineau 1837, quoted in Hilliard 1972:39). This is where zooarchaeologists most disagree with the traditional interpretation. Reitz and Honerkamp (1983:19) as well as Bowen (1993) have concluded that, despite such historical quotes, it was beef that dominated Southern diets, at least along the coast. Using estimates of meat weight derived from faunal remains, Reitz and Honerkamp estimated that cattle contributed 67% of the biomass consumed by residents of Fort Frederica on the

Georgia coast. Colonists apparently consumed beef in greater amounts than pork, not only at Fort Frederica but at a number of Southern Atlantic coast sites (Reitz 1987a:114).

Zooarchaeologists and historians agree that sheep and/or goats were rarely used for food in the South. While sheep remains are commonly identified from New England sites (Bowen 1975), and somewhat more frequently in the Chesapeake (O'Steen 1986) and at Monticello (Crader 1990), they rarely appear in most other Southeastern faunal collections. Considering that mutton is and was commonly eaten in Britain, and that the majority of Southern colonists came from the British Isles, this animal's rarity seems odd. Reasons for not raising and eating sheep with greater frequency vary. Hilliard (1972:142) dismisses the idea that mutton was disliked. In a circular sort of argument, he argues that mutton was eaten less because beef and pork were more readily available. Root (1980:279) and Root and de Rochemont (1976:121) guess that mutton may have been disliked because it spoils quickly, but note that mutton was considered a delicacy in Kentucky and Tennessee. Reitz and Honerkamp, on the other hand, posit an ecological reason for the absence of sheep: on the coastal plain they were vulnerable to parasites and diseases (1983:21). Miller (1988:183) suggests that sheep were rarely kept in seventeenth century Virginia because they were vulnerable to wolf predation. Finally, Carrier (1923, cited in Breitburg 1983b:67) sides with the 'distasteful' crowd: unskilled methods of carcass dressing resulted in not only long processing time, but also failed to remove a thin membrane from the meat before cooking. Goats appear even less frequently than sheep in both the documentary and archaeological records. Hilliard believes that goats were kept only in small numbers since no quantitative census data were ever taken of them (1972:144). Whatever the reason for the scarcity of sheep along the coast, a discrepancy does exist concerning whether they were hated or loved in the Upland South.

According to historical records, a great variety of domestic fowl were kept, at least on plantations. Chickens were of course ubiquitous, but a variety of domestic ducks, geese, gallinaceous birds (pheasants, guinea fowl, etc.), as well as doves were also

reported (Hilliard 1972:145-149). Archaeologically, domestic fowl other than chickens are rarely found (Reitz and Honerkamp 1983:6, 21-22). Gallinaceous birds other than the chicken were quite rare (Hilliard 1972:149), so it is not surprising that they do not appear often in faunal reports. Ducks and geese were more common, and their bones have been identified in small numbers (cf. O'Steen 1986:559) but osteologically may be difficult to distinguish from their wild counterparts.

Dietary Practices: Native Animals

Elucidating the precise role that the native fauna played in the diets of frontier settlers and later Americans in the South has been one area that zooarchaeology has substantially improved upon the historical record. Despite the presence of almost the same entire suite of domestic animals that were available in the Old World, colonists in the New World chose to intensively exploit native game and fish populations. In fact, it seems that to a large extent domestic, Old World, animals were replaced by their wild, New World, counterparts (Reitz and Honerkamp 1983:22).

Use of wild fauna was common all over the South, but use of specific species, or categories of animals, differed according to local environments (Young 1993:57). Historians suggest that wild animals were only important during the early years of settlement, and were replaced by domestic ones after livestock herds were established (Hilliard 1972:38). Yet zooarchaeologists have found that remains of native animals were common even at later sites and in long-settled urban areas (Reitz 1986; Lev-Tov 1993). At coastal sites waterfowl, shorebirds, estuarine fish, and water turtles were heavily exploited, in addition to a variety of mammals. Inhabitants of Fort Frederica on the coast of Georgia ate around 30 species of wild birds, several species of reptiles and wild mammals, and a great variety of fish (Reitz and Honerkamp 1983). Exploitation patterns similar to this are found up and down the southern Atlantic coast (cf. O'Steen 1986; Miller 1988; Reitz 1987b).

Inland from the Coastal South, in the upland areas, native animals were also used to supplement domestic animal-centered diets. Historic excavations within this region have resulted in few published faunal reports, but based on the assemblages from the East Tennessee forts of Loudon (Breitburg 1983b) and Southwest Point (Bunch 1987) it seems that native mammals were the most important of the wild resources. The Upland South is not located along any major migratory bird flyway so it is not surprising that waterfowl were not used nearly as extensively as on the coast. Upland settlers gathered smaller numbers and narrower ranges of fish species than their counterparts on the coast. The dietary strategy followed in the Upland South relied heavily on wild fauna, just as on the coast, but Coastal South diets appear to have been more diverse than inland ones, perhaps due to their location along the Atlantic flyway.

Dietary Practices: Meat Preservation and Butchery

Before refrigeration, slaughtering domestic mammals provided something of a problem since they produced more meat than could be eaten before it spoiled. The solution to this problem was partially to butcher animals only during the cold months, and partially to preserve the meat that could not be consumed fresh (Noel Hume 1978:10-11; Carson 1985, cited in O'Steen 1986:572). A myriad of variations based on two methods of curing were practiced throughout the South. Pork was the most commonly preserved meat: it's high fat content lent it more easily to such methods (Hilliard 1972:42-44).

The two methods of curing pork were the salting/smoking process and pickling the meat with a brine solution in casks. Of the two, salting and smoking was the more common practice, apparently because pickling required that the meat be soaked before eating in order to make it palatable. In addition, the various salting/smoking methods of curing made the meat more flavorful. Meat was placed in salt boxes along with additives like pepper, ashes, charcoal, honey, sugar, and molasses (Hilliard 1972:43-44). Meat was smoked for long periods of time over a low, smoky fire in an outbuilding constructed for

the purpose. On the rare occasions that beef was preserved it was either pickled or dried (Hilliard 1972:44). Pickled or cooked meat was often stored for later use in eartenware crocks sealed with lard or butter (O'Steen 1986:572).

Butchering methods have attracted the attention of many zooarchaeologists since such patterning can reveal much about social systems, which portions of the carcass were consumed, how the meat was cooked, intrasite activity patterning, and, on plantations, what groups got various parts of the carcass (Crader 1990; Deetz 1977; O'Steen 1986; Otto 1975; Price 1985). Deetz (1977:124-125) believes that the change to using a saw instead of a cleaver to butcher animals was a sign of the arrival of the "Georgian order" mindset, which replaced the "Post-Medieval" mindset of eighteenth century colonists. The Georgian order, according to Deetz, was a set of behavioral rules that emphasized individuality, evenness, and standardization. Sawing cuts of meat as opposed to chopping them results in smaller, more evenly-sized cuts of meat suitable to place at the individual place settings which came into fashion during the eighteenth century (Deetz 1977:39-43, 124-125).

O'Steen (1986) looked at butchering data based on an extensive faunal sample excavated from a Maryland plantation. Patterns of cutting and chopping noted on domestic mammal bones generally matched both contemporary and later descriptions of carcass division and processing. One contemporary account of butchering cited in the work describes cutting apart a hog carcass; the head was split open to remove the brains, the mandible divided to remove jowl meat and the tongue, the body cleaved down the middle, and finally the feet and quarters separated (Robertson 1766, cited in O'Steen 1986:573). Faunal remains indicated a pattern of carcass division where jowl meat, brains, and feet were all separated, and then the rest of the body divided into portions to form roasts and steaks.

At Oxon Hill Manor, O'Steen (1986) noted the presence of burning on some elements, indicating that meat was perhaps more often roasted than boiled. Crader (1990) observed the opposite technique of meat cooking. Most butchering marks found on pig

bones occurred on limb elements, whereas cattle elements mostly showed signs of butchery on axial bones. Very few of the pig bones were burned, which suggested to her that pork was boiled as the typical 'one pot meal' of slaves, rather than roasted. When burning was observed, the entire bone, not just the ends, was blackened. Burning was therefore more likely the result of kitchen clean-ups where table scraps were swept into the hearth (Crader 1990:707-710). In contrast to many historical accounts of slave diets, and differing from other slave faunal assemblages, Thomas Jefferson's slaves at Monticello had access to entire animal carcasses (Crader 1990:713-715).

Intrasite patterning in faunal remains has rarely been addressed with historic collections. Part of the reason for this may lie in the fact that zooarchaeologists often limit their historic samples by only examining bones from features, thus confining their analysis to only one temporally well-controlled, spatially homongenous archaeological unit (Reitz and Honerkamp 1983:10, 14). Price (1985) conducted a spatial study of the distribution of faunal remains from several features around the yard area of a nineteenth century Ozark farmstead. Interviews with former site residents and documentary sources were consulted to gather accounts of how and where animals were butchered and cooked. Separate hog butchering and small mammal/bird processing areas were revealed by the analysis. Disposal practices for certain animals were similar to historic accounts. Only certain portions of deer carcasses were brought back to the farm from the kill site, and small animal remains were disposed of in a separate area from large and medium-sized animals (Price 1985:43-46, 50-51).

Summary

Historical zooarchaeology has since its start some 30 years ago attempted to address both broad anthropological questions concerning adaptation and change, as well as narrower historical and social questions concerning status and ethnicity. Much of this

research is centered in the southeastern United States, especially in coastal cities and plantations (Reitz and Honerkamp 1983; Reitz and Scarry 1985; Reitz 1986, 1987a, 1987b, 1987c, 1992; Rothschild 1990; Miller 1979, 1988; O'Steen 1986; Young 1993). Much less work of this sort has been attempted west of the Appalachian Mountains, or even in the Atlantic piedmont province. Notable exceptions include analysis of faunal remains from Monticello (Crader 1984, 1990), early military outposts in Tennessee and late farmsteads in Arkansas (Parmalee 1960; Breitburg 1983b; Bunch 1987; Price 1985), as well as numerous far western studies (Lyman 1987; Langenwalter 1980; Schulz and Gust 1983; Crass and Wallsmith 1992).

Southeastern diets, at least on the coast, have been extensively studied by both historians and zooarchaeologists. Not surprisingly, the two disciplines have come to opposing conclusions on some aspects of diet, agreement on others, and no conclusions on a few points. Historians such as Hilliard (1972) believe pork to have been far and away the mainstay of southern diets in the past. Zooarchaeologists have gradually come to the conclusion, based on meat weight from faunal remains estimates, that beef was the more prevalent of the two meats (Crader 1990; Reitz 1992). Mutton usage remains something of an enigma. Historians generally take the view that mutton was a well-liked but rare food in the South, whereas zooarchaeologists believe that it was rare because it was disliked (Hilliard 1972; Reitz and Honerkamp 1983). A variety of reasons have been given for both its rarity and why it may not have been a popular food (Breitburg 1983b; Root 1980; Reitz and Honerkamp 1983). What is apparent in this debate is that mutton was used much less frequently in the colonies than in Britain.

The importance of wild fauna in southern diets seems to vary by subregion. While historians (Hilliard 1972) have noted that native species were utilized by settlers, no quantifiable data were available until zooarchaeologists tackled the issue. In fact, zooarchaeologists have found that native animals made up a significant proportion of historic diets not only during early years of settlement, but also in later times (Crabtree

1990:179; Reitz and Honerkamp 1983). In some cases, native fauna actually increased in importance over time (Reitz 1992:92). Some dietary differences in native animal usage occurred between the coastal and inland areas of the South. Coastal and estuarine sites tended to have a greater overall diversity in native species exploited, and a greater emphasis on aquatic species. Inland diets, by contrast, exploited mainly terrestrial species, and then concentrated on a few such as deer, squirrels, and rabbits (Young 1993:41-44). Why this difference existed is not entirely clear. Although at first glance one might explain the pattern by noting that estuarine habitats support a greater variety of wildlife than do the uplands, this is not actually the case. Young (1993:57) points out that upland riverine habitats support just as great a variety of fauna as do coastal habitats.

The analysis of butchering patterns on domestic animal bones has given zooarchaeologists considerable insight into spatial patterning, meat preparation and cooking methods, as well as the dynamics of plantation social relations. Price's (1985) Ozark study, a rare example of spatial considerations in historical zooarchaeology, recognized the archaeological signature of documented animal processing activity areas. O'Steen (1986) and Crader (1990) are but two examples of plantation foodways studies. O'Steen examined food remains from the main house and found that butchered bones were good indicators of what carcass portions were consumed. Crader's work dealt with the garbage from slaves' meals. She concluded that the slaves were eating better than the historical record would suggest, since all parts of the carcass were present.

CHAPTER 3

MATERIALS, METHODS, AND GOALS

Materials

Family and Site Background

This thesis is an analysis of the faunal remains excavated from the Gibbs House site [40KN124], Knox County, Tennessee. Knox County lies within the Ridge-and-Valley physiographic province of Eastern North America, and within the Tennessee River drainage (Figure 3.1). The site is located within the Gibbs community (named after the Gibbs family), at the head of Beaver Creek, approximately 7 miles North of the Holston River, and about 20 miles from downtown Knoxville (Irwin 1973). The area is characterized by parallel ridges and valleys running northeast-southwest (Fenneman 1938). Today, as in the past, the area is dotted with small farms growing a variety of crops such as corn, wheat, and tobacco, and raising livestock.

The Gibbs site was first settled by Nicholas Gibbs and his family in the last decade of the eighteenth century, making them among the earliest white residents of Knox County. Nicholas Gibbs was born in 1733 in the Duchy of Baden region of Germany. His parents had fled to Germany because of religious persecution in England. His father was English, his mother German. In 1747, Nicholas left Germany for the New World, arriving in Philadelphia. After service with the British in the French and Indian War, he settled in Maryland with his brother (Faulkner 1988:1-2).

Later, Nicholas went to live in Orange County, North Carolina but soon moved across the mountains into an area of the Territory South of the Ohio River, that became the state of Tennessee. According to family tradition, Gibbs built a log house about 1792 at

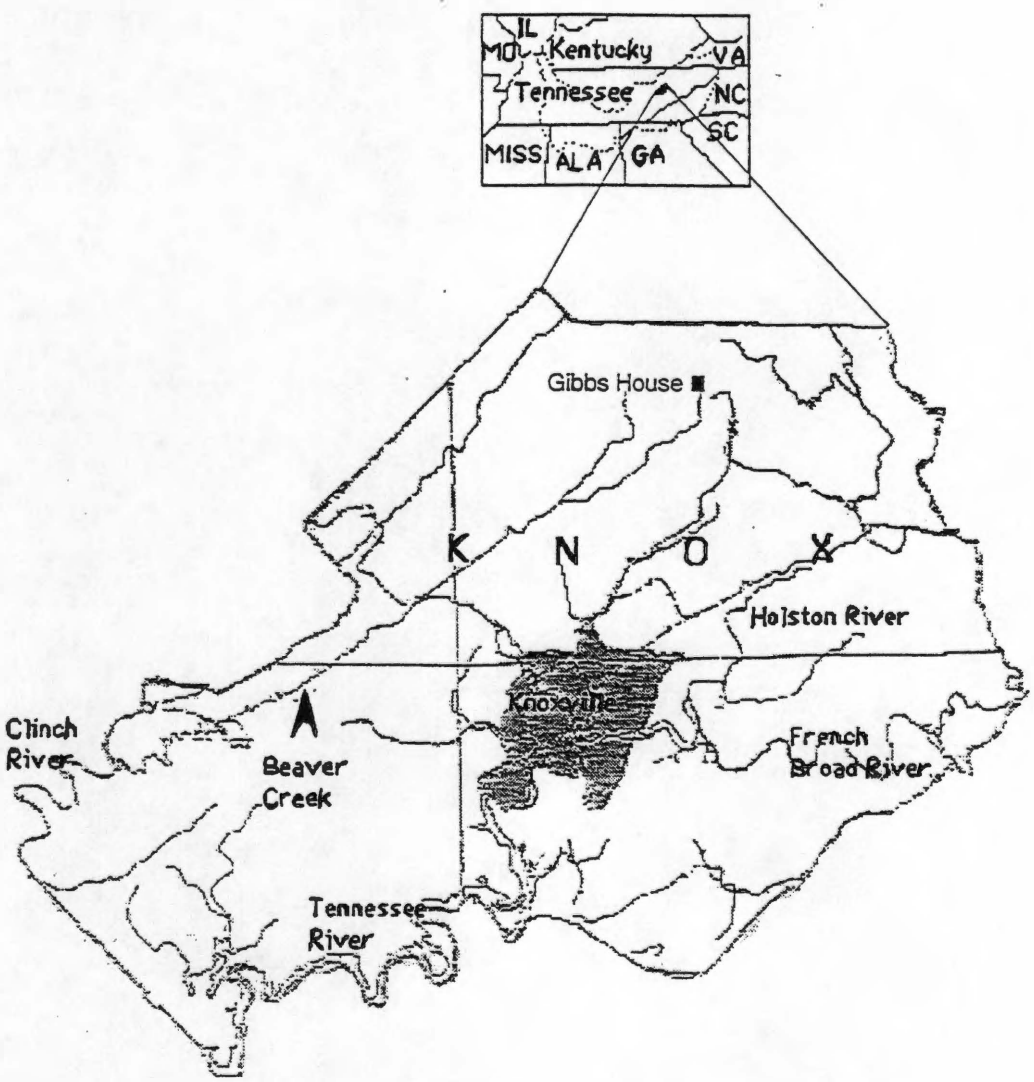

Figure 3.1: Location of Knox County, Tennessee, and the Gibbs House Site

the head of Beaver Creek and by 1796 he had acquired over 1,000 acres of land along this stream (Irwin 1973). Although the Gibbs farm started out large, it became much smaller after Nicholas subdivided it between his five sons sometime prior to his death around 1817. Nicholas' son Daniel was the next head of the household at the original Gibbs home (Faulkner 1988:3).

Census records indicate that Daniel still owned the property in 1840, but by 1850 ownership had passed to his son, Rufus. Rufus was head of household when the United States Census Schedule 4, Productions of Agriculture, surveyed his holdings in 1860. Livestock at that time included two horses, two cattle, six sheep, and six swine. A mix of corn, oats, hay, and sweet potatoes were grown. Rufus was succeeded as head of household sometime in the late-nineteenth century by his son John. John lived in the house until 1913, when the family began renting the property to tenants. The farm stayed in family hands until 1971 when it was sold by Mrs. Ethel Gibbs Brown, a daughter of John Gibbs (Faulkner 1988:3). The property was purchased in 1986 by the Nicholas Gibbs Historical Society (Neal 1986).

The oldest portion of the Gibbs House is a story and a half log structure that stands on a slight knoll overlooking the source of Beaver Creek. Although the house has been extensively remodeled over the years, the original log structure retains much of its architectural integrity.

Archaeological Fieldwork

Archaeological investigations at the Gibbs House were initiated in 1987 at the request of the Nicholas Gibbs Historical Society. The rear house yard was gridded and surveyed at this time. All fieldwork at the site was directed by Dr. Charles H. Faulkner of the University of Tennessee over five seasons of excavation, from 1987 to 1991. Excavators were field school students from the University of Tennessee as well as volunteers. Research goals for the project were to determine former locations and

functions of outbuildings that once stood in the rear yard of the house (Faulkner 1988:1, 4-5). Mrs. Ethel Gibbs Brown, who lived in the Gibbs House during the early-twentieth century, provided the archaeologists with descriptions of the farm as it appeared in the early part of this century, especially the approximate dates and former locations of house additions and outbuildings. At the request of Dr. Faulkner, Mrs. Brown sketched a map of the house, yard, and outbuildings that existed on the farm during her childhood (Figure 3.2).

Several different areas of the rear yard were excavated over the five seasons spent working at the site (Figure 3.3). Faunal collections from these areas can be separated by date of deposition, according to calculated mean ceramic dates (Faulkner pers. comm.; Table 3.1). Areas A and B contained the earliest deposits encountered. These artifact deposits dated to the late-eighteenth/early-nineteenth century. The dates of these deposits correlate with Nicholas Gibbs' tenure as head of household.

Area A, excavated in the fourth and fifth (1990, 1991) seasons, was, according to family tradition, the original location of a log smokehouse that still stands today but at another location on the property. Excavations here uncovered a filled, unlined cellar pit from the early smokehouse, designated Feature 16. The cellar was found in excavation units 26, 40, 41, 42, 45, and 47, and contained heavy concentrations of bone as well as late-18th-early-19th century artifacts. Material in the pit appeared to have been dumped while the structure was still standing. Artifacts were found in a depositional cone pattern, probably as a result of being dumped in from a trapdoor in the smokehouse floor.

The smokehouse cellar was evidently filled in over three stages. At the bottom of the cellar pit was a concentration of straight pins. This suggests that, at least initially, the smokehouse was not used for butchering-related activities; perhaps it was used as an early dwelling or specialized activity area. Above the bottom stratum containing the straight pins was a large cluster of bones. The cluster is probably the result of intensive dumping of various types of household trash into the pit; ceramics and other debris were also

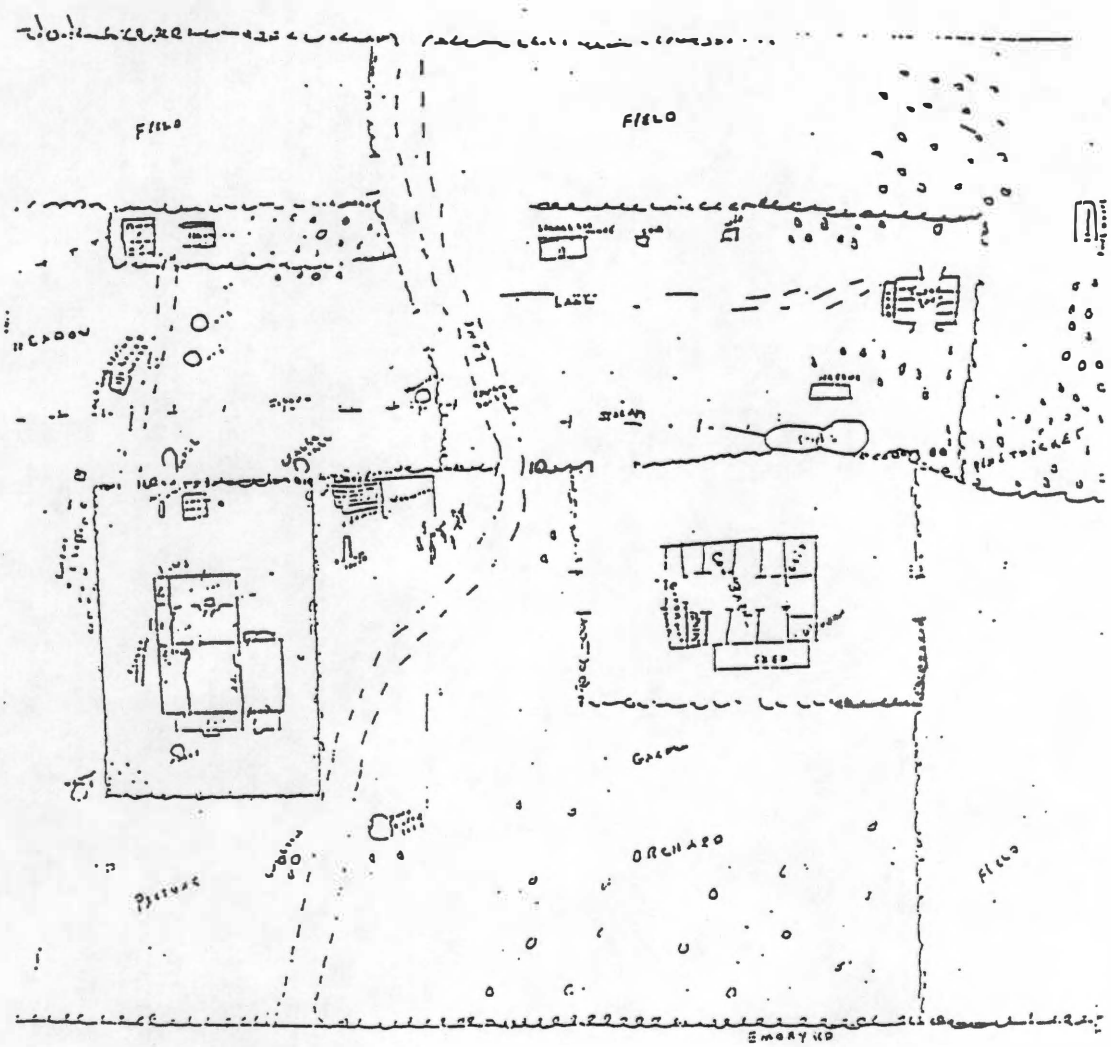

Figure 3.2: A Sketch of the Gibbs House and Farm in the Early 20th Century

(Source: Mrs. Ethel Gibbs Brown)

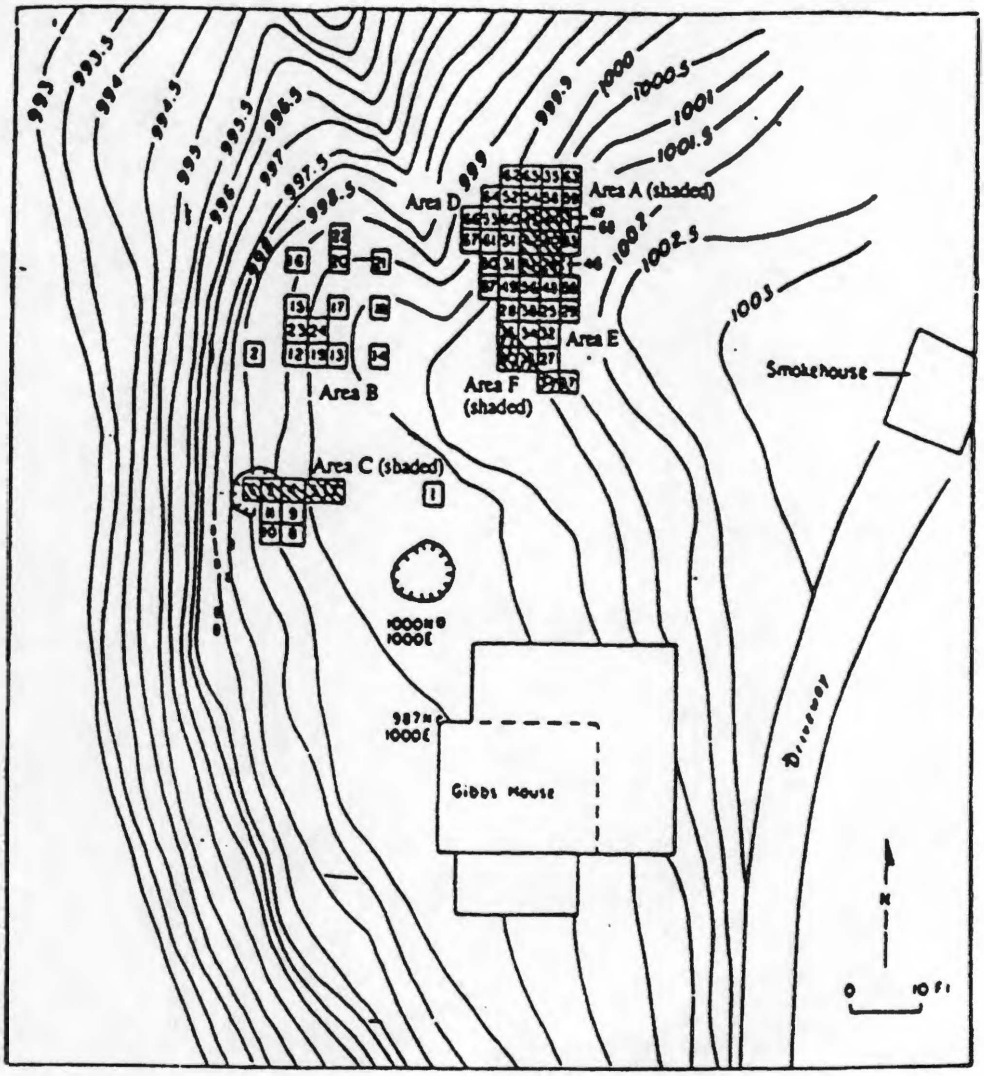

Figure 3.3: Excavation Areas at the Gibbs House Site

(Source: Adapted from Faulkner, Charles H. 1992 An Archaeological Study of Fences at the Gibbs House. In *Proceedings of the Tenth Symposium on Ohio Valley Urban and Historic Archaeology*, edited by Amy L. Young and Charles H. Faulkner. Tennessee Anthropological Association, Miscellaneous Paper No. 16.)

Table 3.1: Deposits and Excavation Unit Dates for the Gibbs House Site

Excavation Area	Excavation Units	Time Period
Smokehouse Cellar (Area A)	26, 40, 41, 42, 44, 45	Late 18th/Earliest 19th Centuries
Ash Midden (Area B)	2, 12, 13, 15, 17, 19, 20, 21, 23, 24	Late 18th/Earliest 19th Centuries
Early Gully (Area C)	3,4, 5, 6, 7	Early 19th Century
Later Gully (Area D)	53, 61, 66, 67 50 and 57 (levels 3, 4 only)	Mid 19th Century
Frame Smokehouse (Area E)	25, 28, 29, 32, 33, 34	Late 19th/Early 20th Century
Gravel Pathway (Area F)	Feature 20 (parts of 30, 33, 34, 36, 37)	Early to Mid 19th Century
Sheet Refuse	Strata 1 and 2 over many parts of site	Late 19th/Early 20th Century

abundant. No chimney pads or hearth remains were found around the smokehouse area. The lack of a chimney suggests that structure remained some type of outbuilding rather than a dwelling (Faulkner, pers. comm.). Despite their name, smokehouses in this region were generally not used to cure meat by smoking, but rather by simply salt-curing without smoke (Faulkner 1991:3-4). Above the bone cluster was a jumbled mix of various types of trash, including bone and ceramics. These ceramics suggest that it was used as a kitchen waste receptacle. After being filled with trash, the cellar pit was capped with limestone. The remaining depression in the ground was eventually filled in with late-nineteenth/early twentieth century refuse (Faulkner, pers. comm.).

The other early yard deposits in area B encompassed the lower levels of excavation units 12, 13, 17, 19, 20, 21, 23, and 24. Faunal remains from this area were found in a deep ash midden in the northwest corner of the yard at the edge of the knoll upon which the house and yard area sit (Faulkner 1989:4-7). The upper levels of these units contained faunal remains and other artifacts that dated to the late-nineteenth and early-twentieth centuries. This area was apparently used as a dump during the entire course of the Gibbs occupation (Faulkner 1989:7).

Area C contained most of the early-nineteenth century (circa 1820s-1840s) faunal material. This area was identified as a shallow depression during the first season of fieldwork (Faulkner 1988:5, 8). A 3x15-foot trench was excavated across the depression, including units 3, 4, 5, 6, and 7 (Faulkner 1988:8-9). Lower levels of the latter units dated to the first half of the nineteenth-century, while upper levels contained late-nineteenth/early-twentieth century artifacts. The depression was originally interpreted as a feature underneath a structure, but excavations revealed it to be a shallow erosional gully. The gullying may reflect a period of neglect while the farm was headed by Nicholas Gibbs' son, Daniel (Faulkner 1988:14). A small number of animal bones was recovered from another contemporary context, Feature 20 in area E. While area E primarily contained late-nineteenth/early twentieth century artifacts, an earlier feature was also found. Feature 20

was a buried early-to-mid-nineteenth century graveled pathway with refuse accumulated around it. The pathway ran across units 30, 33,34, and 36 in a southeast-northwest direction (Faulkner 1991:6, 11).

Mid-nineteenth century faunal remains corresponding with Rufus Gibbs' occupation of the house and farm were excavated during the fifth field season. Excavations in Area D attempted to find foundation stones and fireplace remains in the area surrounding the cellar of the log smokehouse. While no fireplace remains were found, a deep gully filled with circa 1850s to 1880s material was excavated. The gully was found in units 53, 61, 66, and 67, and was designated Feature 31. The adjacent units 50 and 57 also contained contemporary material (Faulkner, pers. comm.).

Late-nineteenth and early-twentieth century artifacts were excavated from several different areas of the Gibbs House yard. The upper two or three levels of most of the other units placed in the yard, including deposits over the smokehouse cellar, the ash midden, and both gullies, contained late-dating artifacts (Faulkner 1988, 1989). In addition to these areas, artifacts from area E, identified by Mrs. Brown as the location of a later frame smokehouse also dated to this time period. Area E included sheet refuse found in excavation units 25, 27, 28, 29, 32, 33, 34, 36, 37, 38, and 39 (Faulkner 1991:3, 6, 9). The frame smokehouse was built by Mrs. Brown's father, John Gibbs, after the log smokehouse was moved elsewhere in the yard (Faulkner 1991:3). Although no artifacts were identified that categorically identify this area as the one-time location of a smokehouse, items such as a wrought iron (meat?) hook, stove parts, a large amount of stoneware crock sherds and limestone footers indicate an outbuilding stood here (Faulkner 1991:27-28). In addition, an ash deposit uncovered adjacent to these deposits was located where Mrs. Brown described an ash hopper for making soap (Faulkner 1991:3, 10).

Methods of Recovery

All soil was screened through 1/4 inch hardware cloth. In addition, baulks left in place during the excavation of the smokehouse cellar were later taken out as flotation and fine screen samples (Faulkner, pers. comm.). Fine screen mesh was window screening (1/16 inch). The faunal remains from the Gibbs House for the most part came strictly from the material recovered in the 1/4 inch screens. Animal bones recovered from fine screening and flotation removed from the smokehouse cellar baulks (area A) were also examined. Faunal remains from the fine screen samples contained more small rodent bones and fish scales than did the 1/4 inch screened material, but was otherwise identical. Flotation samples taken from the ash midden were not examined due to the strong correspondence between faunal remains from the cellar float samples and the 1/4 inch specimens. Since the fine screen material was not very distinct in content from that recovered in the regular mesh, it was not separated during quantification.

Previous Research at the Gibbs House

Only two published studies to date have made use of artifacts excavated from this site. Young (1991:61-63) analyzed the nail assemblage recovered from area E. The nails were used as one of two archaeological test cases for ethnoarchaeological models of how nail assemblages can inform historical archaeologists about refuse origins, architecture, and recycling versus discarding behavior. Three models were developed to test whether nail assemblages were (1) from dumps or ephemeral structures, (2) from log, timber frame, or balloon frame buildings, or (3) from buildings torn down and materials recycled versus torn down and materials discarded (Young 1991).

Results of the study show that area E was the site of a razed building. Architecturally, the building that had stood there was most likely timber frame, although balloon frame is also a possibility. A test of the third ethnoarchaeological model indicated that wood from the structure was probably recycled after razing (Young 1991:65-67).

A study of the 17 postholes excavated at the site was recently published by Faulkner (1992). The latter study was an attempt to reconstruct the placement, architecture, and meaning of yard fence lines represented by the postholes. Faulkner concluded on the basis of posthole shape (round versus square), types of artifacts in the holes, and spacing of the postholes, that fences had shifted over the last 200 years due to changes in outbuilding location and pathways (1992:34-39).

During at least some points in time over the history of the site, the rear yard was cordoned off by an inner fence close to the house, and an outer fence along the yard border. The inner fence enclosed the house and a part of the yard with no outbuildings, while area between the two fences was an enclosed working area with outbuildings (Faulkner 1992:35-37). This yard arrangement matches a description of Upland South farmyard organization summarized by Rotenizer (1992). This model demonstrates a bisected yard pattern where an inner yard was kept clean and free of outbuildings, while an outer yard contained outbuildings, most activity areas, and artifact concentrations (Rotenizer 1992:4-7).

Faunal Analysis

All of the faunal remains from well-dated contexts at the Gibbs House were analyzed for this thesis. The Gibbs House Site faunal assemblage is an important body of data for several reasons. First, little archaeological data from this region are available concerning historic subsistence strategies, especially during the frontier period. Second, the faunal remains were excavated from a number of well-dated contexts that span one family's occupation of the site for the first century-and-a-half of white settlement in East Tennessee.

Thirdly, the fact that the excavated faunal remains come from a number of different types of depositional contexts, ranging from filled gullies to a cellar to sheet refuse, is also significant. Reitz and Honerkamp (1983:10-14) have pointed out that zooarchaeologists

who work with historic collections often have limited sample sizes as a result of analyzing only feature deposits. This results in the additional problem that "they restrict their study to a limited range of behaviors, ones which resulted in the formation and use of features, and do not examine practice of casual disposal which results in sheet deposit." By including faunal remains from several diverse deposits, including filled erosional gullies, sheet refuse, and a cellar, the latter problem has been avoided. Lastly, the Gibbs House assemblage has the rare characteristic of being well-dated and, at the same time, representing a continuous sequence from the late-eighteenth up into the early-twentieth century. The broad timespan represented here provides the opportunity to examine how diet in this region changed (or remained the same) from frontier until early modern times.

Methods

All vertebrate faunal remains excavated from the Gibbs House Site were identified using the comparative collections housed in the Laboratory of Zooarchaeology, Department of Anthropology, the University of Tennessee, Knoxville. Bones were identified to the lowest possible taxonomic category. In many cases bird and mammal bones were too fragmented to identify beyond the class level, but could be sorted into the broad size classes of small, medium, and large birds or mammals. Passerine-sized birds were classified as small, birds the size of a chicken were considered medium, and turkey or goose-sized birds were classified as large. Mammals the size of small rodents or raccoons were labeled small, while those mammals up to the size of pigs were classified 'medium.' Finally, mammals the size of cattle or horses were designated 'large.'

Faunal samples from each different dated area of the site were tabulated separately in order to construct a dietary profile for each time period represented. Both the Minimum Number of Individuals (MNI) and the Number of Identified Specimens (NISP) were calculated. MNI was calculated based on paired elements as first introduced by White

(1953). The MNI was further refined by considering factors such as bone portion present, epiphyseal fusion and tooth eruption (Klein and Cruz-Uribe 1984:26-27). Because of the difficulties inherent in using isolated teeth to form MNI estimates, these were not considered during the calculations (Ringrose 1993:127).

Each of the latter two methods has its shortcomings; these have thoroughly been discussed elsewhere (see Klein and Cruz-Uribe 1984; Grayson 1978, 1981, 1984; Binford 1981; Ringrose 1993). To get around their shortcomings, some authors have recommended that a lower limit of 200 individuals be attained to have an accurate estimation of MNI, or a lower limit of 1400 bone fragments for NISP to be used (Casteel 1978; Wing and Brown 1979:118-120). Other authors suggest that both be calculated and compared to one another to see which of the two measures appears to be a more accurate summary (Klein and Cruz-Uribe 1984:33). In this thesis both the NISP and MNI values for all animals identified are reported. However, all discussions of relative abundance are based on NISP values rather than MNI's. It seems clear from a glance at the species lists presented in following chapters that the calculated MNI values exaggerate the importance of rare species, just as Grayson (1978) has pointed out.

Other ways of getting around the shortcomings of MNI and NISP have involved the estimation of the meat available from species present. A number of techniques have been devised, including (1) multiplying an average weight for an animal by the MNI number for that species and (2) transforming the total weight of archaeological bone for a given species into meat weight by using a constant meat-to-bone weight ratio (Breitburg 1983). A third more sophisticated method has been used extensively with historic collections by Reitz (1992), Reitz and Honerkamp (1983), and Reitz and Scarry (1985). The method favored by Reitz and Scarry (1985:18) involves an equation scaling body mass to skeletal mass and dimensions as body size increases. Meat weight is predicted by plugging in either bone weight or a skeletal measurement into the scaling equation. The transformation from MNI's or bone weights to meat weights is not as simple a problem as

once thought. Consequently the first two techniques have been largely abandoned (Ringrose 1993:132). Jackson (1989) recently published a critique of skeletal mass allometry-based meat estimates. Meat weights were not estimated for the Gibbs assemblage because the problems with these estimation techniques simply compound the problems associated with other quantification measures.

Characteristics of the bones noted during identification included portion present, modifications, butchery, and weathering. Modifications recorded included burning, rodent gnawing, and carnivore gnawing. Butchery was recorded in order to analyze how the animal carcasses were divided up and is discussed in detail in Chapter 4. Therefore, the type of butchering mark (e.g. chop, saw, or cut), location of the mark, as well as the direction of the blow were noted. Bone weathering was noted in terms of Behrensmeyer's (1978) weathering stages. Weathering was recorded in an effort to determine if bones had been deposited on the surface and left for a long period of time before being buried as a result of activities like yard clean-up. Very few bones showed any signs of weathering, however, suggesting that the excavated material accumulated through primary depositional activities. Carnivore and rodent gnawing was also rare. The rare incidence of gnawing reinforces the idea that Gibbs House deposits were primary in nature.

Goals

A number of avenues for investigation were laid out at the start of this research. Because the Upland South subregion of the Southeast and yeoman farmsteads have not been subjected to the sort of intensive investigations that coastal plantations have, a number of rather basic questions have remained unasked and therefore unanswered. The overall orientation of this thesis is to explore the pattern of Upland South subsistence strategies, especially for the late-eighteenth and early-nineteenth centuries. Later dietary patterns at the Gibbs House Site are considered in terms of how they relate to earlier periods; change or

continuity over time.

Specific hypotheses are as follows: Given the different environments, farming strategies, and regional traditions, there should be dietary differences between the Coastal South and the Upland South. Upland South residents such as the Gibbs should have relied on pork as the staple meat, just as historians suggest (cf. Hilliard 1972). The pattern along the coast, according to zooarchaeologists, was a preference for beef over pork (Reitz and Honerkamp 1983). This preference may have had to do with the fact that Upland South farmers drove large herds of cattle to the coastal markets, making them as readily available and cheap a meat to produce as pork (Gray 1933). Sheep and goats were raised in this subregion, but mainly, as elsewhere in the South, for wool and milk (respectively) rather than meat production (Breitburg 1983a). Therefore bones from these animals, as is the pattern elsewhere in the South, will be rare. This is despite the fact that many area settlers came from the Chesapeake region (Perkins 1991:488; Gray 1933:872), and in which the Gibbs family also spent some time, where sheep bones are relatively common in faunal assemblages (cf. O'Steen 1986).

Native animals played an important role in historic American diets, especially early in the colonization process (Crabtree 1990:179). Due to the isolated and wild conditions of the frontier period in the West, the late-eighteenth/early-nineteenth century faunal assemblage from the Gibbs House Site should contain a very large proportion of native animal to domestic animal bones. Coastal South colonial or frontier period faunal assemblages vary somewhat in their content of native fauna. Some seventeenth century Chesapeake residents apparently could not afford time away from their crops due to labor shortages to hunt often. Thus native fauna were not an important dietary component (Miller 1988). However, residents at Fort Frederica in Georgia used more native game than domestic animals during the eighteenth century (Reitz and Honerkamp 1983).

Specific types of native game utilized should vary between the coast and the uplands due to environmental factors. The Gibbs House Site is not located near any sizable

streams, so use of aquatic animals will be low. In addition, the Tennessee River Valley is not nearly the major flyway that the Atlantic coast is, so migratory bird use (especially waterfowl) may also be low in comparison to the coast. Use of native taxa in the Gibbs' diet should decrease over time as residents adapted to the Ridge and Valley environment and established their herds of domestic livestock. Overall, dietary patterns at the Gibbs House should be more in line with local sites such as Fort Southwest Point (Bunch 1987) , Fort Loudon (Breitburg 1983b), or even sites in Middle Tennessee (Breitburg 1983a), than with Coastal South sites.

Intrasite patterning at the Gibbs House Site may be examined with the frontier period material. Two distinct but contemporary deposits (the smokehouse cellar and the ash midden) should reveal activity patterning. Animals were probably butchered near the smokehouse and the meat hung to be used as needed; bones stripped of meat may have been tossed into the cellar. Therefore, the cellar material should contain both butchering waste (non-meat-bearing elements) and food remains (meat-bearing elements). The ash midden probably accumulated through the dumping of kitchen debris, as suggested by the presence of burned ceramics and its proximity to the former location of the kitchen (Faulkner 1989:4). Faunal remains from the ash midden should show a high incidence of burning and be only from meaty elements.

Butchering patterns for domestic mammals should match those described by O'Steen (1986), taken from historic sources. All portions of the animal, including the head and feet, should have been utilized. The carcasses should have been divided into basic butchering units such as head, hindquarters, forequarters, etc. Pig bones in particular should show characteristic patterning since more is known about historic pork than beef cuts (O'Steen 1986).

Taken together, this line of research will provide a starting point for understanding the process of adaption in this region's historic past. How area residents interacted with their environment to get food, whether this interaction changed over time, and whether it

differed from other areas of the Southeast will be discussed. Historical issues concerning how archaeological evidence of local foodways articulates with documentary accounts will also be addressed.

CHAPTER 4

FRONTIER PERIOD DIET AT THE GIBBS HOUSE SITE

Species Utilized

The earliest deposits at the Gibbs House Site, areas A and B, yielded the largest sample of faunal remains from any location on the site. The majority of these bones were excavated from the smokehouse cellar (area A) as opposed to the ash midden (area B). A total of 3,310 bones and bone fragments was recovered. Of these, 722 bones were identifiable to the taxonomic level of order or, in most cases, a lower category. An additional 1,931 bones were identifiable to the level of class. A total of 657 bone fragments were unidentifiable to any taxonomic category.

Mammals

A species list tabulated for this material shows the relative abundance of the various taxa identified. Percentages given in the species list and discussed in the text are based only on the total number of bones identifiable to species. In terms of NISP, domestic animals dominated the assemblage. Hogs and cattle contributed 418 bones, or about 62% of all identifiable bones. Of these, 339 bones (50%) were from pigs while only 79 (12%) were from cattle. Interestingly, not a single sheep or goat bone was recovered.

Remains of native mammals were fairly common in the collection, although only a few species were well represented. Several identified species were probably intrusive in the deposits. Commensal taxa include shrews, moles, and unidentified rodents (mice or rats). The most important food mammals were white-tailed deer and eastern cottontail. In addition, squirrels (both gray and fox), opossums, and woodchucks may have been

utilized. Together, native mammals accounted for almost 13% of the dietary remains.

Birds

The most commonly eaten bird at the Gibbs House was the sole domestic species identified, the chicken. A total of 71 chicken bones made up 11% of the assemblage. The most common wild bird by far was the turkey, with 26 bones assignable to this taxon. Native birds identified other than the turkey included a woodpecker, bobwhite, mallard duck, Canada goose, and a long-billed curlew. Several avian elements could only be identified to family, Phasianidae, which includes both wild and domestic species of gallinaceous (chicken-like) fowl. Other birds were identified only as members of the order Passeriformes, which includes hundreds of species of perching (song) birds. Although such birds are usually considered commensal taxa on historic sites, there is a local tradition of eating them (Faulkner, pers. comm.). A variety of wild avian taxa were utilized but none except the turkey were used with any frequency. Only 37 bones of native birds were identified, contributing 6% of the assemblage.

Presence of one long-billed curlew bone (a proximal humerus) was something of a surprise. Presently, this bird is restricted to the Atlantic coastlines of South Carolina, Georgia and Florida, in addition to the Gulf coasts of Florida, Louisiana, and Texas. East Tennessee is well out of the bird's range. Was it simply a migrant blown off course and shot? Or was the bird's range formerly much more extensive than it is today? And where are the other elements? Could the bone simply have arrived on the site attached to decorative wing feathers brought from the coast? Of these possibilities, an unlucky migrant way off course seems the most likely scenario. According to Peterson (1980:126, Map 130), this bird formerly bred further east than the high plains in which it is now seen; at one time it was a migrant along the northeastern Atlantic coast. Looking at its former distribution, it is easier to see how the bird might have occurred in East Tennessee.

Species identified and relative abundance for all taxa are summarized in Table 4.1.

Table 4.1: Species List for the Frontier Period at the Gibbs House Site

Species	Common Name	NISP	%	MNI	%
	MAMMALS				
Didelphis virginiana	opossum	2	trace	1	2
Sorex sp.	shrew	1	trace	1	2
Scalopus aquaticus	eastern mole	4	trace	1	2
Sylvilagus floridanus	eastern cottontail	28	4	4	8
Sciurus sp.	fox/grey squirrel	10	2	2	4
Sciurus carolinensis	gray squirrel	16	2	1	2
Sciurus niger	fox squirrel	1	trace	1	2
Marmota monax	woodchuck	1	trace	1	2
Rodentia	rodents	2	--	--	--
Sus scrofa	domestic pig	339	50	6	12
Odocoileus virginianus	white-tailed deer	27	4	2	4
Bos taurus	domestic cattle	79	12	3	6
Artiodactyla	ungulates	42	--	--	--
Mammalia	small-sized mammal	6	--	--	--
	medium-sized mammal	928	--	--	--
	large-sized mammal	218	--	--	--
	mammal, size unidentifiable	363	--	--	--
	BIRDS				
Branta canadensis	Canada goose	2	trace	1	2
Anas platyrhynchos	mallard	2	trace	1	2
Anatidae	ducks, geese, and swans	1	trace	1	2
Gallus gallus	domestic chicken	71	11	13	27

Table 4.1: Continued

Species	Common Name	NISP	%	MNI	%
Colinus virginianus	northern bobwhite	2	trace	1	2
Meleagris gallopavo	turkey	26	4	2	4
Phasianidae	pheasants and allies	5	1	1	2
Numenius americanus	long-billed curlew	1	trace	1	2
Melanerpes sp.	woodpecker	1	trace	1	2
Passeriformes	perching birds	2	--	--	--
Aves	small-sized bird	6	--	--	--
	medium-sized bird	142	--	--	--
	large-sized bird	30	--	--	--
	bird, size unidentifiable	118	--	--	--
	REPTILES				
Testudines	turtles	1	--	--	--
Lacertilia	lizards	2	--	--	--
	AMPHIBIANS				
Rana/Bufo sp.	frog or toad	2	trace	1	2
Amphibia	amphibians	1	--	--	--
	FISHES				
Catostomidae	suckers	27	--	1	--
Cyprinidae	minnows	1	--	1	--
Aplodinotus grunniens	freshwater drum	24	4	1	2
Osteichthyes	bony fish	111	--	--	--
	MOLLUSKS				
Crassostrea virginica	american oyster	1	trace	1	2

Table 4.1: Continued

Species	Common Name	NISP	%	MNI	%
Mollusca	molluscs, unidentifiable	7	--	--	--
unidentifiable bone		657	--	--	--
Totals		**3,310**	**100**	**49**	**95**

Fish, Amphibians, and Reptiles

Very little of the fish, amphibian, and reptile material was identifiable beyond the class level. In the case of the fish, this situation was mostly caused by the fact that very few skull elements were found in this part of the faunal assemblage. Perhaps the skull elements were discarded somewhere else, or else these fragile elements simply did not survive in the ground. A total of 163 fish elements was recovered, among which only 58 were identifiable beyond the class Osteichthyes. Fish elements other than skull bones, such as ribs, vertebrae, spines, and scales can only rarely be assigned a lower taxonomic category such as genus or species. Recovery methods are probably not responsible for the lack of skull elements since fine screen and flotation samples were taken. The fine screen samples contained about the same proportions of fish bone (5 percent) to other animal classes as the 1/4 inch screened material (4 percent). Of the identifiable fish elements, 24 were from freshwater drum, 27 from unidentified taxa of suckers, and one cyprinid.

Amphibian and reptile remains were also difficult to identify. Frogs or toads acounted for two of the three amphibian elements found, and an unidentifiable species of turtle accounted for one of the three reptile bones. The remainder of these bones could not be further identified.

Molluscs

Only eight mollusk shells or shell fragments were observed in the assemblage. Of these, seven were unidentifiable species of freshwater mussels. The remaining mollusk shell was that of an American oyster. The presence of the oyster shell is another surprise. Obviously, saltwater oysters are not local to Tennessee. Perhaps this shell was some sort of relic the Gibbs family had brought with them from their former homes in North Carolina and Maryland.

In general the Gibbs assemblage seems dominated by land-oriented animals.

Domestic mammals and birds of course account for most of this, but even the wild animals reflect this trend. Aquatic mammals such as beaver and muskrat are entirely absent while more upland-oriented mammals like squirrels, rabbits, and opossums show up at least in low numbers. Wild birds demonstrate a similar pattern; waterfowl and shorebirds are rare, while upland birds like turkeys appear more frequently. Use of fish, reptiles, and amphibians seems minimal. This pattern is hardly surprising given the site's location adjacent only to small creeks.

Dump Locations and Activity Areas

The two contemporary late-eighteenth/early-nineteenth century deposits at the Gibbs House Site (areas A and B) presented an opportunity to study differential disposal practices. The most noticeable difference between the two areas was the proportion of burned bone. Very little material from the smokehouse cellar was burned. Only 2% of that sample showed any blackening. However, a large proportion of the material from the ash midden, 63%, was burned.

Burned bone from the ash deposit was blackened over the most of the surface, not just the ends. Had only the ends of the bones been burned, it could have been the result of roasting meat on a spit. Due to the proximity of the area B midden to the kitchen at the rear of the house, in addition to its content of ash, burned ceramics, and other household debris, it seems possible that this is an accumulation of kitchen-activity waste. Perhaps scrap and bones were tossed into the hearth fire, burned, and then dumped along with ashes and other rubbish. Yet if bones had been tossed into a fireplace they would have become calcined, not just blackened. Another problem with this hypothesis is that the midden contains elements from non-meaty portions of the carcass. Pig foot bones as well as maxillary teeth show up in this deposit. While it is possible that foot bones were left

from eating pig's feet, skull elements should have been discarded with butchering waste during brain removal. It is impossible, therefore, to exclusively correlate the ash midden with kitchen activities.

Bone material from the smokehouse cellar was not only more abundant and less burned, but showed other trends as well. The cellar assemblage reflected species and element compositions similar to the ash midden. One clear difference was that bones showing signs of butchery were more common in the cellar. Roughly twice as high a proportion (19%) of cellar bones exhibited butchering cuts, while only 11% of ash midden bones were similarly scarred. Qualitatively, bones from the cellar were generally more complete than the mostly shaft fragments taken from the ash midden. Presence of chicken eggshell was another feature that distinguished the smokehouse cellar from the ash midden. Thousands of eggshell fragments were found in the cellar deposit (the shell was not quantified) but few were found in the ash midden.

While activities associated with the formation of the Area B ash midden seem to be multiple, including perhaps both kitchen clean-up and butchering, the smokehouse cellar material demonstrates a more focused use, at least during a part of the time. Perhaps the ash midden accumulated not from kitchen activities, but rather from dumping and subsequent burning of rubbish. Experimental work concerning the visible effects of burning on bone indicates that blackening occurs around 300^0 Celsius (Shipman *et al* 1984; Nicholson 1993). These studies do not make clear which types of fires or fire durations are necessary to produce such a temperature. Either a short duration, high temperature hearth fire, or a low temperature, long duration trash fire could potentially produce the blackening.

Butchering Patterns

Examining patterns of carcass dismemberment gives insight into what types and cuts of meat were eaten. Both the cellar and ash midden bone collections contained dozens of bones with butchering marks on them. The most frequent type of butchering mark was a chop, made with an ax or cleaver. Cut marks made during meat removal were also common. Only rarely did the faunal remains show signs of sawing. When saw marks were observed, they were usually on cattle bones.

Deetz (1977:124-125) has discussed sawing as a technology associated with the Georgian Order mindset, in that it produces same-sized meat cuts. This intellectual paradigm came into full fashion in the late-eighteenth century. The virtual absence of saw marks at this contemporary site could be interpreted to mean that the fashion had not yet reached the hinterlands. Still, *some* bones were sawed. More likely, this technology was known about long before, but the production of uniform cuts of meat was only necessary in the urban market economies typical of the coast, not the rural barter economies of the frontier. Sawing was apparently mainly used here to divide large cuts of beef.

The butchering patterns observed on the domestic mammal bones generally conform to written accounts of butchering or cooking activities. Pig bones formed the largest sample of bones exhibiting butchering marks; 114 butchered elements, or 34% were those of pig (Table 4.2; Figure 4.1). Butchered cattle bones were fewer in number (57), but made up a higher proportion (71%) of that species' identified elements.

Pigs

An eighteenth century cook's instruction book describes the procedure for scalding, scraping, cleaning, cooking, and butchering a hog (Robertson 1766, excerpted in O'Steen

Table 4.2: Pig Bones with Butchering Marks from Areas A and B at the Gibbs House Site

Skull Element	Number	Axial Element	Number	Limb Element	Number
premaxilla	6	atlas	1	scapula	5
nasal	2	thoracic vertebra	6	humerus	7
palatal	2	lumbar vertebra	6	radius	4
maxilla	2	vertebra, indet.	5	ulna	4
zygomatic arch	1	sacrum	1	metacarpal III	2
temporal	1	rib	5	metacarpal V	1
occipital	3	sternum	1	femur	3
mandible	10	pelvis	2	patella	1
ascending ramus	1	illium	2	tibia	8
		acetabulum	2	fibula	6
		ischium	1	astragalus	1
				calcaneus	3
				metatarsal IV	3
				metatarsal V	1
				metapodial	2
				first phalanx	1
				second phalanx	1
Totals	**28**		**33**		**53**

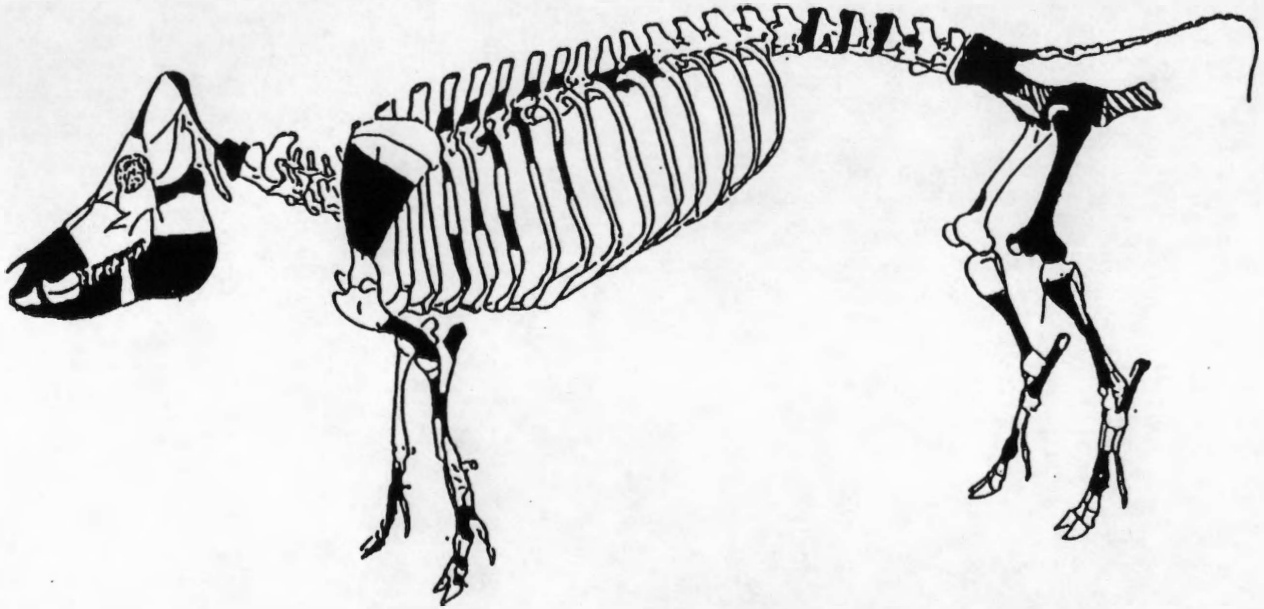

Figure 4.1: Locations of Pork Cuts for Late 18th/Early 19th Century Deposits at the Gibbs House Site

(Source:Adapted from Davis, S.J.M. 1987 *The Archaeology of Animals.* Yale Univesity Press, New Haven and London.)

1986:573-574). Cooks were instructed to cut off the head, split the carcass down the middle, remove the lower jaw (which was then cut in two), cut off the ears, and then remove the brains. The butchered pig bones reflect these and other butchering procedures. Several mandibles were identified in the sample, and all displayed a similar pattern of breakage. The lower jaw was always separated into two pieces, right and left, as well as cut off at the ascending ramus. The ascending ramus commonly occurred without the articular condyle. This breakage pattern indicates that, first, the mandible was separated from the head by an axe or cleaver blow below the articular facet. The separated jaw was then divided into an ascending ramus portion, and a tooth row part, apparently to facilitate jowl meat removal. Finally, the mandible was split apart perhaps to carefully prepare the jowls for smoking, a delicacy in East Tennessee (Burnett 1946:97).

Many elements forming the pigs' snout exhibited butchering marks as well. Nasals, premaxillae, palatals, and maxillae were hacked apart. O'Steen (1986) noted a similar pattern of snout removal at a contemporary Maryland plantation. As O'Steen (1986:607) points out, much of any animal's head is nasal passages and sinuses, which must be cleaned out before salting or smoking. Chopping off the anterior end of the skull allowed the rest of the skull's passages to be cleaned. A butchery-scarred atlas is a testament to head removal. Other butchered skull elements suggest that the brains were removed. Few scarred pieces of frontals, temporals, occipitals, and other skull plates were identified. Both the identification of these elements, and the paucity of them, suggest that hog heads were smashed apart, the fragments often being beyond identification, to access the brains.

Other portions of the body are well represented by butchered bones, with the exception of the neck, tail, and carpals, which are almost entirely absent. The axial portion of the carcass, including vertebrae and ribs, was heavily chopped apart. Thoracic vertebrae, while sometimes split down the middle,were more often divided into smaller

pieces by removal of the dorsal spines. Perhaps chops were produced from such cuts. Those few ribs that could be positively identified as pig rather than another medium-sized mammal seemed to have been separated into two sections. The ribs were removed from the thoracic vertebrae by blows just below the rib heads. This was probably the result of splitting the carcass along either side of the vertebral centra with an ax, a butchering method sometimes employed prior to the use of saws for carcass dismemberment (Wigginton 1972:196). Ribs were then subdivided into upper and lower racks by blows along the midshaft. Lumbar vertebrae were most commonly chopped in an anterior-posterior direction, splitting the elements in half vertically. As with the thoracic vertebrae, the lumbars were used for chops. One sacrum fragement was identified, but this likely stayed with pelvic cuts rather than forming its own portion.

Elements that comprise the forequarter, the scapula, humerus, radius, and ulna were all identified in equal numbers. Butchered scapula fragments evidence a pattern where the proximal end was separated from the leg, while the distal end was chopped off to free the shoulder from the muscle mass that holds it against the axial skeleton. The remainder of the scapula supported a large piece of meat suitable for roasting or salt-curing as a ham. Smaller, midshaft, butchered scapula fragments demonstrate subdivision of the shoulder into smaller portions. Chop marks identified on humerus fragments mainly occur on pieces of the shaft. This may indicate the bone was broken apart for marrow extraction after meat was removed.

The humerus was separated from the lower leg by powerful blows either above the distal condyle or along it. The ulna's olecranon process may have been broken away by the same blow. Chopped midshaft segments of the radius and ulna suggest that even the relatively meatless lower leg was utilized. In fact, the many metacarpals found indicate that feet were part of the foodway, a practice not uncommon at the time. A handful of butchered metacarpals and even phalanges suggest that marrow was an important and

necessary dietary item, considering the trouble involved in removing it from so small a cavity.

Those elements comprising the hindquarters, including the pelvic bones, femur, and the proximal tibia and fibula were unevenly represented. Only 3 femoral fragments, compared with eight tibia pieces and seven pelvic parts, were found. Perhaps the underrepresentation is due to the selling of hams off the farm, or it may simply be an artifact of differential destruction; femora do have large marrow cavities. The pelvis suffered more than its fair share of butchery. The various bones that comprise the innominate were often hacked off to form separate pieces of meat suitable for roasts and steaks. The illium blade was cleaved along the shaft extending from the acetabulum, and the ischium similarly was divided from the rest of the element. The pubis was hacked apart during the splitting of the carcass down the middle. Finally, the acetabulum was cut away on all sides, probably freeing it to join the femur as a ham.

To judge from a patella chopped in half, it seems that the Gibbs family was producing short hams that retained with the femur or proximal tibia. This as opposed to using the majority of the tibia as a part of a long ham. Hind feet were treated similarly to the fore feet. Distal tibias and calcanei received blows intended to separate the leg from the foot. Metatartsals were not uncommon, and a few were butchered to remove the marrow.

By using published estimates of epiphyseal fusion and tooth eruption sequences, such as those by Silver (1969), one can interpret the meat production strategy adopted. Wapnish and Hesse (1988:84) have outlined three possible animal production models: (1) a 'self-contained production/consumption' model, where "all mortality experienced by a domestic herd. . .are included": (2) a 'consuming economy' model, where "harvest profiles will include an abundance of market-age animals and a relative dearth of animals of reproductive age": and (3) a 'producing economy' model, where "the harvest profiles for marketed species should include a dearth of market-age animals," in addition to a very few

young animals as well as an abundance of older animals.

Of the 339 pig bones identified from the early period at the Gibbs House Site, 71 elements were assignable to age classes listed by Silver (1969). The most abundant groups present in the sample were young adult animals older than one but less than three and a half years of age. After approximately one year of age, weight gain in hogs stabilizes so that it is not profitable to keep animals much longer (Ashbrook 1955:73). Pigs younger than one year therefore have already reached an acceptable slaughtering weight. A few elements from very young animals less than a year old were identified, as well as a somewhat larger number from pigs six years or older. These bones may been from very young or suckling pigs which were sometimes roasted or boiled whole. The older animals were probably sows allowed to live for many years to constantly produce new litters. The representation of the various age groups is summarized in Figure 4.2.

Cattle

Fewer and less-detailed historic accounts concerning the process of cattle butchery are available to compare with recovered beef bones. However, O'Steen (1986) was able to find a mid-eighteenth century English source as well as a mid-twentieth century discussion about cuts of beef utilized. O'Steen observed that butchered cattle bones closely matched descriptions of meat cuts from both sources. The main differences observed were in how large cuts were subdivided (O'Steen 1986:574-575). Generally speaking, beef carcasses were divided into the familiar fore and hindquartes, fore and middle ribs, and the sticking-piece or neck (Bradley 1755, excerpted in O'Steen 1986:575).

It is difficult to see any sort of clear cattle butchering pattern in the Gibbs House Site assemblage due to the relatively small number of cattle bones identified (79), and the smaller number of cattle bones bearing butchery scars (57). Too few ageable bones (5) were identified to offer reliable interpretations about cattle mortality patterning. Bits and

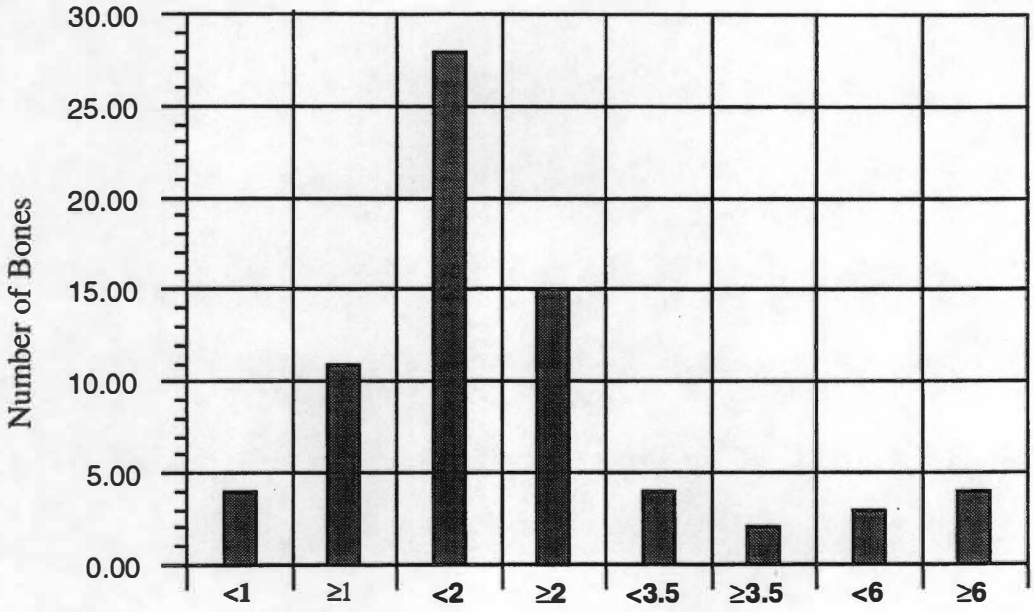

Figure 4.2: Hog Mortality Profile Based on NISP from Areas A and B, Gibbs House Site

pieces of the entire beef carcass are present in the assemblage, but only a few head elements bore butchering marks. Perhaps this is due to the skull's being smashed apart beyond recognition in the process of brain removal. The ample number of isolated teeth suggest that skulls were present at the site.

The axial skeletal elements were better represented and therefore yielded more clues about butchery and meat cuts. Only one cervical vertebra, exhibiting dorsal-ventral cuts, was recovered. This vertebra was probably damaged during head removal rather than inclusion in a meat cut. Ten butchered thoracic vertebral fragments fell into two butchering patterns. Four of these fragments had been chopped in a dorsal ventral direction, separating the vertebrae into vertical slices, apparently to make steaks. The remaining six fragments were butchered in a cranial-caudal direction through the vertebral centrum or along both sides. Splitting of the centrum is a result of dividing the carcass into two halves, while chopping the lateral vertebral processes, is probably a result of separating the ribs from the vertebrae. Table 4.3 lists all butchered cattle elements, while Figure 4.3 illustrates the element fragments identified.

Ribs appear to have been chopped near the proximal end and again somewhere lower down (at variable locations along the shaft). The first cut was probably for steak production; proximal ribs could be left with vertebrae to be used as steaks. The variable location of lower rib chop marks is understandable considering that eighteenth-century butchers divided the rib cage into as many as three vertical sections; steak meat, top rib, and brisket or flank (O'Steen 1986:Figure 224).

Fore and hindquarter divisions are harder to interpret; represented elements are fewer and more fragmented. Six forequarter fragments from the scapula, humerus, and ulna were identified. The three scapula fragments were from portions of the cranial and caudal margins. Apparently the large muscle attached to the scapula was subdivided quite a bit, leaving only marginal bone fragments. The single humerus fragment recovered was a

Table 4.3: Cattle Bones from the Gibbs House Site Exhibiting Butchering Cuts.

Skull Element	Number	Axial Element	Number	Limb Element	Number
frontal	1	cervical vertebra	1	scapula	7
temporal	1	thoracic vertebra	10	humerus	1
occipital condyle	1	lumbar vertebra	2	ulna	2
mandible	2	rib	12	metacarpal	1
ascending ramus	2			pubis	2
hyoid	1			acetabulum	2
				femur	2
				tibia	1
				metatarsal	1
				first phalanx	3
				second phalanx	1
Totals	**8**		**25**		**24**

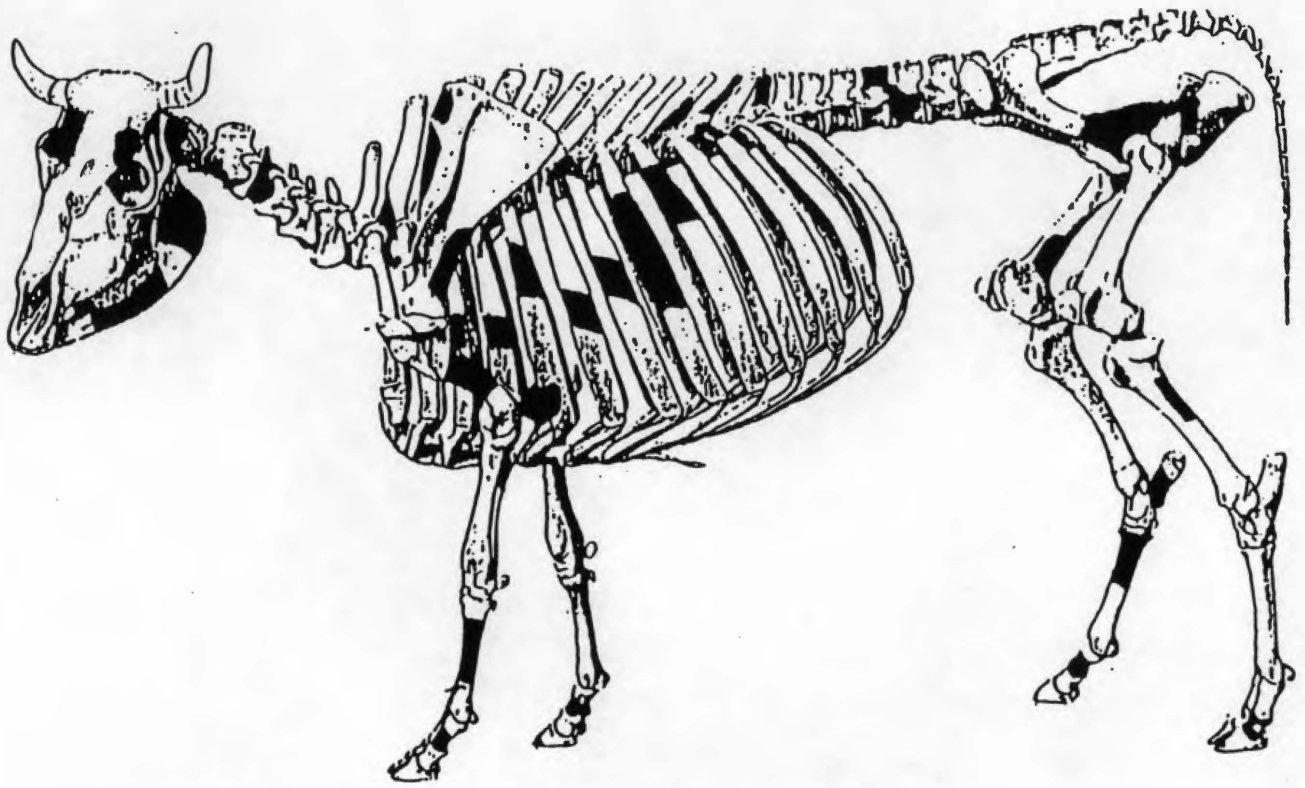

Figure 4.3: Locations of Cuts on Cattle Bones from Late 18th/Early 19th Century Deposits at the Gibbs House Site

(Source: Adapted from Sisson, S. and J.D. Grossman, 1975 *The Anatomy of the Domestic Animals*, fifth edition, edited by Robert Getry. W.B. Saunders Company, Philadelphia, Pennsylvania.)

complete shaft with the proximal and distal ends hacked off. According to O'Steen (1986), the humerus formed a cut called the 'clod.' The humerus shaft could also have been opened up for marrow extraction. A proximal ulna fragment probably was damaged during separation of the humerus from the lower leg. A shaft fragment of an ulna may have been from subdivision of the beef shin.

A total of seven bone fragments from hindquarter elements showed signs of butchery. The pelvis seems to have been divided primarily to separate the hind leg from the body. To this end the acetabulum was separated by blows to the illium, ischium, and pubis, leaving it free to travel with the femur. The two femur and one tibia fragments identified were shaft pieces, again pointing to a pattern of marrow extraction.

Foot and lower leg bones from both the fore and hindfeet showed signs of butchery. One metacarpal bore chop marks that cut through the proximal and distal shaft ends, leaving only the midshaft. A metatarsus was separated from the remainder of the lower leg and foot by a blow through the midshaft. This left the proximal end and one half of the metatarsal shaft. Three chopped apart first phalanxes and one second phalanx were also present. The butchered phalanges and the metacarpal seem clear indications of a foodway that included marrow as an important dietary element.

Binford (1978) compiled a marrow and grease index for sheep and caribou, detailing which elements contained what type of marrow and how much. He found that the phalanges contain the type of marrow most favored by the Nunamiut Eskimo, the type highest in oleic acid (Binford 1978:24). Even though phalanges contain high-quality marrow, the Nunamiut did not usually process them because it was too much trouble for the small amount present (Binford 1978:26). The marrow indices for cattle and hogs are no doubt broadly similar to those of caribou and sheep. The quality of marrow contained in the lower foot bones makes it easier to understand why the Gibbs family went to the

trouble of processing it. Perhaps tedious marrow removal was avoided by boiling the broken bones in stews.

Discussion

The frontier period faunal assemblage from the Gibbs House Site yielded some interesting and somewhat surprising results. The range of species utilized, and those emphasized, offer a glimpse into regional dietary patterning early on in settlement history. The dumping patterning observed in the two contemporary deposits offers some vague indications of activity areas and meat preservation and preparation practices. Butchering mark placement, elements reperesented, and the hog mortality profile adds to the analysis of dietary practice.

Dietary emphasis at the Gibbs' farmstead was clearly placed on domestic resources, especially mammals. Bones of pigs and cattle, along with chickens, contributed far more of the identified fragments in the assemblage than all of the native animals added together. The dominance of domestic animals was somewhat unexpected, given the seemingly isolated, frontier conditions of eastern Tennessee in the late-eighteenth century. Previous research along the coastal frontier has demonstrated that, far from being somehow 'preadapted' for any new environment due to having domestic animals, early colonists depended to a large degree on native game and fish (Reitz 1992; Reitz and Honerkamp 1983). In some cases, colonists seem to have derived more of their caloric intake from native than domestic animals.

An adaptational pattern similar to the coastal one might be expected in the frontier uplands as well. There has been relatively litte zooarchaeological research completed for the early period of white settlement in the Upland South, although two excavated forts in this area have had faunal analyses completed for them. Breitburg (1983b) analyzed the

extensive faunal assemblage excavated from British Fort Loudon, a mid-eighteenth century military and trading outpost on the Tennessee River some 40 miles southwest of the Gibbs House Site. While the largest contributing taxa to the faunal assemblage were domesitc mammals, native animals were also a significant dietary component. Native taxa contributed between 27 and 49 percent of the consumed meat at the fort, depending on the individual deposit (Breitburg 1983b:92, 96-97).

Bunch (1987) analyzed the faunal assemblage from Fort Southwest Point in Kingston, Tennessee. This fort was constructed at the confluence of the Clinch and Tennessee rivers in 1792 to protect white settlers from Indians and, later, Indians from whites (Bunch 1987). Here, domestic animals contributed 65 percent to the diet, and wild animals contributed 18 percent, the rest being from commensal taxa (Bunch 1987:43). At both of these upland sites domestic mammals were the major meat source for the residents despite their frontier locales. The sites' functions as military outposts may have much to do with the observed pattern; soldiers stationed at the forts were supplied with preserved pork rations as well as herds of domestic animals (Breitburg 1983b). Therefore, it was not necessary to make extensive use of indigenous fauna.

The Gibbs House Site, interestingly, displays a similar proportion of domestic to wild animal dependence despite the fact that it is a domestic rather than military site. Based on added NISP percentages from Table 4.1, the Gibbs family also subsisted mainly upon domestic animals. The domestic animals represented, hogs, cattle, and chickens, accounted for 73 percent of all identifiable bones. Wild game contributed about 22 percent of the diet. The remaining five percent were commensal species (shrews, moles, and small rodents). This ratio is certainly within the percentage ranges presented by Bretburg (1983b) for Fort Loudon, and only slightly different from the average given by Bunch (1987).

Why do frontier period Upland South sites often contain a majority of bones from

domestic animals while similar sites in the coastal South contain a much larger number of remains of native animals? It is tempting go back to the tired explanation of differential environmental richness between the lowland estuaries and upland river valleys. In reality this is not a good explanation; the interior river valleys have a different, but equally plentiful, array of endemic taxa. A more likely explanation posits that the more significant part of the adaptational process took place on the coast. Subsequent, inland-moving colonization was largely by people who had gradually made their way from coastal areas. In so doing they would have had time to adopt New World farming practices. One adaptational shift for the English in the New World was the abandonment of sheep as a major meat source due to such probable factors as wolf predation and susceptibility to disease (Reitz and Honerkamp 1983; Miller 1988). Rohrbough (1978:41-42) believes that frontier farming families were prepared enough for their new environments that they could generate a production surplus by their third year of settlement.

Domestic animal species overwhelmed all other species in terms of dietary importance. These animals were not used in even numbers; not surprisingly, residents had preferences, whether based on taste, economics, or climatic constraints. Drawing from previous research in the field of history and the subdiscipline of zooarchaeology, one is led to two different answers concerning which domestic animal was the most important. As discussed in Chapter 2, historians (Gray 1933; Hilliard 1972; Root and de Rochmont 1976) studying southern diets have always come to the conclusion that pork was the most important meat throughout the South. Yet zooarchaeologists (Reitz and Honerkamp 1983; Bowen 1993) have demonstrated that cattle would have supplied much more meat than pigs, based on archaeological samples of animal bones.

But what of the Upland South? Reitz and Honerkamp's samples were from coastal sites, as were Bowen's. Zooarchaeological research at Fort Loudon by Breitburg 1983b:92) also demonstrated that beef was the more important of the two meats, although

the soldiers' preserved pork rations may not show up archaeologically (the so-called 'bacon factor,' see Crader 1990). Bunch's report on the Fort Southwest Point material also reveals that beef was the predominant meat, making up 65 percent of the available meat weight, while pork came in second at almost 26 percent (1987:43).

Perhaps military sites, with their specialized functions and provisioning systems of vast cattle herds as well as pre-packaged salt pork rations, are poor models for upland farmers like the Gibbs'. An analysis of several early-nineteenth century Middle Tennessee plantations demonstrated that pork consistently made up 50 to 75 percent of available meat, compared to a range of 13 to 35 percent for beef (Breitburg 1983a). Breitburg suggested that this pattern was "intricately related to the slave populations associated with [the] plantations" rather than a regional dietary preference per se (1983a:193).

The Gibbs House Site faunal assemblage resembles the Middle Tennessee plantation pattern of pork and beef consumption rather than one typical of a coastal/East Tennessee fort. Pig bones represented half of all identifiable bones, while cattle elements comprised only 12 percent of the assemblage. Given that the Gibbs farm was not a surplus-oriented, slave-holding farming enterprise and yet showed the same beef/pork consumption ratio as the Middle Tennessee plantations, it may be that this pattern is not purely an economic artifact, but perhaps an ethnic one as well. The English had a strong preference for beef and mutton (Ross 1993:48). Zooarchaeological studies have revealed such a preference along the coastal plain and piedmont where the English chose to settle. By contrast, it seems from zooarchaeological studies that the predominantly Scotch-Irish and German settlers of the back country preferred pork (Breitburg 1983a).

An additional factor in the observed pork/beef ratio has to do with preservation. In the centuries before refrigeration, meat had to either be used fresh or preserved in some way. Pork lends itself well to preservation, probably because of its high fat content. Today people still salt cure or smoke pork because of its desirable flavor (Ashbrook

1955:88-91). By contrast, beef was a more problematic meat to use safely. Slaughtering a beef produces much more meat than an average-sized family can consume fresh, so that the meat must either be cured or sold to neighbors, the latter being a long area tradition (Hilliard 1972:44). Beef was sometimes dried, but in general did not lend itself as well as pork to the various curing methods available because of its relatively low fat content , a more acute problem perhaps with the poor breeds of American cattle available in that era (Hilliard 1972:44; Gray 1933; Breitburg 1983b).

The third most common domestic mammal on historic sites was sheep (or goats). A variety of explanations have been offered for their scarcity on sites in the historic South, including issues of taste, climate, and butchering methods. It is clear that sheep were not used as a meat source in this period at the Gibbs House; no sheep or goat bones were identified in the early deposits. Nicholas Gibbs' descendants were raising sheep on the farm by 1850, but this may have been mainly for wool; the agricultural census for that year listed the Gibbs family's wool production figures. On the Middle Tennesse plantations sheep were apparently eaten, but only rarely; they generally accounted for less than 14 percent of the available meat (Breitburg 1983a:189, 192-193). Sheep were even rarer at the military sites of Fort Loudon, where only eight bones were identified (Breitburg 1983b:Table 7), and at Fort Southwest Point, where four sheep bones were found (Bunch 1987:Table 1). Breitburg (1983b:67) believes that sheep were kept for textile production and only eaten in times of necessity. What is clearly demonstrated by the paucity of sheep remains throughout the Upland South is that mutton was not a favored meat in the region, despite historical quotations to the contrary (see Root 1980).

The butchering data presented earlier in this chapter provide valuable information on which cuts of meat and portions of domestic mammal carcasses were used. On a general level it is apparent that the Gibbs family made use of all parts of both pig and cow carcasses, including the head and feet. Particularly well-illustrated from placement of

butchering marks is the way in which pigs' heads were chopped apart for brain, jowl meat, and tongue removal.

The long bones shafts as well as foot elements of both hogs and cattle show signs of being broken open, presumably to facilitate marrow removal. It seems somewhat surprising that a historic family engaged in raising its own animals would find it necessary to render marrow. Even more surprising, perhaps, is that even bones bearing relatively little marrow such as metapodials and phalanges were broken open. Breakage of long bone shafts for marrow processing has been documented in slave faunal assemblages (McKee 1987), but apparently not for other assemblage contexts. However, few historic faunal reports present detailed analyses of butchering patterns.

McKee (1987:37) states his belief that "some breakage relates to opening long bones for marrow, [but] much of it may be due to the reduction of bones to. . .fit into cooking pots." In this way remaining marrow and grease could be removed even from small bones like phalanges. This butchery pattern sounds remarkably similar to that adopted by the Gibbs family. If McKee's hypothesis is correct, then the Gibbs family may also have been reducing bones not so much for marrow rendering, but more to fit into pots for stew-based meals. Boiling opened bone shafts would release the marrow and grease to make a rich broth. This type of meal preparation is a more satisfactory explanation than an actual marrow rendering process. Experimental work on the effects boiling and roasting have on bone microstructure by Woltanski (1993) indicates that there are distinctive damage patterns for each of these two cooking procedures. In an application of this experimental work, Woltanski examined a single pig humerus from the Gibbs House. Inspection of the specimen was inconclusive, as its microscopic structure was "somewhere in the middle between roasted and boiled bone" (Woltanski 1993:93).

The mortality profile constructed for hogs may reveal something about the farm's economic strategy. The pig age profile most closely resembles the 'producing economy'

model outlined by Wapnish and Hesse (1988:84). A production orientation would leave a distinctive imprint on the herd population structure; there would be only a small number of market-age individuals, and a majority of older animals culled from breeding stock. In modern times at least, hogs are slaughtered at around eight to ten months (Ashbrook 1955:73). Wapnish and Hesse's Middle Bronze Age samples from Israel reflect a similar culling age (1988:88). The majority of ageable pig bones from the Gibbs assemblage are from individuals around two years old. If hog culling ages have remained the same over the last 200 years, then the Gibbs family must have participating in a production economy.

But Colonial period culling ages may have been different if those breeds matured at different rates from those of today. One would expect weight gain to have been slower in those days since pigs foraged on a free range system rather than being confined and grain fed as they are today (Gray 1933). One agricultural historian claims that free-ranging hogs take between two and three years to reach the desired weight of around 200 pounds (Clemen 1923:54). Zooarchaeological research at Middle Tennessee plantations indicates that most hogs were slaughtered when between 17 to 21 months of age (Breitburg 1983a:185), while at Monticello 18 to 24 months was the most common age group (Crader 1990:694). These slaughtering ages correspond to the culling practices common at that time (Breitburg 1983:185; O'Steen 1986:598). Most of the pig bones from the Gibbs assemblage fall within, or just outside, the Colonial period culling ages. Therefore, the majority of pig bones are in fact from market age animals. Adjusting for the late culling age of the period, the Gibbs House Site production strategy corresponds to Wapnish and Hesse's (1988:84) 'consuming economy' model.

Summary

Overall, the faunal assemblage from the Gibbs House Site reveals much about frontier life in East Tennessee. The range of species utililized, pig culling practices, and relative species abundance reveals the economic organization of a small farm. The patterning observed in the distribution and locations of butchering marks as well as the relative species abundance demonstrates the origins of certain regional foodway traditions.

In contrast to the frontier era along the Atlantic coast, where early residents depended to a large extent on native fauna, backcountry settlers like the Gibbs family seem to have been able to depend upon their domestic herds for a steady meat supply. Various species of wild fauna were of course utilized by the Gibbs', but none had the major dietary impact of the barnyard animals. The settlers quickly adapted to their frontier surroundings by establishing a herd management policy similar to that worked out over a longer period of time along the coast. Thus sheep were kept only in small numbers, and then mostly used for wool production. The free range foraging system was also kept. Hog culling patterns indicate that the Gibbs family primarily produced meat for their own consumption. Such an orientation was typical of area settlers; Kulikoff (1993:351-352) argues that backcountry farmers "sold surpluses at local markets only after they had insured that their own families had food and clothing."

Indications of cooking practices and regional dietary preferences were elicited from the butchering data and species abundance ratios. Butchering cut locations on cattle and pig bones revealed that most of the carcass was eaten. Little of the available muscle and organ material in the head was wasted; jowl meat, tongue, and brains were removed from the surrounding bones. The limbs and body were divided into meat cuts, mostly steaks, roasts, and hams. Feet probably were separated cooked down and potted, a common

practice (O'Steen 1986:572). Limb bone shafts and even foot bones were cracked open either to facilitate marrow rendering, cooking in stew pots, or both.

Other regional dietary preferences are revealed by the ratio of pig to cattle bones in the assemblage. Pork was evidently a more important source of meat than beef. This preference has been noted in other parts of the interior, such as Middle Tennessee (Breitburg 1983a). By way of contrast, beef was the more prevalent meat along the southeastern coast (Reitz and Honerkamp 1983). The incredible efficiency of the pig as a meat producer (O'Steen 1986:592-598), combined with the ease with which pork could be cured (Hilliard 1972:42-43), made it the ideal farm product. Cattle had the disadvantage of having meat difficult to cure palatably, maturing more slowly than pigs, and producing too much meat to consume at one time (Hilliard 1972:44). In addition, the large demand for beef along the coast may have encouraged farmers to raise their cattle primarily to sell on the hoof to coastal market-bound drovers (Gray 1933).

The difference observed between coastal residents' use of beef versus that of the interior settlers may also be due to ethnicity: The coast was settled overwhelmingly by the English, whereas the backcountry was colonized primarily by Scotch-Irish and German immigrants. The dichotomy between Coastal South and Upland South diets, and how it relates to ethnicity and regional traditions, will be discussed in more detail in the following chapter.

CHAPTER 5

COMPARISON OF GIBBS TO UPLAND AND COASTAL SOUTH SITES

Differences between the diets of contemporary residents of the southeastern coastal plain and the interior portion of the South were noted in the preceding chapter. The two subregions differed on at least two important points; coastal residents favored beef over pork while the opposite was true in the uplands; and native game, especially aquatic fauna, seemed more prevalent at coastal sites. To explore the dietary differences between the two regions in more detail, a two-stepped analysis was undertaken. The first part of the analysis consisted of a Shannon-Weaver diversity index calculation estimated for several combined Upland South and several combined Coastal South sites. These same sites were recombined to form frontier and later settlement groups. The purpose of this analysis was to pick out any sort of obvious dietary strategy differences such as coastal assemblages being more diverse than upland ones. Another possibility might be that frontier-area sites would have incorporated more species into their diets due to their isolation.

The second portion of the analysis attempted to pick out which types of faunal resources were emphasized by upland versus coastal southerners, as well as frontier era versus later settlements. Were domestic resources more heavily relied upon than native ones in one area or period versus another? What about specific types of native and domestic resources? Perhaps there were different emphases on domestic and native birds; or between native and domestic mammals. Use of these analytical methods might also isolate any differences between frontier and later period diets in both subregions. The chi-square test of independence provided a means to explore these questions, using 4-celled contingency tables and an alpha of .05.

Shannon-Weaver Diversity Analysis

Measures of diversity enable one to estimate amount of subsistence specialization in terms of variety and degree based on species identified from archaeological sites (Reitz and Scarry 1985:20). Diversity is really a combination of two separate measures, richness (or diversity), and evenness (or equability). Richness calculates a value based on the number of species used, while equability calculates the degree to which the species present were exploited (Reitz and Scarry 1985:20). A variety of diversity measures have been devised, but the Shannon-Weaver index of diversity is the measure most commonly used in historical zooarchaeology.

The formula for this diversity index is $H' = -p_i \log_e p_i$, where p_i is the number of the *ith* species divided by the sample size and multiplied by its value transformed into a natural (base e) logarithim (Reitz and Scarry 1985:20). The latter formula is the richness portion of diversity: The Shannon-Weaver index measures both how many species were used and in what proportion, in a combined number. To isolate the evenness component the following formula is used; E = H'/H max. H' is the diversity figure and H max is simply the natural log of the total number of identified species (Reitz and Scarry 1985:20).

The diversity values calculated were based on MNI estimates added together from the coastal, upland, frontier, and late sites, respectively. While MNI's are not normally additive in the same way that NISP is, it seems permissible to aggregate them here since the various sites used were separated spatially and/or temporally; thus there is no chance that the same individual animal will be counted twice. The higher the richness value is, the more diverse the assemblage is. The Shannon-Weaver index has a maximum diversity value of 4.99. The evenness index may be interpreted on a scale of 0 to 1.0. Assemblages approaching 1.0 have high equability (Reitz and Scarry 1985:20). Caution must, however,

be used when interpreting diversity indices, since several authors have noted that there is a strong correlation between diversity value and sample size: Diversity values tend to increase as sample sizes increase, and vice-versa (cf. Meltzer *et al* 1992).

Shannon's diversity was calculated from 11 faunal assemblages originating from eight different sites, combined into four groupings. Sites were chosen by both location and completeness of data presented. The goal of the diversity analysis was to determine whether there was a consistent difference in dietary diversity between the Coastal South and Upland South. If environmental locale is truly not the principle factor influencing diet, then there should be no consistent pattern in each of the two regions. If, however, estuarine environments do tend to make more species available for human consumption, then coastal sites should have higher richness scores than upland ones.

Another relevant hypothesis that this analysis could shed light on are the commonly held assumptions about frontier life. It has become almost a truism to think of the frontier as a vast, empty wilderness whose conditions forced or at least encouraged pioneering settlers to adopt a diffuse subsistence pattern (Hilliard 1972:11-13, 72-74). If this assumption is factual, then frontier period assemblages should be more diverse than later ones. The expectation would be for both the richness and evenness scores from frontier sites to be high.

Evenness values may summarized as being either high, middle, or low. According to Reitz and Scarry (1985:20), a high evenness score reflects a "normal diet": That is, one emphasizing only a few species but incorporating many others in gradually descending numbers from most to least abundant. What then do middle and low evenness scores represent? Extending Reitz and Scarry's reasoning, a low evenness score may be one where a few species are emphasized and very little else is eaten. A middle evenness value would be where a smaller number of species are used at all, but a larger proportion of these are heavily exploited. Therefore more taxa are eaten in relatively equal numbers.

In order to test these hypotheses, assemblages representing both areas, and both frontier and later time periods were used in the analysis. To make sure that the calculated diversity values were not simply products of the sample size, the correlations between both the richness scores and sample size, as well as the evenness values and sample size, were estimated. The correlation coefficient for richness versus sample size was -.488, with a p-value of .51; thus the null hypothesis that the two variables are not correlated is supported. Similar results were obtained for evenness versus sample size; the correlation coefficient was -.403 (p=.60). Diversity values calculated are therefore not simply products of the samples' sizes. Consequently, the richness and evenness scores are valid indicators of past dietary strategies for these samples.

The sites used for the Coastal South diversity estimate were Fort Frederica on the Georgia coast (Reitz and Honerkamp 1983), Oxon Hill Manor on the Potamac River in Maryland (O'Steen 1986), Horne Plantation on Maryland's Eastern Shore (Lev-Tov 1992), and Pettus Plantation/Utopia Cottage in tidewater Virginia (Miller 1979). Upland South sites included Forts Loudon (Breiburg 1983b) and Southwest Point (Bunch 1987) in East Tennessee, Wynnewood in Middle Tennessee, and the Gibbs House. Sample sizes of the four groups are as follows: Coastal South MNI = 489; Upland South MNI = 594; Later Sites MNI = 221; Frontier Sites MNI = 808.

Richness values calculated for the two groups of sites conformed to expectations. The coastal assemblages produced a diversity score of 4.426, approaching the 4.99 upper limit. The Upland South faunal collections together gave a much lower diversity reading, at 2.712. Young (1993) came to a similar conclusion about these diets using different sites and a different diversity measure.

If estuarine environments are truly the virtual meat lockers that they often are characterized, then coastal assemblages should have high evenness, as a few species are emphasized out of a great variety taken. Once again, the expected pattern was realized.

Coastal sites produced an equability figure of .99, just below the 1.0 maximum. By way of contrast, the upland sample gave a mid-level evenness value of .66.

A frontier versus late pattern in dietary diversity was the last hypothesis tested. Six of the sites used in this analysis can be considered frontier either because of their location, their date, or both. Frontier sites include Fort Frederica, Pettus Plantation, Utopia Cottage, Fort Loudon, Fort Southwest Point, and Gibbs House. Non-frontier sites are Wynnewood, Oxon Hill Manor, and probably Horne Plantation as well. The hypothesis that frontier sites tend to have more diffuse diets than later sites was not supported. In fact, the analysis revealed a trend in the opposite from expected direction. The richness score from the frontier sample was 3.08, while the later sites registered 3.71. Evenness scores were quite similar. The evenness score from the frontier sample was .84, not far below the .92 value from the later sites.

The diversity analyis reveals some interesting trends that can be explored in more detail using the chi-square tests. Coastal residents clearly exploited a larger number of species than did upland residents. Some of this difference may in fact be environmental; residents along the Atlantic Flyway could make greater use of waterfowl and shorebirds than could residents of the Tennessee River Valley (a minor flyway). Still, much of the diversity difference may be the products of human choice since only a fraction of the total number of edible species in any given environment are ever used for food. Therefore it is apparent that human choices and perceptions about what species were good to eat had a significant impact on southern regional diets.

The equability scores were an interesting aspect of the regional diversity analysis. The very high evenness estimate for the coastal sample indicates that, although residents utilized a great number of species, they concentrated on only a handful for most of their meat supply. On the other hand the middle evenness value derived from the upland sample indicates that these settlers practiced a more focused diet; a narrower range of species were

exploited, but a greater number of these species contributed significant amounts to their diets. In fact, one could argue that the relatively low richness score for the upland sample is a product of a logistical dietary strategy where several species are hunted or raised intensively, while many others are simply ignored. By contrast, coastal residents may have practiced a more scattered 'catch as catch can' strategy; domestic and perhaps a couple of wild species were exploited heavily, while a host of other species sporadically contributed small amounts to their diet.

Chi-Square Test Results for Animal Group Usage

Chi-square tests of independence based on NISP were run on the same sites used for the diversity analysis. Table 5.1 lists the observed and expected values for all chi-square tests performed. One series of chi-squares tested independence in wild and domestic bird samples from the Gibbs House Site versus each of the other sites, producing a series of 4-celled contingency tables. A similar series of tests was run on native and domestic mammal samples. Chi-square tables were also calculated for grouped data; all upland sites versus all coastal sites, first using native and domestic bird bone totals, and then using native versus domestic mammal bone totals. The sites involved were then regrouped to reflect frontier versus later, more settled sites and then tested using the same animal groupings as before. The same sites used for the diversity analysis were again used for the chi-square tests. The four types of faunal collections discussed here, Upland South, coastal South, frontier, and late assemblages were also formed from the same site groupings used above.

The chi-square tests produced mixed results in terms of pinpointing dietary differences between either upland and coastal sites or frontier period versus later assemblages. None of the grouped data tests on domestic versus native bird usage showed

Table 5.1: Comparative Chi-Square Test Results for Animal Usage, from Four Regional Environmental Settings

Animal Type	Locale/Date	Observed	Expected
Domestic Birds	coastal	1203	1142.9
	upland	356	416.1
Native Birds		401	461.1
		228	167.9
Domestic Birds	frontier	1387	1375.5
	late	272	283.5
Native Birds		510	521.5
		119	107.5
Domestic Mammals	coastal	3460	3819*
	upland	17830	17471*
Native Mammals		744	385*
		1402	1761*
Domestic Mammals	frontier	18049	18149*
	late	3036	2935.7*
Native Mammals		1833	1732.7*
		180	280.3*

* Indicates significant at $p<.05$

any significant differences. The domestic and native mammal chi-square tests did demonstrate independence at the 95 percent confidence level. Wild mammals were more common than expected in coastal assemblages but less common than expected in upland assemblages. The reverse pattern was displayed for domestic mammals, as coastal assemblages contained less than expected while upland ones had more. In the tests for mammals at frontier versus later settlements, other patterns were observed: Frontier sites utilized native mammals in greater than expected numbers, and made less use of domestic ones. Later sites showed the opposite pattern, making greater use of domestic mammals, and less frequently using wild ones.

The results of the chi-square analysis did provide more detailed information to go along with the broader trends outlined by the diversity estimates. From a glance at the species lists from the various sites used in the analysis, it seems likely that coastal residents created a very diverse diet for themselves by exploiting all manner of aquatic and semi-aquatic birds. The lack of significant differences in wild bird usage between the two regions reflects the diffuse subsistence pattern of the coast: The difference is not so much in numbers of individual wild and domestic birds (what the chi-square measures) used, but in the number of species used. Coastal residents used many species of birds but many in low numbers. Upland residents concentrated on only a few bird taxa, but exploited them in large numbers. There was no difference in bird exploitation by time period; frontier era sites were not significantly different than later sites. The latter chi-square test does seem to match the diversity results, since there was not a large amount of difference by time period.

The differences in exploitation of native versus domestic mammals in the four groups followed the trends set earlier with the diversity calculations. Since coastal diets were more diverse than upland ones, it is not surprising that those colonists made greater use of native mammals than did uplanders. Upland sites demonstrated the opposing trend of emphasizing domesitc mammals over native species. The difference in domestic

economy of the coastal farms and plantations prevented landowners from engaging heavily in livestock raising. Just the opposite was the case in the backwoods, since the upland topography prevented large-scale cash-crop enterprises. Instead, uplanders invested in livestock, not only raising enough for themselves, but raising export herds for the coastal cities (Gray 1933).

Again not surprisingly, consumption of both domestic and native mammals differed according to time period. Frontier era settlers apparently consumed more native mammals than did their later counterparts. Yet before we invoke romantic images of the buckskin-clad pioneer eating three meals of bear, bobcat, and beaver a day for lack of adequate numbers of domestic mammals, alternative explanations must be considered. This trend may as easily reflect a *decrease* in the use of native mammals over time, as it does an early emphasis on native mammals. Increasing human population density and resulting habitat destruction probably played a large role in the decrease in importance of native mammals over time. No doubt frontier settlers did make extensive use of native mammals, but this should not be taken to mean that their diets were dominated by such species.

One last area of divergence between the Upland and Coastal South may have been in use of aquatic fauna (fish, amphibians, and aquatic reptiles). It seems intuitively logical that coastal colonists would have had excellent opportunity to exploit aquatic resources. But would that opportunity be any less for upland residents? Hundreds of fish species live in the interior rivers and creeks, and spring runs of redhorse (*Moxostoma* spp.) still attract crowds of anglers. Without performing any statistical tests on these data (the data set is too small for this), there do not in fact seem to be any great differences between the two subregions in amount or variety of aquatic fauna used. In the coastal group of faunal assemblages, these taxa accounted for 35 percent of the total MNI's for that set, just slightly higher than the 30 percent figure derived for the upland collection. Again, differences between the areas appear to be in the sheer number of taxa exploited rather than

differences between the areas appear to be in the sheer number of taxa exploited rather than in relative abundance.

Summary

The Shannon-Weaver diversity analysis results were probably the most interesting aspect of the regional comparison. These tests demonstrated that coastal diets are in fact more varied than upland ones. This fact is probably due more to differing dietary strategies adopted by the areas' residents, as revealed by the equability figures; coastal residents pursued a diffuse subsistence strategy where a great deal of species were at least occasionally eaten, but a small number formed the dietary core. The middle equability statistic for the upland assemblage is the product of a focal dietary strategy emphasizing several species but overall pursuing a smaller range of species than coastal settlers.

Frontier versus late dietary strategies were quite similar in terms of equability. Residents of both time periods used diffuse strategies; equability for both groups was high. There were some unexpected differences in richness; frontier era sites actually were somewhat lower in diversity than were later sites. While the difference was not great (0.6 on a five point scale), neither was it negligible. This is the opposite of the expected pattern; frontier diets ought to have been more diverse, given the 'pristine' wilderness, lucrative skin trade, and difficulties with domestic mammals adapting to the New World (at least on the coast). A larger database of frontier and late sites might shed some light on the pattern.

Fine-grained analyses of diets in the coast and uplands, as well as the frontier and later settlements, provided clear evidence of patterning. The chi-square test results for upland versus coastal mammal use showed that coastal residents made more use of native mammals, and that upland residents focused on domestic mammals. These results are in line with expectations, since many historians have discussed the thriving livestock-based

economy of the Upland South (Gray 1933; Hilliard 1972; Gates 1960). The lack of significant differences in usage of native versus domestic birds can be explained by the diverse and highly equable diet of coastal residents; they used many species, but most in small numbers. The chi-square tests in effect measure only the intensity of species exploitation and not the range of species utilized.

Grouped data tests concerning temporal differences also showed no differences in bird utilization. The stonger than expected emphasis on native mammals at frontier sites versus a more domestic-oriented strategy at later sites was not surprising. Frontier sites are usually thought of as exploiting wild game like deer in large numbers, and this test adds some support to that generalization. Still, the major dietary contributions at even frontier sites came from domestic mammals.

This broad-based analysis was quite successful in illuminating some of the larger dietary differences within subareas of the South. The complementary combination of a very general analysis like diversity, along with more specific hypothesis-testing with chi-squares, worked well. The foodways of the frontier and later, as well as upland and coastal Southerners, split off from one another for the most part in clearly demarcated directions. Future additions to the small database of Upland South faunal assemblages will help to further define the foodway of the hinterlands.

CHAPTER 6

EARLY-NINETEENTH CENTURY DIET AT THE GIBBS HOUSE SITE

Species Utilized

Two deposits datable to the early-nineteenth century period of occupation at the Gibbs House Site (circa 1820-1850) yielded faunal remains. A filled-in gully along the western edge of the farmyard (area C in Figure 3.3) contained all but seven of the bones (Faulkner 1988:5). The other area was a gravel pathway that dated to this time (area F in Figure 3.3). The path had a few bones embedded into it, apparently discarded there while the path was in use (Faulkner 1991:13). Unfortunately, the early-nineteenth century sample is smaller than the one from the early, frontier period. A total of only 535 bones and fragments was excavated from the two areas. Out of this number, 255 were identifiable to the taxonomic level of class or lower. The faunal remains were highly fragmented and, as a result just, 84 bones were identifiable to species.

Mammals

The vast majority of bones belonged to mammals. In fact, of the total number of fragments identified, all but 30 were mammalian. Domestic mammals represented pigs, cattle, and a sheep. Wild mammals were sparsely represented; one bone each from a deer, a squirrel, and a woodchuck were identified. One human molar with a large cavity was also found. Pigs again dominated the assemblage; 59 bones of this species were present and made up 70 percent of the identifiable remains. Cattle bones were sparse with only nine elements (11 percent of the assemblage) were identified for this taxon. The sheep was

represented by a distal humerus, no other sheep bones were present in the entire Gibbs House Site assemblage.

Birds

The only species of domestic bird represented was chicken. Chicken bones were not present in large numbers; only 11 elements were identified, making up 13 percent of the identified bones. Chicken bones are more easily broken beyond identification than most mammal species, and the actions that fragmented this assemblage may have differentially affected preservation of avian remains. There are only 16 unidentifiable bird bones, or a total of 27 when including the chicken elements. The small number of bird bones overall compared to the large number of mammal bones (420) suggests that birds were not an important dietary component. Their representation in the assemblage is perhaps not so much a taphonomic product as it is a reflection of dietary choice. The sole wild bird identified from the gully and pathway assemblage was a single bone of the Canada goose.

Other Fauna Identified

The number of taxa present in this portion of the Gibbs House Site assemblage was quite low; only 10 species (not counting the human tooth) were identified. Aquatic fauna were used even less frequently in the early-nineteenth century than they had been in earlier years. No fish bones were found, although a complete half of a freshwater mussel shell was recovered. The mussel was identified as a purple wartyback, a species most often found in medium-sized streams and small rivers; the closest sizable body of water is the Holston River, some seven miles away. The only other species noted was a box turtle, represented by a single plastron piece. Table 6.1 presents a summary of species representation and abundance. Percentages of NISP are based on the total number of bones identifiable to species.

Table 6.1: Species List for Early-Nineteenth Century Deposits at the Gibbs House Site

Species	Common Name	NISP	%	MNI	%
	MAMMALS				
Sciurus carolinensis	gray squirrel	1	1	1	8
Marmota monax	woodchuck	1	1	1	8
Sus scrofa	domestic pig	59	70	2	15
Odocoileus virginianus	white-tailed deer	1	1	1	8
Ovis aries	domestic sheep	1	1	1	8
Bos taurus	domestic cattle	9	11	1	8
Homo sapiens	human	1	--	1	--
Mammalia	medium-sized mammal	165	--	--	--
	large-sized mammal	55	--	--	--
	mammal, size unident.	128	--	--	--
	BIRDS				
Branta canadensis	Canada goose	1	1	1	8
Gallus gallus	domestic chicken	11	13	2	15
Aves	bird, size unident.	16	--	--	--
Terrapene carolina	eastern box turtle	1	1	1	8
	MOLLUSKS				
Cyclonaias tuberculata	purple wartyback	1	--	1	--
	unidentifiable bone	84	--	--	--
Totals		**535**		**13**	

Dump Locations and Activity Areas

The main locus of dumping in the early-nineteenth century was a gully along the western slope of the farmyard, the disposal area having shifted from the now filled-in smokehouse cellar and the northwest corner ash midden. In addition, a few bones were discarded along a gravel pathway at the northern end of the yard. Like the bones recovered from the ash midden, only a small proportion (4 percent) showed clear butchering marks. Another similarity between the two spatially and temporally distinct deposits lay in the general condition of the bones. The majority of the bones found in the gully deposit were heavily fragmented, often beyond identification. Many of the unidentifiable fragments were from mammal limb diaphyses, apparently smashed into pieces to gain access to the marrow cavity.

The similarities between the two deposits suggest that some of the same activities contributed to their formation at different times. The gully's proximity to the kitchen L-addition at the rear of the house and the fragmented state of much of the material suggests an association with kitchen activities. It is not at all clear what types of activities the pathway and bones discarded there represent. According to Faulkner (1992:34-36), the pathway was used to access a spring located in the Beaver Creek floodplain. Fence postholes indicate that a gate separated most of the path from the inner farmyard. This same fenceline also separated most of the gully dump area from the inner farm yard. Perhaps both areas, being located outside what Rotenzier (1992) described as the inner, clean, yard area, were simply convenient and acceptable places to discard waste.

Butchering Patterns

A total of only 17 domestic mammal bones identifiable to the species level bore butchering marks. Of these, 10 were from hogs and six from cattle. The remaining butchered bone was from a sheep. In general the identifiablility of bones in this deposit was poor. This condition was probably due to activities related to a butchering strategy in which bone diaphyses were broken apart. As a result of this butchering style, only a small number of butchered bones were identifiable to species.

Pigs

Locations of butchering marks on pig bones seemed very similar to the frontier period pattern. Recovery of two skull elements, a partial maxilla and an occipital fragment demonstrate that the brain and other edible portions of the head were utilized. Butchered pig elements are listed in Table 6.2. An ascending ramus fragment may have been separated during jaw removal. A single, scarred, cervical vertebra most likely relates to removal of the head for further processing. Three of the four forequarter pieces displayed butchering marks located at midshaft, the result of blows aimed at carcass disarticulation. A humerus shaft fragment exhibits a spiral fracture, apparently from a blow designed to split apart the shaft lengthwise. A pelvis fragment from along the pubic symphysis was chopped through during the splitting of the carcass into two sides. Finally, a metapodial was cleanly cut in half, perhaps to remove a foot for pickling.

Other hog elements did not display clear butchering marks, but these were not complete. Figure 6.1 shows the locations of all identified pig elements. These included two maxillary fragments, a partial parietal, a mandibular piece, a proximal tibia, and a fibula shaft. The various skull fragments were likely produced while removing the brains.

Table 6.2: Pig Bones with Butchering Marks at the Gibbs House Site

Skull Element	Number	Axial Element	Number	Limb Element	Number
maxilla w/2 teeth	1	cervical vertebra	1	humerus	1
occipital	1	pelvis	1	ulna	1
ascending ramus	1			radius	2
				metapodial	1
Totals	**3**		**2**		**5**

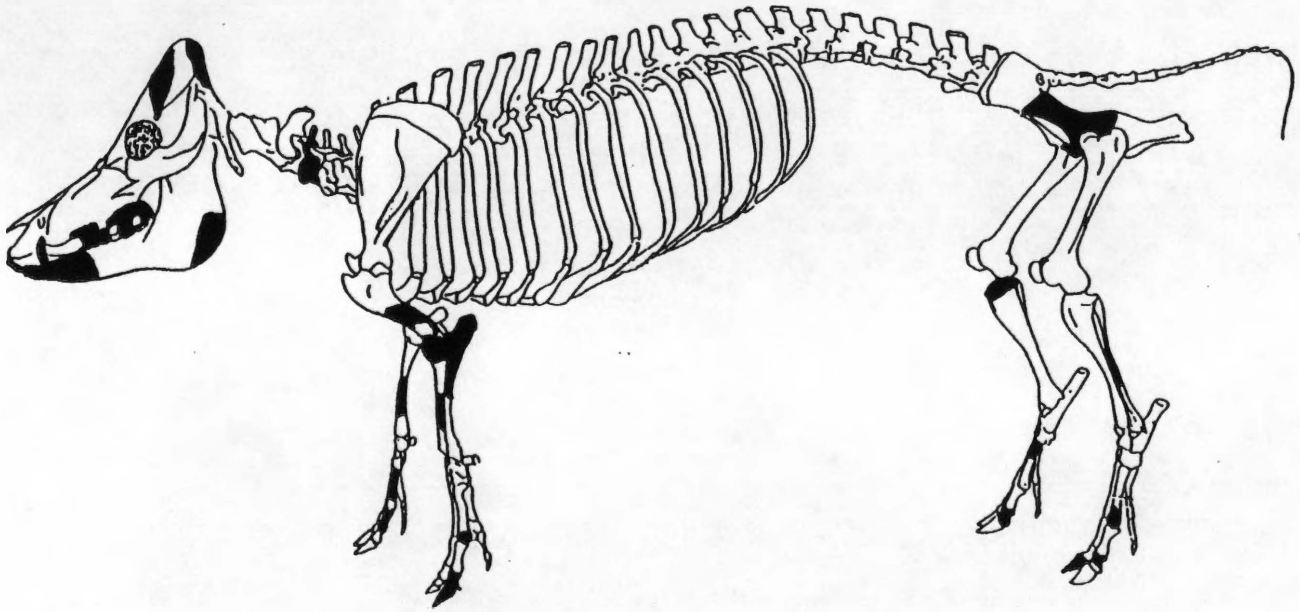

Figure 6.1: Locations of Pork Cuts for Early-Nineteenth Century Deposits at the Gibbs House Site

(Source: Adapted from Davis, S.J.M. 1987 *The Archaeology of Animals.* Yale University Press, New Haven and London)

Tibia and fibula fragmentation may have been caused during preparation of a large lower leg roast or ham. Several complete phalanxes and metapodials indicate that the Gibbs family was, perhaps in contrast to the earlier period, not using the feet for stewing or marrow production.

Pig and cattle bones assignable to the age categories Silver (1969) outlined based on epiphyseal fusion and tooth eruption sequences were rare. Only eight pig bones and three cattle bones had preserved epiphyses or teeth still in their sockets. These samples of ageable bones were too small to construct meaningful and reliable age profiles.

Cattle

Of the nine cattle bones identified, five bore butchering marks. The pattern observed again seems broadly similar to frontier period butchering evidence. Table 6.3 lists all butchered cattle bones, and Figure 6.2 displays cut locations. Elements displaying butchering marks included a humerus fragment, a rib, and three phalanges. In addition to these, an unfused proximal humerus, a metapodial shaft, two complete phalanges, and some rib pieces were identified but did not show signs of butchery. The butchered humerus piece was a distal shaft, severed from the distal condyle and remaining portion of the shaft by medial-laterally directed ax blows. Two of the three butchered phalanges were severed in a dorsal-basal direction through the midshaft, while the third was split from a proximal-distally oriented chop, dividing the bone into upper and lower halves.

Bones not bearing butchering marks are more difficult to interpret relative to meat cuts. It is interesting to note that all of the butchered foot bones were first phalanxes; the unbutchered ones consisted of one second and one third phalanx. The metapodial shaft piece identified may relate to carcass distarticulation rather than marrow processing since the diaphysis was intact. Eleven large mammal (most likely cattle) rib fragments were also noted. Aside from these rib fragments, axial elements from domestic mammals were

Table 6.3: Cattle Bones with Butchering Marks from the Gibbs House Site

Skull Element	Number	Axial Element	Number	Limb Element	Number
none		rib	1	humerus	1
				phalanx 1	3
Totals	**0**		**1**		**4**

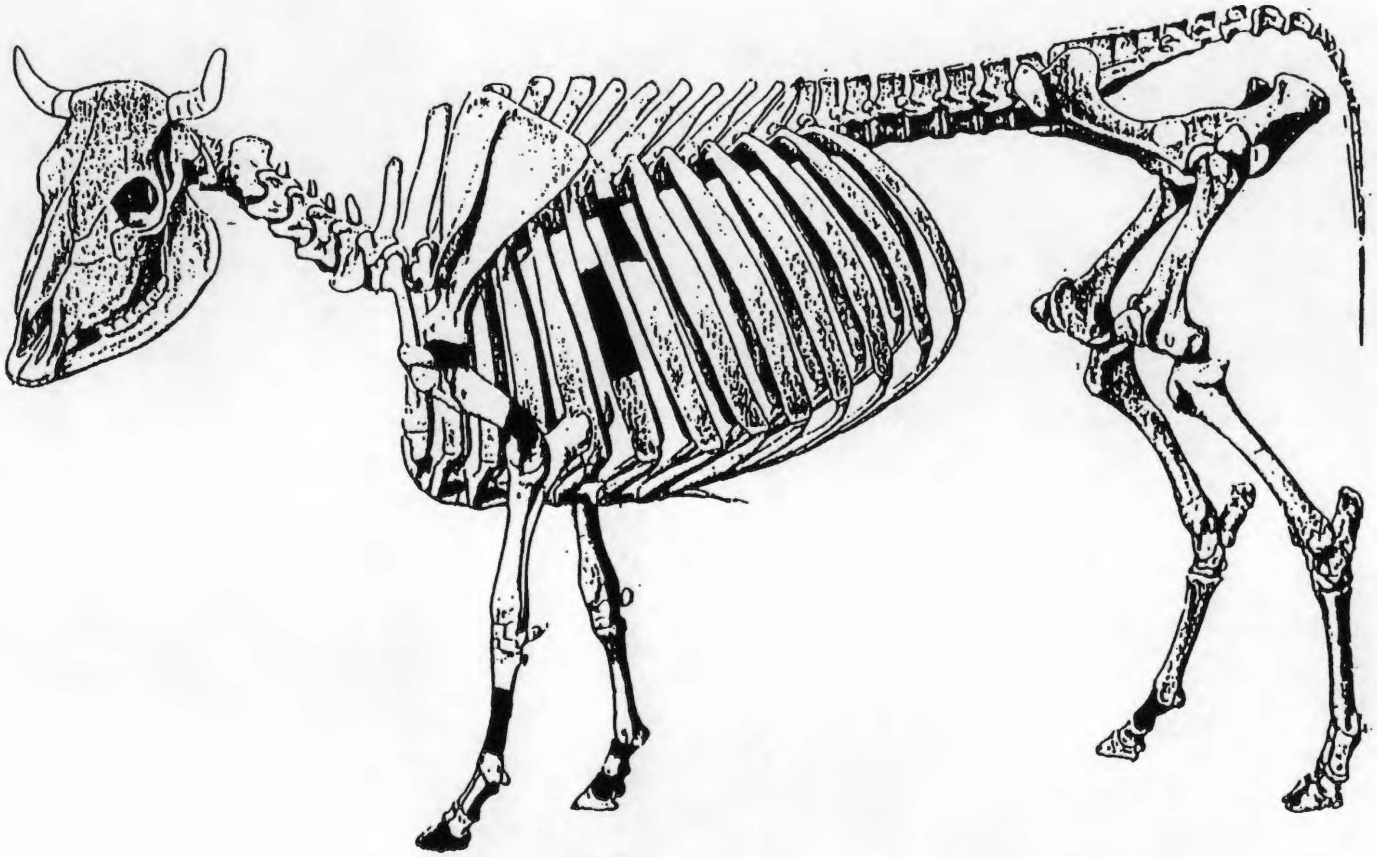

Figure 6.2: Locations of Beef Cuts for Early-Nineteenth Century Deposits at the Gibbs House Site

(Source: Adapted from Sisson, S. and J.D. Grossman, 1975 *The Anatomy of the Domestic Animals*, fifth edition, edited by Robert Getry. W.B. Saunders Company, Philadelphia, Pennsylvania.)

relatively rare. No cattle or large mammal vertebral fragments were found, and only one pig vertebra was present.

Discussion

The early-nineteenth century faunal assemblage, although small, does show some interesting changes as well as continuities from the frontier period collection. The relative importance of the domestic animals remained the same over time, although a fourth domestic species (sheep) was represented in the assemblage. The major difference between the two periods' subsistence strategies lay in the amounts of native species utilized. After the initial period of settlement and farm organization, the Gibbs family seems to have made changes in their foodways, affecting the species represented, and yard organization, affecting the trash deposition areas. Butchering strategies, on the other hand, retained their distinctiveness over time.

Domestic mammals still dominated the Gibbs' diet in the early-nineteenth century. In fact, domesticates played an even more dominant role in this later period; about 95 percent of the identified animal bones belonged to four domestic species; pigs, cattle, sheep, and chickens. The relative importance of the domesticates was the same as in the earlier assemblage. Pigs were the most important meat source, while bones of cattle and chickens were approximately even in frequency.

One butchered sheep bone was identified as well. This was the only sheep bone found on the entire site. Where is the rest of the animal? The sheep bone, a distal humerus, bore two chop marks; one running medial-laterally that broke away the distal condyle, and another running in the same direction that cleaved away the shaft above the distal end. The butchering marks clearly demonstrate that the animal was killed and used for food, rather than dying of some natural cause and not being consumed. The Schedule

4 Census of Agriculture for 1850 (the terminal date for this deposit) lists Daniel Gibbs as owning six sheep. The census also lists the wool production potential for the sheep, which suggests that sheep were kept primarily for wool rather than meat.

Usage of wild game declined dramatically in the early-nineteenth century. Only four wild animal bones (plus the mollusc shell) were included in the collection. Whether the small sample size is responsible for the paucity of native fauna, or whether this is a true reflection of dietary change is not clear. If native taxa are poorly represented in the later deposits, then dietary change would be the likely explanation. It may be that by the early-nineteenth century the Gibbs farm was quite successful, so that residents not only had plenty of domestic animals for meat, but were too extensively engaged in commercial farming activities to afford the time to hunt. Another possible explanation is that some 50 years of white settlement in Beaver Creek Valley led to the depletion of wild game either through overhunting or habitat loss from woods turned into fields. It is noteworthy that fish are absent in the early-nineteenth century assemblage; the purple warty-back was more likely picked up as a curiosity rather than selected as a food source.

The locations of the two early-nineteenth century bone-bearing deposits indicate that the Gibbs' basic concept of farmyard organization was retained over the years. A fenceline separated an inner and outer farmyard area at this time (Faulkner 1992). The yard division separated the upland farm's outer, 'dirty', yard from the inner yard which was kept clean (Rotenizer 1992). Faunal remains for the most part came from deposits located just on the outer side of that fence, just as had been the case with the frontier period deposits.

The low amount of butchering marks noted in the early-nineteenth-century assemblage probably relates to the Gibbs' butchering strategy. Analysis of butchering mark placement on domestic mammal bones indicates that the Gibbs family not only disarticulated carcasses to produce meat portions, but also rendered marrow. Evidence of marrow production is present in the form of long bones whose diaphyses have been

smashed into many pieces. Some of these shaft fragments even show the impact scars from blows aimed at opening the marrow cavity.

Another interesting feature of the domestic mammal bones is the low number of axial elements present. Rib fragments made up 25 percent of the bone fragments unidentifiable to species, but limb fragments were more common, at 38 percent. Rib fragments were less common than limb pieces even though there are more ribs than limb elements. The other major group of axial elements, vertebrae, was almost absent from the assemblage. No unidentifiable vertebral fragments were noted, and only one identifiable vertebra was recovered. As Binford (1978) has shown, vertebrae and other axial elements are worthless for marrow production.. However, vertebrae do have fairly high yellow grease values (Binford 1978:34).

If the Gibbs family was processing grease, they may have pulverized vertebrae beyond recognition. It should also be pointed out that a common characteristic of canid-ravaged assemblages is an underrepresentation of axial elements (Brain 1981). Yet carnivores did not affect this assemblage; no canid tooth marks were present on any of the bones. The lack of axial elements may, therefore, be due to either destruction from grease-making, disposal of axial elements in some unexcavated area of the farm, or perhaps destruction during butchering. While today carcasses are split down the middle of a vertebral column with a saw, in earlier times a cleaver or ax was used for this purpose. Interviews with Appalachian farmers reveal that at least some would, in earlier times when using an ax, split the carcass down *either side* of the backbone, and not down the center (Wigginton 1972:196). This act would tend to fragment the vertebrae more severely than splitting them down the middle, and perhaps render the splinters totally unidentifiable.

Summary

The early-nineteenth century faunal assemblage from the Gibbs House provides some important insights into the dietary choices of a farm family in the period after initial settlement of the frontier. Both continuities and changes from the frontier period became apparent from the collection of animal remains. While the frontier period diet concentrated on domestic animals, a few native species made significant contributions. Yet in the early-nineteenth century, domestic animals accounted for almost all of the meat diet; the Gibbs' dietary diversity declined sharply in the antebellum period. Whether the decline was due to overhunting, habitat destruction, or both is simply not known. Small sample size could also be an answer; zooarchaeologists have pointed out that diversity tends to increase with larger numbers of bones (Reitz and Honerkamp 1983:10).

The division of the farmyard into active clean and active dirty areas, a characteristic of upland farmsteads, remained in place during this period. The actual locations of dumps shifted, but remained in the outer yard area. Butchering patterns largely remained constant as well. Livestock continued to be raised (according to census records) as well as slaughtered on the farm. Domestic mammal elements from both meaty and non-meaty sections were present. Carcasses were not only turned into meat cuts, but bones were apparently also rendered for both grease and marrow, perhaps for use in making soap.

The questions raised and patterns identified in this and the preceding periods' assemblages must be pursued for the later deposits as well. If there is little dietary diversity in later deposits, then we can surmise that the short species list of the early-nineteenth century deposits is a true reflection of dietary adaptation. Similarly, the butchering traditions outlined for these deposits, especially those involving marrow and grease production, provide a detailed precedent for later foodways. The primary question of

interest here involves how these upland traditions continued or changed in later years.

CHAPTER 7

MID TO LATE-NINETEENTH CENTURY DIET AT THE GIBBS HOUSE SITE

Species Utilized

Several excavated areas of the Gibbs House yard produced faunal remains dating to the later half of the nineteenth up to the turn of the century (circa 1850-1910). Animal bones dating to the mid-nineteenth century period were excavated primarily from area D (see Figure 3.3). The latter area was an erosional gully located behind the log smokehouse (by this time moved elsewhere in the yard). This gully produced only 155 bone fragments, too small a sample from which to draw conclusions. For this reason the mid-nineteenth century sample was combined with the late-nineteenth century material (also a small sample) in order to interpret foodway patterning from a more substantial sample. The late-nineteenth century faunal material totaled 414 bones and bone fragments; the two samples together comprised 569 elements and pieces. Late-nineteenth century material came from the sheet refuse in the upper levels of all of the deposits around the farmyard. Area E was the only tested portion of the yard that yielded exclusively late-nineteenth century material. This area was the location of a frame smokehouse erected sometime in the late-nineteenth century and torn down in the 1950s.

Faunal remains from these deposits, like those from other yard areas, tended to be heavily fragmented. Given the sheet refuse nature of much of the artifactual material, it may well be that trampling was responsible for the damage to the bones. A continuation of the marrow-rendering tradition from earlier periods of occupation at the site could also account for the observed damage. As a result of the fragmentation only 117 (21 percent)

of the bones could be identified to species. Still, the vast majority of the bones (all but 14) were identifiable to the class level.

Mammals

Just as was the case with the earlier Gibbs House Site faunal assemblages, and is the case at most historic sites, mammalian species were numerically the most important class of fauna. Among domestic species, pig remains were the most numerous. Hogs made up 58 percent of the identified bone; cattle accounted for only 14 percent. Pork continued to be the most important meat source up through the late-nineteenth and early-twentieth centuries. No sheep bones were identified in this assemblage. The absence of sheep in this late collection is interesting since one sheep bone was included with the early-nineteenth century animal bones. The absence or near absence of these animals demonstrates conclusively that they never gained acceptance as important food sources at this farm.

A number of native mammals were used to supplement the diet, albeit sparingly. Five species of native mammals were identified, including opossum, raccoon, gray squirrel, eastern cottontail, and white-tailed deer. None of these animals with the sole exception of deer were represented by more than three elements each. Deer appear to have been a somewhat more important supplementary food since eight of that species' bones were found. Three of these deer bones were actually antler fragments; one even showed some polish and shaping.

Birds

Avifauna were quite rare in this collection; only 29 bird elements, including those that were unidentifiable as to species, were present. Just as in the early-nineteenth century assemblage, the chicken was the only bird represented in this sample. In fact, the chicken was the only bird represented in each of the three temporally distinct assemblages at the

Gibbs House Site, and always made up around 11 percent of the diet. The absence of turkey from the early-nineteenth and mid to late-nineteenth century assemlages suggests two things: The first is that the turkey, although it had probably been domesticated much earlier, was evidently not kept as a barnyard fowl by British Isles/German colonists. Had it been kept in coops, its usage would have been constant over time. Secondly, if the turkeys eaten by the Gibbs' were wild, then their absence from the later deposits may have to do with the destruction of the bird's natural habitats as the Beaver Creek Valley and surrounding areas became more intensively farmed and settled.

Fish and Reptiles

Only two fish elements, unidentifiable beyond class, were found. As little as the Gibbs family relied on aquatic fauna during the frontier period, their use of such species seems to have declined further throughout the nineteenth century: No fish bones were found in the early-nineteenth century material, although one freshwater mollusc shell was present. By way of contrast, the frontier period deposits contained 153 fish bones and scales. Some of this difference may be due to recovery methods since the log smokehouse cellar was sifted through fine screen mesh as well as floated. All other deposits were sifted through 1/4 inch screen only. Still, many fish bones from the smokehouse cellar were recovered in the 1/4 mesh, so the differences may be due to more than just screening methods.

The only other species represented was a box turtle, identified from a single bone. Table 7.1 presents a summary of species representation and abundance for latter half of the nineteenth century.

Table 7.1: Species List for Mid to Late-Nineteenth Century Deposits at the Gibbs House Site

Species	Common Name	NISP	%	MNI	%
	MAMMALS				
Didelphis virginiana	opossum	2	2	1	8
Cricetidae	mice and rats	1	1	1	8
Sciurus carolinensis	grey squirrel	2	2	1	8
Sylvilagus floridanus	eastern cottontail	3	3	1	8
Procyon lotor	raccoon	2	2	1	8
Sus scrofa	domestic pig	63	57	1	8
Odocoileus virginianus	white-tailed deer	8	7	1	8
Bos taurus	domestic cattle	15	14	1	8
Mammalia	medium-sized mammal	180	--	--	--
	large-sized mammal	32	--	--	--
	mammal, size unident.	202	--	--	--
	BIRDS				
Gallus gallus	domestic chicken	13	12	2	17
Aves	medium-sized bird	15	--	--	--
	large-sized bird	1	--	--	--
	bird, size unident.	13	--	--	--
	REPTILES				
Terrapene carolina	eastern box turtle	1	1	1	8
	FISHES				
Osteichthyes	bony fish	2	--	1	--

Table 7.1: Continued

Species	Common Name	NISP	%	MNI	%
	unidentifiable bone	14	--	--	--
Totals		**569**		**12**	

Dumping Patterns and Activity Areas

During the latter half of the nineteenth century the Gibbs' farmyard was reorganized. The log smokehouse was moved elsewhere in the yard and used for some other function, and a frame smokehouse was built to replace it (Faulkner pers. comm.). The location of fence lines during the late-nineteenth century is not as clear as in earlier periods. Six fence lines were built, removed, and replaced from the mid-nineteenth through first half of the twentieth century (Faulkner 1992:37). It seems likely that for much of this time, the fence lines ran along the rear edge of the yard, thus enclosing the frame smokehouse and associated dumping areas within the inner farmyard. According to reconstructed fence lines, the small amount of mid-nineteenth century faunal material from the area D gully would have been located in the outer farmyard at the time of deposition.

The majority of the late-nineteenth century faunal remains came from around the frame smokehouse in area E. These deposits were of a thin, sheet refuse nature rather than earlier deposits mostly filling natural or artificial depressions. The dumping of animal bone within the inner farmyard, and the fact that they were excavated from sheet midden, indicates that the split farmyard organization was abandoned in later times. Refuse was allowed to collect in the inner farmyard, the area normally kept free of outbuildings and free from debris (Rotenizer 1992). No spatial patterning in either species or element distributions nor concentrations of burned bone were apparent.

Butchering Patterns

Butchering marks on pig and cattle bones were not frequent in the assemblage, probably as a result of both the small sample size and the fragmented nature of the faunal

remains. Fifteen pig bones and three cattle bones showed butchery marks. More can be said about carcass utilization by examining cattle and pig bones that did not show obvious signs of butchery. No discussion of domestic mammal kill-off strategies is offered here, since only nine pig bones and two cattle bones were ageable.

Pigs

Examination of butchering mark placement as well as the elements present, reveals that hog carcasses continued to be divided up in similar fashion over time at the Gibbs farm. Most portions of the carcass were represented, including the head, feet, back, and limbs. The cranium and snout were clearly chopped apart; a nasal, temporal, and two occipital fragments demonstrate brain and snout removal. An anterior mandible, chopped behind the second premolar, shows that jowl meat and probably tongue also continued to be eaten. Various fore and hind limb elements show disarticulation butchering marks, the types of cuts that would reflect roasts and hams. Two humerus fragments consisted of incomplete shafts; the diaphysis may have been broken open for marrow removal. Three foot elements, two second phalanxes and a fifth metatarsal, were chopped through. It seems more likely that these bones were cut during the process of foot removal rather than broken open for marrow removal; there is little marrow in the metapodials and second phalanges. An ax blow that sheared in half an astragalus was probably the result of separating the shank (distal tibia and fibula) from the hind foot. Table 7.2 lists all butchered pig elements, and Figure 7.1 displays the locations of all identified pig bones.

Cattle

Four of the five butchered cattle bones were from limb elements (see Table 7.3 for a complete list, and Figure 7.2 for cut locations). The remaining bone was a piece of an ascending ramus. The ramus was probably hacked apart during removal of the mandible.

Table 7.2: Pig Bones with Butchering Marks at the Gibbs House Site

Skull Element	Number	Axial Element	Number	Limb Element	Number
temporal	1	thoracic vertebra	1	scapula	2
mandible	1			humerus	2
				radius	1
				femur	1
				astragulus	1
				metatarsal V	1
				phalanx 2	2
Totals	**2**		**1**		**10**

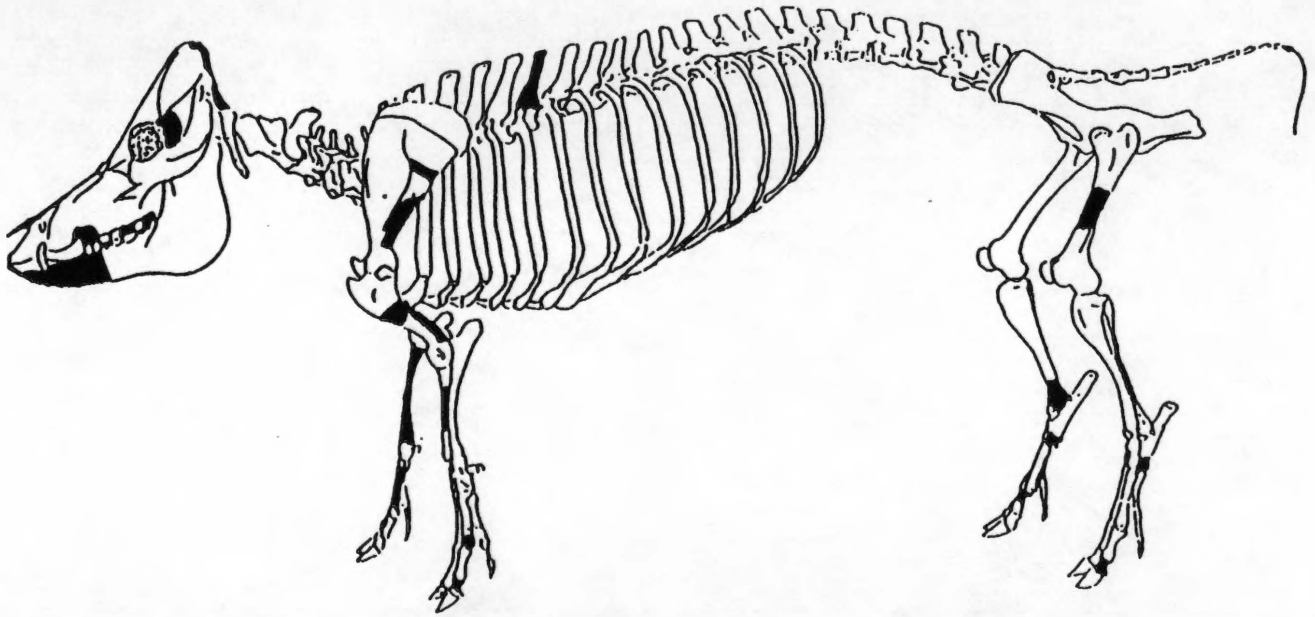

Figure 7.1: Locations of Pork Cuts for Mid to Late-Nineteenth Century Deposits from the Gibbs House Site

(Source: Adapted from Davis, S.J.M. 1987 *The Archaeology of Animals.* Yale University Press, New Haven and London.)

Table 7.3: Cattle Bones with Butchering Marks at the Gibbs House Site

Skull Element	Number	Axial Element	Number	Limb Element	Number
ascending ramus	1	none		scapula	2
				radius	1
				tibia	1
Totals	**1**		**0**		**4**

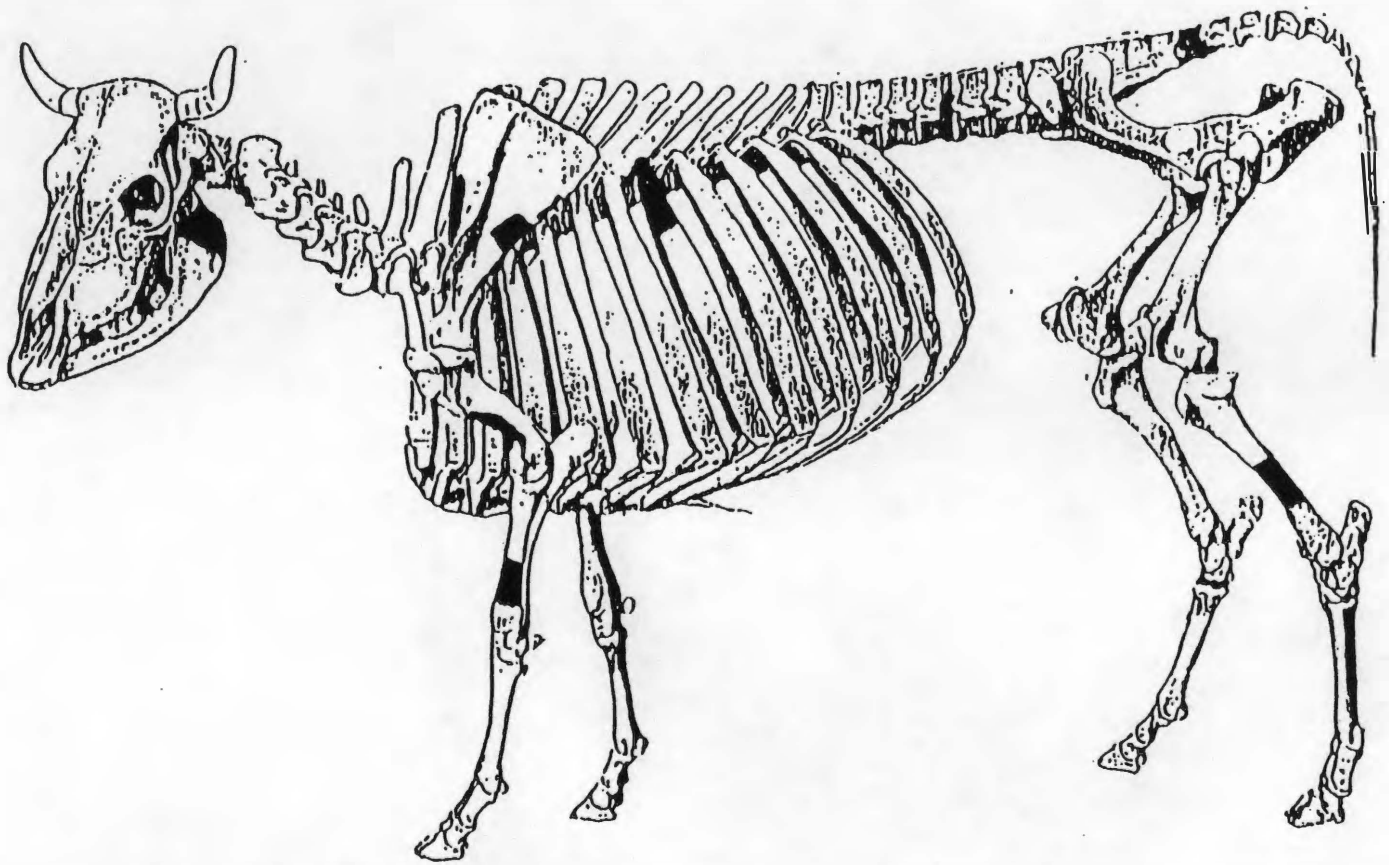

Figure 7.2: Locations of Beef Cuts for Mid to Late-Nineteenth Century Deposits at the Gibbs House Site

(Source: Adapted from Sisson, S. and J.D. Grossman, 1975 *The Anatomy of the Domestic Animals*, fifth edition, edited by Robert Getry. W.B. Saunders Company, Philadelphia, Pennsylvania.)

The limb elements show blows placed primarily for carcass disarticulation, although one humerus shaft cavity was opened by a cleaver's impact (Figure 7.2 displays locations of all cattle bones identified). A scapula piece shows interesting butchery marks; the scapula was was cut apart on either of its sides by a power band saw (as opposed to a hand saw), producing a narrow, commercial-like roast. This scapula slice could either represent a change from an earlier butchering technology to using more modern equipment, a saw, or perhaps it represents a cut of meat purchased from a commercial butcher.

Discussion

The mid to late-nineteenth century material demonstrates some interesting continuities as well as certain divergences from the frontier period material. It is difficult to interpret just how much this late sample differs from the early-nineteenth century one; sample size limitations appear to have significantly influenced the species diversity of that assemblage. Both the frontier and mid to late-nineteenth century faunal samples contained a mix of several native and the usual domestic species. Yet the early-nineteenth century sample had barely any wild fauna included in it, so there is a discontinuity over time between wild animal use in the late-eighteenth and late-nineteenth centuries. This discontinuity is due to the small sample size of the early-nineteenth century assemblage; diversity of faunal and other kinds of assemblages often are products of their sample size (cf. Metlzer *et al* 1992). The discrepancy could also be due to agricultural practices combined with a growing population in the Beaver Creek Valley.

The frontier and mid to late-nineteenth century assemblages are more similar in their content of native species. During the frontier period, they accounted for about 13 percent of the dietary remains, while the abundance of their remains in the late sample was slightly higher, 17 percent. For the most part, the same types of native taxa were incorporated into

the diet. Small terrestrial mammals such as squirrels, rabbits, and the occasional woodchuck, raccoon or opossum remained in the foodway throughout the hundred year span of the deposits. Use of aquatic fauna like fish, amphibians, and waterfowl, never very important, did decrease over time. The significance of upland birds like the turkey also diminished as the nineteenth century progressed. Probably the most substantial wild source of meat was the white-tailed deer; venison remained a favored meat through time.

Apparently the backwoods game-hunting tradition first established during the earliest years of settlement did not disappear with the closing of the frontier era. Similar proportions of wild game were consolidated into the diet of each period. In fact, a large late-nineteenth/early-twentieth century faunal assemblage excavated from a farmstead in the culturally similar Ozark region of Missouri contained a broader range but similar abundance of wild species (Price 1985). Recipes for such wild game collected by the *Foxfire* book series researchers (Wigginton 1972) demonstrate that this foodway certainly survived well into the twentieth century.

Another foodway that remained consistent through time was the hierarchy of domestic animal food sources. Pork was number one from the earliest log cabin homesteads of the eighteenth century to the framehouse farms of the late-nineteenth century. The Gibbs House Site faunal deposits demonstrate this pattern since pig remains were by far the most abundant in each of the temporally distinct deposits. Cattle bones, by contrast, were always a distant second. Even when refrigeration became a common household technology in the twentieth century, pork remained dominant (Wigginton 1972). Sheep, the animal that so dominated British diets, ran into a number of problems early on in the English settlement of the New World, and never did become important. Only one sheep bone was recovered in all of the Gibbs House deposits, despite the fact that Rufus Gibbs owned six of the animals in 1850; apparently they were kept for wool rather than meat (United States Schedule 4 Census of Agriculture 1850).

Butchering retained its consistent patterning over time. Carcasses were primarily sectioned with cleavers, axes, or other relatively heavy chopping tools. In the mid to late-nineteenth century sample, pig and cattle carcasses continued to be butchered into steaks, roasts, hams, and various non bone-bearing cuts of meat. The cow scapula bearing saw marks is an indication that by the late-nineteenth century more modern, saw-based, butchering technology had finally been adopted by at least one of Appalachia's farms. Animal heads were split apart to remove brains, and mandibles split to remove the souse meat. The apparent marrow-rendering tradition of earlier periods at the Gibbs House probably continued in this late time. Several foot and limb bone diaphyses were smashed, apparently to access the marrow cavity within. Although the highly fragmented nature of this sample could be a result of the same marrow-processing activities, the pattern of damage is not distinct from that caused by trampling.

Given the sheet refuse context of much of these deposits, it seems likely that trampling did affect the late-nineteenth century assemblage. The presence of sheet refuse build-up in the yard area immediately surrounding the house may be an indication of farmyard maintenance deterioration during at least a part of this period. This area of the yard was kept free of bone debris during earlier periods; faunal remains dating from the frontier, early-nineteenth, and mid-nineteenth century time periods were all excavated from various filled-in depressions or features separated from the inner yard by fences. By the twentieth century, trash was no longer dumped on the premises. According to Mrs. Ethel Gibbs Brown, the family's trash was hauled away to a dump (Faulkner, pers. comm.).

Summary

The late-dating faunal sample from the Gibbs House Site demonstrates that many of the foodway trends first identified and discussed with the frontier period assemblage

continued intact up through the late-nineteenth century. The incorporation of native animals into the diet of the Gibbs family was, even during the frontier days, little more than a meat source supplemental to domestic species. Game made up about the same proportion of the diet in both the frontier and late-nineteenth periods. The species of native animals used did change somewhat over time. Deer probably were always the most important wild meat source, but wild bird and aquatic fauna waned in abundance after the frontier era came to a close. On the other hand, hunting of small mammals waxed, or at least remained constant, during the later years of the nineteenth century.

Three domestic species, cattle, hogs, and chickens, consistently dominated the faunal assemblages from all periods. Even in the mid to late-nineteenth century, hogs accounted for the lion's share of the meat consumed by the Gibbs family. Cattle and sheep never became the dominant meat sources that the former came to be along the East Coast and western plains, and the latter had been in Britain.

Dumping areas shifted over time but until the late-nineteenth century had always remained outside the inner yard, with natural and artificial depressions used as convenient waste receptacles. Yet in the late-nineteenth century this careful dumping pattern deteriorated, resulting in a thin scatter of bone refuse across many areas of the inner yard. Later, the farm was apparently rejuvenated; the log smokehouse was moved, a new frame one was erected, and trash was hauled off of the farm (Faulkner 1992; pers. comm.).

The patterns of butchery observed in the mid to late-nineteenth century sample of animal bones in many ways was a continuation of earlier practices. Certainly the dominance of cleaver-based butchering methods demonstrates a strong continuity with the earlier assemblages. Furthermore, the reduction of limb bone shafts into splinters, spiral fractured fragments, and complete elements split down the middle indicates another link with traditional foodways; bone destruction occurred for purposes of marrow extraction or perhaps stew-based meals.

Yet, one butchered bone fragment stands out as a symbol of the changes that were to come to Appalachia. The scapula came from an early-twentieth century (circa 1900-1930) level of sheet refuse, dated by the ceramics and glass associated with it (Faulkner, pers. comm.). The technology that produced that roast, a band saw, was certainly in use by the beginning of this century; an unsystematic collection from a 1900-1920 Knoxville dump produced commercial-style bone cuts produced by a band saw (Faulkner, pers. comm.). That neatly sliced *Bos* scapula represents the integration of a sawing technology into Appalachian butchering practice. The rest of the nation had been using various types of [steam] power tools to aid in butchery for some time (Clemen 1923:126). In fact, sawing had become the primary method of carcass division even in the late-nineteenth century frontier of Gold Rush California (Schulz and Gust 1983).

By the early-twentieth century the Gibbs farm was probably in some disrepair; John Gibbs was not an avid farmer, and in 1915 moved the family closer to Knoxville, renting out the farm to a series of tenants (Faulkner, pers. comm.). Early-twentieth century residents there took advantage of either now available services like commercially produced meat cuts, or professional butchers who would slaughter and butcher farmers' animals for them. In either case, the sawed scapula fragment stands out as a sort of symbol for the changes coming to Appalachia in the following decades. These changes finally began to erode the independent folk culture of the Upland South and replace it with a more pan-American lifeway. By the 1950s, the distinctive folk and foodways of Appalachia that had gradually developed since the frontier era had become endangered enough that Eliot Wigginton felt compelled to record as much of it as possible in his series of *Foxfire* books (1972 and others).

CHAPTER 8

SUMMARY AND CONCLUSIONS

This study of the faunal remains excavated from the Gibbs House Site, a farmstead in the Upland South, has brought considerable light onto the subject of dietary patterning in this region. Both the processes of alteration and constancy in foodways can be traced through this collection of broken and chopped animal bones that span approximately 150 years of white settlement in Appalachia. Examination of domestic species used and their relative importance reveals regional meat preferences which had their origins in both ethnic traditions and ecological adaptations. Those native species used disclose information about how they were integrated into economies developed in the Old World and transplanted to the New. Dumping and butchering patterns reveal somewhat more particularistic facts; they concern mainly the organization of this specific farm and the Gibbs' ways of rendering livestock into food. Finally, looking back across the century and a half of faunal collections from this single site enables us to see change, and abscence of it, on an unusually fine scale.

Historians have consistently maintained that pork was by far and away the most important type of meat in Southern diets, no subregional differences were recognized. Yet zooarchaeologists have discovered that beef was the much more important meat in the coastal regions of the South. This study concurs with the historians and demonstrates that pork was certainly the most important meat at the Gibbs House Site and other Upland South sites. Whether pork became the most important meat here because of the ethnic preferences brought over by the Scotch-Irish, German, or even the Finnish-Swedish settlers (Jordan and Kaups 1989:121-122), or rose in significance because the animal

adapted so well to the deciduous forests (Bokonyi 1975), it is clear that this meat dominated the backwoods diet long after the frontier had closed.

In other ways this analysis diverged from at least the traditional view historians have had about the frontier. For a long time the eighteenth century western frontier across the Appalachians was thought of as a terribly isolated region where buckskin-clad homesteaders battled Indians and hunted wild game for most of their meat. In contrast to this image, the faunal remains from the frontier period deposits at the Gibbs House Site paint a much more tranquil and economically vibrant picture of the colonial periphery. Although a fair amount of native species were incorporated into the Gibbs family diet, around 90 percent of their meat came from domestic livestock; pigs, cattle, and chickens. The most important species of wild game were turkeys, deer, and rabbits; all species that might have been attracted to the homestead's fields of grain and thus could be hunted with a minimum amount of effort. So the Gibbs' were quickly able to adapt to their hinterland environs and set up a successful farmstead that could be relied upon for the majority of their food.

The backwoods surroundings of the Gibbs and other area farmsteads did perhaps make them more frugal with the meat they produced. Analysis of butchering patterns reveals that many of the cattle and hog elements identified bore butchering marks. Bones bearing these marks were used as clues that, along with folkloric evidence, made some recovery of Gibbs' dietary strategy possible.

Carcasses were divided into various major units, and then further reduced to specific cuts. Surviving accounts from eighteenth century cookbooks lent meaning to the chop marks found on so many bones; it became clear that feet, limbs, ribs, and vertebrae, as well as skulls and mandibles, were each separated to produce a variety of dishes. Little or none of the carcass was wasted. In the case of pigs, even the head was chopped apart to access the brains, remove the tongue and jowl meat, and perhaps even the snout itself was

saved and cooked. From the consistent pattern of limb bone destruction, it seems likely that the Gibbs family did not even let the marrow go to waste; marrow was rendered as an additional caloric source. The family's cleaver-based butchering strategy changed very little over time. This technology was used even late in the nineteenth century, by which time saws had long ago replaced axes for butchering throughout most of the country.

Idiosyncrasies in butchering methods, dietary preferences for certain meats (pork over beef), and the species of wild game most heavily exploited indicate that the Upland South may well have had a foodway distinct from the Coastal South. What appears as regional differentiation could, however, mainly be a product of frontier adaptations as opposed to cultural preferences per se. Chapter 5 of this report explored these questions by combining faunal data from several sites and applying the statistical measures of diversity and chi-square. Sites grouped as frontier versus those considered later settlements did not show the great differences that one might expect were adaptation the main explanation for dietary differentiation. Individuals in frontier and late sites were quite similar in terms of both the number of different species used and their relative abundance. The chi-square tests indicated some differentiation; people in frontier sites relied more on native mammals than did those of later sites. No difference in native/domestic birds was observed.

The small-scale differences between the Gibbs House and coastal sites noted earlier, namely favoring pork over beef and emphasis on only a few native animals, were supported by the statistical comparisons. The broad comparisons between Upland and Coastal South faunal assemblages clearly showed what many have assumed; that coastal residents of estuarine environments enjoyed much more varied diets than did the backwoods settlers. Coastal residents appear to have adopted a foodway that took the greatest advantage of the wide range of fauna they perceived edible. Their diets concentrated on just a few species, yet they actively sought meat supplements from a host of other taxa. An opposing foodway was developed by hinterland homesteaders; their diet

was not terribly diverse, but rather focused on a range of species to obtain the majority of their meat. Only a few other species were used.

Chi-square tests showed no difference in bird usage, perhaps because upland birds simply replaced coastal waterfowl in numbers if not in variety. The diversity of Coastal South diets was revealed by their unexpectedly high use of native mammals and their reduced use of domestic ones. The economic orientation of the Upland South -- supplying coastal markets with livestock and preserved meat (Gates 1960:220) -- was demonstrated by significantly larger than expected amounts of domestic mammal bones in the assemblages.

Many of the trends first noted in the frontier period portion of the Gibbs House Site assemblage continued in the later faunal collections as well. Pork was always the dominant meat from the founding of the farm in the 1790s until the family moved off of it in the early twentieth century. Even long after the farm had become established, throughout the nineteenth and into the twentieth century, wild game continued to play a supporting but nevertheless important dietary role (see Table 8.1). Recently collected recipes from the area make mention of squirrel, opossum, and venison dishes (Wigginton 1972).

While the Gibbs family diet remained quite constant over the years, other aspects of their culture and foodway did undergo some changes. Throughout almost the entire occupation of the farm by the Gibbs family the yard was neatly organized. It was kept clean and separate from working portions of the farm by a series of fence lines and discreet dump locations in accord with regional practice (Rotenizer 1992). Yet late in the nineteenth, and on into the early-twentieth century, sheet refuse began to build up all over this inner farmyard. Trash was no longer dumped in concealed locales well away from the house, but instead was allowed to collect wherever it fell. This change in dumping patterns implies a deterioration of farm organization concomitant with John Gibbs' lack of interest in agriculture and the turning over of the farm to tenants (Faulkner, pers. comm.).

Table 8.1: Percentages of Species Represented at the Gibbs House Site for All Time Periods Based on NISP

Species	Common Name	Frontier Period	Early 19th	Mid to Late 19th
	MAMMALS			
Didelphis virginiana	opossum	trace	0	2
Sorex sp.	shrew	trace	0	0
Scalopus aquaticus	eastern mole	trace	0	0
Sylvilagus floridanus	eastern cottontail	4	0	3
Sciurus sp.	gray/fox squirrel	2	0	0
Sciurus carolinensis	gray squirrel	2	1	2
Sciurus niger	fox squirrel	trace	0	0
Marmota monax	woodchuck	trace	1	0
Cricetidae	mice and rats	0	0	1
Procyon lotor	raccoon	0	0	2
Sus scrofa	domestic pig	50	70	57
Odocoileus virginianus	white-tailed deer	4	1	7
Ovis aries	domestic sheep	0		0
Bos taurus	domestic cattle	12	11	14
	BIRDS			
Branta canadensis	Canada goose	trace		0
Anas platyrhynchos	mallard	trace	0	0
Anatidae	ducks, geese, swans	trace	0	0
Gallus gallus	domestic chicken	11	11	13

Table 8.1: Continued.

Species	Common Name	Frontier Period	Early 19th	Mid to Late 19th
Colinus virginianus	northern bobwhite	trace	0	0
Meleagris gallopavo	turkey	4	0	0
Phasianidae	pheasants and allies	1	0	0
Numenius americanus	long-billed curlew	trace	0	0
Melanerpes sp.	woodpecker	trace	0	0
	REPTILES			
Terrapene carolina	eastern box turtle	0	1	1
	AMPHIBIANS			
Rana/Bufo sp.	frog or toad	trace	0	0
	FISHES			
Aplodinotus grunniens	freshwater drum	4	0	0
	MOLLUSCS			
Crassostrea virginica	american oyster	trace	0	0
Cyclonaias tuberculata	purple wartyback	0	1	0

Only one zooarchaeologically recognizable aspect of their foodway underwent much change. If both the relative importance and heavy reliance on domestic species stayed the same, and the range and relative importance of native species remained constant, then what changed? The Gibbs' (and perhaps Appalachian in general) distinctive, cleaver-based butchering technology and related marrow rendering focus remained in place for much of the family's tenure at the farm. This butchering technology weathered the march of the Georgian order (with its saw-based butchery according to Deetz 1977:124-125) across the minds of late-eighteenth century colonists.

But the chopping technology did finally give way to the increasing pressures of modernization that Appalachia felt during the early-twentieth century. This is the context in which the first, and only, neatly sawed [*Bos*] bone was found. It indicates that site residents either switched to having their livestock professionally butchered by someone equipped with the latest in high-tech butchering equipment, or began to purchase their meat from a commercial source. Whichever action produced that piece of bone, the implication is that the long independent culture of the Upland South was at that time finally succumbing to the outside forces of change.

Archaeological research on aspects of the distinctive Upland South culture is really in its infancy (Andrews and Young 1992), and studies like this would certainly benefit from more such investigations at similar sites. Nevertheless, some conclusions about the nature of the knowledge we have gained from this study can be drawn. The information gleaned from the faunal remains excavated at the Gibbs House Site, and the regional comparisons with other assemblages, fall both into the realms of history and anthropology. The particularistic data recovered concerning which wild species were used, the relative importance of domestic animals, the organization of the farmyard, and the butchering methods used are really of an historical nature. They fill in small gaps in the historical record of foodways and agricultural practices. The broader themes addressed are of a more

anthropological nature; those questions that concerned regional differentiation and dietary adaptations to New World environments as well as change and continuity of foodways over time.

A closer look reveals that all of the questions are closely intertwined. We cannot hope to understand adaptive trends without knowing the particulars of various sites, which in turn can be better understood by examining the historical record. Yet the historical particulars of this and other sites are useless to historians without some broader framework tying the data to complex questions about our past. This, in essence, is the type of interdisciplinary anthropological research that some zooarchaeologists (MacDonald 1991:60) have implored us to undertake in order to more fully integrate archaeozoology into processual archaeology.

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APPENDICES

APPENDIX I

APPENDIX I: GIBBS HOUSE BONE CODE

Area:

a = smokehouse cellar

b = NW corner ash midden

c = early 19th century gully

d = mid 19th century gully

e = frame smokehouse area

h = excavation units 20, 21

Date:

1 = late 18th/early 19th

2 = early 19th only

3 = mid-to-late 19th

4 = late 19th/early 20th

5 = early-to-mid 19th

6 = mid-19th only

7 = 20th century

8 = late 19th only

Gensp:

014 = Pig

015 = Cow

Element:

1 = premaxilla

2 = nasal

3 = palatal

4 = frontal

5 = temporal

6 = parietal

7 = occipital

8 = occipital condyle

9 = maxilla

10 = incisor

11 = canine

12 = premolar

13 = carnacial

14 = molar

15 = petrus temporal

16 = zygomatic arch

17 = orbital

18 = horn core

19 = hyoid

20 = mandible

21 = ascending ramus

22 = atlas

23 = axis

24 = cervical vertebra

25 = thoracic vertebra

26 = lumbar vertebra

27 = sacrum

28 = caudal vertebra

29 = scapula

30 = humerus

31 = ulna

32 = radius

33 = ulna and radius

34 = carpal

35 = naviculo-cuboid

36 = tarsal

37 = calcaneus

38 = astragulus

39 = lateral malleolus

40 = pelvis

41 = pubis

42 = illium

43 = ischium

44 = acetabulum

45 = femur

46 = patella

47 = tibia

48 = fibula

49 = tibia and fibula

Element (continued):

50 = metatarsal

51 = metatarsal I

52 = metatarsal II

53 = metatarsal III

54 = metatarsal IV

55 = metatarsal V

56 = metacarpal

57 = metacarpal I

58 = metacarpal II

59 = metacarpal III

60 = metacarpal IV

61 = metacarpal V

62 = metapodial

63 = phalange

64 = 1st phalange

65 = 2nd phalange

66 = 3rd phalange

67 = rib

68 = sesamoid

69 = sternum

70 = synsacrum

71 = carpometacarpal

72 = tibiotarsus

73 = tarsometatarsus

74 = coracoid

75 = tibio-fibula

76 = urostyle

77 = plastron

78 = carapace

79 = dentary

80 = articular

81 = opercular

82 = preopercular

83 = pharyngeal

84 = pectoral spine

85 = anal spine

86 = dorsal spine

87 = scale

88 = neural

89 = pterygiophore

90 = furculum

91 = indet. vertebra

92 = beak

93 = shell

94 = indet. tooth

95 = 4th tarsal

96 = indet. fish spine

97 = clavicle

98 = cuneiform

99 = antler

100 = cleithrum

101 = central tarsal

102 = ulnar carpal

103 = cranium

104 = radial carpal

105 = petrosum

106 = scute

107 = pharyngeal tooth

108 = pleural

109 = nuchal

110 = quadrate

111 = fin ray

112 = auditory meatus

113 = 3rd carpal

114 = 2nd and 3rd tarsal

Frag 1:

1 = anterior

2 = posterior

3 = complete

4 = cranial

5 = caudal

6 = dorsal

7 = basal

8 = lingual

9 = buccal

Frag 2:

1 = proximal

Frag 2 (continued):

2 = distal

3 = shaft

4 = proximal & shaft

5 = distal & shaft

6 = unident. fragment

Frag 3:

1 = medial

2 = lateral

Symmetry:

1 = right

2 = left

Fusion, Proximal Epiphysis [Pfus]:

1 = unfused

2 = fusing

3 = fused

Fusion, Distal Epiphysis [Dfus]:

1 = unfused

2 = fusing

3 = fused

Tooth Position [Tpos]:

1 = upper

2 = lower

Tooth Number [Tnum]:

1 = first

2 = second

3 = third

4 = fourth

Tooth Type [Ttype]:

1 = permanent

2 = deciduous

Number of bones [Num]:

Actual number of bones fitting preceding description.

APPENDIX II

APPENDIX II: IDENTIFIED ELEMENTS FOR PIGS AND CATTLE

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
	2	015	0030		1		1	1					1
a		015	0030		3		1	1	1				1
a	1	014	0001	3									1
a	1	014	0001				1						1
a	1	014	0001				2	1	1				1
a	1	014	0001				2	1					1
a	1	014	0002				2						1
a	1	014	0002				2						1
a	1	014	0002										1
a	1	014	0002										1
a	1	014	0002				1						1
a	1	014	0002										1
a	1	014	0002										1
a	1	014	0002										1
a	1	014	0002				2						1
a	1	014	0002										1
a	1	014	0003				2						1
a	1	014	0003										1
a	1	014	0003				2						1
a	1	014	0003										1
a	1	014	0003										2
a	1	014	0005			2							1
a	1	014	0007				1						1
a	1	014	0007										1
a	1	014	0007				1						1
a	1	014	0007				2						1
a	1	014	0008				2						1
a	1	014	0009				2	0	0				1
a	1	014	0009	1			2						1
a	1	014	0010							1	1	1	1
a	1	014	0010				2			1	0	1	1
a	1	014	0010	3						1	1	1	1
a	1	014	0010	3			2			1	2	1	1
a	1	014	0010				2			1	3	1	1
a	1	014	0010	3			2			1	1	1	1
a	1	014	0010	3			1			1	2	1	1
a	1	014	0010	3			1			1	1	1	1
a	1	014	0010	3			1			2	3	1	1
a	1	014	0010	3						1	0	1	1
a	1	014	0010	3			1			2	2	1	1
a	1	014	0010	3			2			1	1	1	1
a	1	014	0010							1	3	1	1
a	1	014	0010	3						1	2	1	1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
a	1	014	0010							2	1	1	1
a	1	014	0010				1			2	2	1	1
a	1	014	0010	3						2	1	1	1
a	1	014	0010	3						2	2	1	1
a	1	014	0010	3			2			1	2	1	1
a	1	014	0010	3						1		1	1
a	1	014	0010	3						1	3	1	1
a	1	014	0010	3			2			2	1	1	1
a	1	014	0010	3			2			2	2	1	1
a	1	014	0010			2				1	1	1	1
a	1	014	0010				2			1	2	1	1
a	1	014	0010	3			2			1	1	1	1
a	1	014	0010	3			2			1	2	1	1
a	1	014	0010	3			2			1	2	1	1
a	1	014	0010	3						2		1	1
a	1	014	0010	3						2		1	1
a	1	014	0010		7		2			2	2	1	1
a	1	014	0011							1	0	1	1
a	1	014	0011							0	0	1	1
a	1	014	0011										1
a	1	014	0011				2			1	0	1	1
a	1	014	0011	3			1			2	1	1	1
a	1	014	0011	3			1			2	2	1	1
a	1	014	0011	3			1			2	3	1	1
a	1	014	0011	3			1			2	4	1	1
a	1	014	0011	3			2			1	0	1	1
a	1	014	0011	3						2		1	1
a	1	014	0011	3			2			2		1	1
a	1	014	0011	2			1		1				1
a	1	014	0011	3						1		1	1
a	1	014	0011	3			2			1		1	1
a	1	014	0011	3			1			1		1	1
a	1	014	0012							2	1	1	1
a	1	014	0012				2	0	0	1	1	1	1
a	1	014	0012	3			2			1	4	1	1
a	1	014	0012				2			1	2	1	1
a	1	014	0012				2			1	3	1	1
a	1	014	0012	3			1			1	1	1	1
a	1	014	0012				2	2	1				1
a	1	014	0012	3			2			1	4	1	1
a	1	014	0012							0	0	1	1
a	1	014	0012				1			1	1	1	1
a	1	014	0012				2	1	1				1
a	1	014	0012							2	2	1	1
a	1	014	0012							2	3	1	1
a	1	014	0012							2	4	1	1
a	1	014	0012	3			2			2	2	1	1
a	1	014	0012	3			2			2	3	1	1
a	1	014	0012	3			2			2	4	1	1
a	1	014	0012				2			1	2	1	1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
a	1	014	0012				2			1	3	1	1
a	1	014	0012	3			2	4	2				1
a	1	014	0012	3			1			1	2	2	1
a	1	014	0013	3			1			2	1	1	1
a	1	014	0013	3		1				2	2	1	1
a	1	014	0014							0	0	1	1
a	1	014	0014							0	0	1	1
a	1	014	0014							0	0	1	1
a	1	014	0014							1	2	1	1
a	1	014	0014				1	0	0	1	3	1	1
a	1	014	0014				1	0	0	1	2	1	1
a	1	014	0014				2	0	0	1	0	1	1
a	1	014	0014	3						1	1	1	1
a	1	014	0014				2			1	2	1	1
a	1	014	0014	3			1			2	3	1	1
a	1	014	0014				2			1	1	1	1
a	1	014	0014						1				1
a	1	014	0014	3			1			1	2	1	1
a	1	014	0014	3			1						1
a	1	014	0014				1			2	3	1	1
a	1	014	0014	2									1
a	1	014	0014				1			1	1	1	1
a	1	014	0014							2	1	1	1
a	1	014	0014							2	2	1	1
a	1	014	0014	3			2			2	1	1	1
a	1	014	0014	3			2			2	2	1	1
a	1	014	0014	3			2			2	3	1	1
a	1	014	0014				1			1	2	1	1
a	1	014	0014				1			1	3	1	1
a	1	014	0014		7		2			1	1	1	1
a	1	014	0014		7					2	3	1	1
a	1	014	0014	2	7		1			1	2	1	1
a	1	014	0014		7		2			1	2	1	1
a	1	014	0016				1						1
a	1	014	0020										1
a	1	014	0020				1						1
a	1	014	0020										1
a	1	014	0020	2			1						1
a	1	014	0020		1		1						1
a	1	014	0020				1						1
a	1	014	0020										1
a	1	014	0020	1			2						1
a	1	014	0020	7			2						1
a	1	014	0020				2						1
a	1	014	0020	2									1
a	1	014	0020		3								1
a	1	014	0021										1
a	1	014	0021										
a	1	014	0021	2	0	0							1
a	1	014	0021				2	0	0				1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
a	1	014	0021				1						1
a	1	014	0022				2						1
a	1	014	0024				3	0	0				1
a	1	014	0025										2
a	1	014	0025	7			3						1
a	1	014	0025	3			0	2	2				1
a	1	014	0025			2	3						1
a	1	014	0025	7									1
a	1	014	0025	3									1
a	1	014	0025	6									1
a	1	014	0025			2							1
a	1	014	0025			2							1
a	1	014	0026				2	0	0				1
a	1	014	0026				2	0	0				1
a	1	014	0026	3									1
a	1	014	0026	2									1
a	1	014	0026			2							1
a	1	014	0026	3									1
a	1	014	0026			2							1
a	1	014	0027				2	0	0				1
a	1	014	0028	3									1
a	1	014	0029		1		1	0					1
a	1	014	0029	5									1
a	1	014	0029	4			2						1
a	1	014	0029		3		2	1					1
a	1	014	0029		1		2	1					1
a	1	014	0030		4		2	0	0				1
a	1	014	0030	2	3		2	0	0				1
a	1	014	0030	1	3		2	0	0				1
a	1	014	0030	2	3	1	2						1
a	1	014	0030		3		2	1	1				1
a	1	014	0031		2		1	0	1				1
a	1	014	0031		2		2						1
a	1	014	0031		3								1
a	1	014	0031		3		1						1
a	1	014	0031		3		1						1
a	1	014	0032				1	3	0				
a	1	014	0032		3								1
a	1	014	0032		1		2	3					1
a	1	014	0032		3		2						1
a		014	0037		5		1	0	0				1
a	1	014	0037	3			1	0	1				1
a	1	014	0037				1						1
a	1	014	0038	3			1						1
a	1	014	0038	3			1						1
a	1	014	0038	2			2						1
a	1	014	0040				1	2	0				1
a	1	014	0040	3			1	3					1
a	1	014	0040				2	3					1
a	1	014	0041	3			2	1	1				1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
a	1	014	0041				2	1					1
a	1	014	0042	2			3	0	0				1
a	1	014	0042				1						1
a	1	014	0043	1			2						1
a	1	014	0044				2	1	1				1
a	1	014	0044				2	3					1
a	1	014	0045		3		1						1
a	1	014	0045		4		1	2	0				1
a	1	014	0046										1
a	1	014	0047		2		1	0	3				1
a	1	014	0047		1		1	1	0				1
a	1	014	0047		5		2		1				1
a	1	014	0047		5		1	0	1				1
a	1	014	0047		3		1						1
a	1	014	0047		1		1	1	0				1
a	1	014	0047	3			2	1	3				2
a	1	014	0047		2		1		3				1
a	1	014	0047		4		1	2					1
a	1	014	0047		3		1						1
a	1	014	0048		3		1						1
a	1	014	0048		3		1						1
a	1	014	0048		3		1						1
a	1	014	0048		3		2						1
a	1	014	0048		3		1						1
a	1	014	0048		5		1		3				1
a	1	014	0052	3			2	3	0				1
a	1	014	0052	3			1	1					1
a	1	014	0052	3			2	1					1
a	1	014	0053	3			2	0	1				1
a	1	014	0053	3			2	0	2				1
a	1	014	0053	3			1	0	2				1
a	1	014	0053		4		1	0	2				1
a	1	014	0053	3			2	0	2				1
a	1	014	0053		5		1		1				1
a	1	014	0054		1		2	0	0				1
a	1	014	0054	3			1	0	2				1
a	1	014	0054	3			1	0					
a	1	014	0054	3			2	0	1				1
a	1	014	0054		4		2	1	0				1
a	1	014	0055	3			2	1	0				1
a	1	014	0055	3			1	0	3				1
a	1	014	0055		4								1
a	1	014	0055		5		1						1
a	1	014	0055	3			1	1					1
a	1	014	0058	3			1	1	0				1
a	1	014	0058	3			1	1	0				1
a	1	014	0059	3			2	0	3				1
a	1	014	0059	3			1	0	1				1
a	1	014	0059	4			1						1
a	1	014	0059	3			2		2				1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
a	1	014	0064				1	0	0				1
a	1	014	0060		4		1						1
a	1	014	0060	3			2	0	1				1
a	1	014	0060	3			1	0	2				1
a	1	014	0060	3			1		1				1
a	1	014	0061	3			1	1	0				1
a	1	014	0061	3			1	0	1				1
a	1	014	0061		5		2						1
a	1	014	0061	3			1	1					1
a	1	014	0062		4		0	0	1				1
a	1	014	0062		3								1
a	1	014	0062		2		0	0	1				1
a	1	014	0062		2				1				1
a	1	014	0062										1
a	1	014	0062		1		0	1	0				1
a	1	014	0062		1			1					1
a	1	014	0062		2				1				1
a	1	014	0062		5				2				1
a	1	014	0062		3				1				1
a	1	014	0062		3								1
a	1	014	0062		2				1				1
a	1	014	0062		1				1				1
a	1	014	0063		4		2						1
a	1	014	0064	3			0	3	0				1
a	1	014	0064	3			0	3	0				1
a	1	014	0064	3			0	3	0				1
a	1	014	0064	3					1				1
a	1	014	0064	3				1	1				1
a	1	014	0065	3			0	3	0				1
a	1	014	0065	3			0	3	0				1
a	1	014	0065	3			0	3	0				1
a	1	014	0065				0	3	0				1
a	1	014	0065	3				2					1
a	1	014	0065	3									1
a	1	014	0065	3									1
a	1	014	0065	3				3					1
a	1	014	0066	3									1
a	1	014	0066	3									1
a	1	014	0066	3									1
a	1	014	0066	3									1
a	1	014	0066	3									1
a	1	014	0066	3				3					1
a	1	014	0067		3								1
a	1	014	0067		2								1
a	1	014	0067		3								1
a	1	014	0067		3		2						1
a	1	014	0067		3		1						2
a	1	014	0067		3		1						1
a	1	014	0067		4		2						1
a	1	014	0068	3									1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
a	1	014	0069										1
a	1	014	0091	7									3
a	1	014	0091			3	3						1
a	1	014	0094										2
a	1	014	0094										1
a	1	014	0094										3
a	1	014	0094						1				1
a	1	014	0094									1	1
a	1	014	0095	3			1	0	0				1
a	1	014	0103				1	1	1				1
a	1	014	0105	3									1
a	1	014	0108	3			1						1
a	1	014	0109	3			1						1
a	1	015	0004				1						1
a	1	015	0005	6									1
a	1	015	0008										1
a	1	015	0012				1	0	0	2	2	2	1
a	1	015	0012				1	0	0	2	3	2	1
a	1	015	0012				1	0	0	2	4	2	1
a	1	015	0012	3						0	0	1	1
a	1	015	0014				1	0	0				1
a	1	015	0014				1	0	0	2	2	1	1
a	1	015	0014				1	0	0	2	3	1	1
a	1	015	0019				2	0	0				1
a	1	015	0019				1						1
a	1	015	0020	4	3		1						1
a	1	015	0020				1	0	0				1
a	1	015	0020		3								1
a	1	015	0021	2			1						1
a	1	015	0021	7			1						1
a	1	015	0024			2							1
a	1	015	0025	6			3						1
a	1	015	0025	6									1
a	1	015	0025			2	1						1
a	1	015	0025										1
a	1	015	0025	6									1
a	1	015	0025	6									1
a	1	015	0025	6									1
a	1	015	0025	6									1
a	1	015	0025		6								1
a	1	015	0026			2	2						1
a	1	015	0029	4	3		1	0	0				1
a	1	015	0029	5	3		2						1
a	1	015	0029	5	1		1	0	0				1
a	1	015	0029	5									1
a	1	015	0029	4	2		1						1
a	1	015	0029	5	3		2						1
a	1	015	0029		3								1
a	1	015	0029		3		2						1
a	1	015	0029	2	3								1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
a	1	015	0029		3								1
a	1	015	0029		3		1						1
a	1	015	0030		3		2	0	0				1
a	1	015	0030		3								1
a	1	015	0031		3		1						1
a	1	015	0037		4		2						1
a	1	015	0041			1	1						1
a	1	015	0041			1	1						1
a	1	015	0044				2	3	0				1
a	1	015	0044				2	3	3				1
a	1	015	0045				2	1	0				1
a	1	015	0045		3	2	1						1
a	1	015	0046	3			3						1
a	1	015	0047	2	3		2						1
a	1	015	0047		5		2		1				1
a	1	015	0050		4		1						1
a	1	015	0056		3								1
a	1	015	0067										1
a	1	015	0067	3									1
a	1	015	0067										1
a	1	015	0067		3								1
a	1	015	0067		3								1
a	1	015	0067		2								1
a	1	015	0067		3		2						1
a	1	015	0067		3		1						1
a	1	015	0067		4		1	1					1
a	1	015	0067		3		1						1
a	1	015	0067		1		2						1
a	1	015	0067		3								1
a	1	015	0067		1		2	1					1
a	1	015	0067		5								1
a	1	015	0098	3			1	0	0				1
a	1	015	0102				1						1
a	4	014	0011		6					0	1	1	1
a	4	014	0011	3			2			1	1	1	1
a	4	014	0012	8			1			2	4	1	1
a	4	014	0047		2		1	0	1				1
a	4	014	0094							0	0	1	2
a	4	014	0101	3			1	0	0				1
b	1	014	0001				1						1
b	1	014	0002										1
b	1	014	0003				1						1
b	1	014	0010							1		1	1
b	1	014	0010	3			2			2	3	1	1
b	1	014	0010	3			2			1	1	1	1
b	1	014	0010		3					2		1	1
b	1	014	0010	3			1			1	2	1	1
b	1	014	0010	3			1	3	1				1
b	1	014	0010	3			2			1	1	1	1
b	1	014	0010		3		1			1	1	1	1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
b	1	014	0010				2			2	3	1	1
b	1	014	0010	3			2	2	1				1
b	1	014	0010	3			2			2	3	1	1
b	1	014	0010				2			2	2	1	1
b	1	014	0010	3			1			1	1	1	1
b	1	014	0010		7		2			2	2	1	1
b	1	014	0011		6					2		1	1
b	1	014	0011				1			2		1	1
b	1	014	0012				1			1	2	1	1
b	1	014	0012		7		2			1	3	2	1
b	1	014	0012	3			1			2	3	1	1
b	1	014	0012				1			1	2	1	1
b	1	014	0014	3			1			2	1	1	1
b	1	014	0014				1			2	1	1	1
b	1	014	0014				1			2	3	1	1
b	1	014	0014	3			2						1
b	1	014	0025										1
b	1	014	0030		2		2		3				1
b	1	014	0031		3								1
b	1	014	0032		3	2	1						1
b	1	014	0045		3	2	1						1
b	1	014	0048		3		2						1
b	1	014	0048		3		2						1
b	1	014	0048		3		1						1
b	1	014	0053	3			1	1					1
b	1	014	0055		4		1						1
b	1	014	0061		1		2						1
b	1	014	0062	3				4	1				1
b	1	014	0067		3		1						1
b	1	014	0067		3								1
b	1	014	0094		7								1
b	1	014	0094									1	1
b	1	014	0094	3									1
b	1	015	0012	3			1			1	2	1	1
b	1	015	0014		7		2			2	2	1	1
b	1	015	0025	6									1
b	1	015	0026		6								1
b	1	015	0029		3								1
b	1	015	0031		1		1						1
b	1	015	0064		2								1
b	1	015	0064		2								1
b	1	015	0064		2			3					1
b	1	015	0065	3									1
b	1	015	0067		3								1
b	1	015	0067		3								1
b	1	015	0067		3								1
b	4	014	0002				2						1
b	4	014	0010	3			1			1	1	1	1
b	4	014	0010	3			1			2	3	1	1
b	4	014	0010	3			2	3	1				1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
b	4	014	0010	3			1			2	1	1	1
b	4	014	0011		7		2			2		1	1
b	4	014	0012	3			2			1	3	1	1
b	4	014	0030	2	3		1						1
b	4	015	0014		7					2		1	1
b	4	015	0021				1						1
b	4	015	0029	5	3		2						1
b	4	015	0029	4									1
b	4	015	0112	3			2						1
b	6	014	0010		7		2			2	2	1	1
b	6	014	0010	3			1			2	2	1	1
b	6	014	0014		8							1	1
b	6	014	0014		7		1			1	3	1	1
b	6	014	0030		3		2						1
b	6	014	0032		3		2						1
b	6	014	0054		4		2						1
c	1	014	0069	3									1
c	1	015	0065	1		2		3					1
c	2	014	0006				2	1					1
c	2	014	0007										1
c	2	014	0009				1						1
c	2	014	0009				1						1
c	2	014	0009										1
c	2	014	0010	3			1			2	2	1	1
c	2	014	0010		7					2		1	1
c	2	014	0010	3			2			1	2	1	1
c	2	014	0010	3			2		2				1
c	2	014	0010	3			2			1	1	1	1
c	2	014	0011				2			1		1	1
c	2	014	0011		7		1			1		1	1
c	2	014	0011		7		1			1		1	1
c	2	014	0011	3			2			1		1	1
c	2	014	0011							2		1	1
c	2	014	0012	3			1			1	3	1	1
c	2	014	0012	3			1			1	4	1	1
c	2	014	0012	3			2			1	2	1	1
c	2	014	0012		7					1		1	1
c	2	014	0012				2			1	3	1	1
c	2	014	0012									1	1
c	2	014	0012	3			2			1	4	1	1
c	2	014	0012	3			1			2	3	1	1
c	2	014	0012	3			1			1	3	1	1
c	2	014	0012	3			1			1	4	1	1
c	2	014	0014	3			2			1	2	1	1
c	2	014	0014		7		1			2	3	1	1
c	2	014	0014		7				1				1
c	2	014	0014	3			2			2	2	1	1
c	2	014	0014		7		1			1	2	1	1
c	2	014	0014		7							1	1
c	2	014	0015				1						1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
c	2	014	0020			1							1
c	2	014	0021				1						1
c	2	014	0024			2							1
c	2	014	0030		3		1						1
c	2	014	0030		3		1		3				1
c	2	014	0031		4		2						1
c	2	014	0032			3	1	2					1
c	2	014	0032		4		1	3					1
c	2	014	0040				1						1
c	2	014	0047		1		2	1					1
c	2	014	0048		3		1						1
c	2	014	0062		2							1	1
c	2	014	0062		3							1	1
c	2	014	0062		1			1					1
c	2	014	0062		2				1				1
c	2	014	0064	3				3					1
c	2	014	0065	3									1
c	2	014	0065		4								1
c	2	014	0094		7							1	3
c	2	014	0094		8								1
c	2	014	0094									1	3
c	2	014	0094									1	2
c	2	015	0030		2		2						1
c	2	015	0062		2								1
c	2	015	0063		5								1
c	2	015	0064		1			3					1
c	2	015	0064			2		1					1
c	2	015	0065	3									1
c	2	015	0066	3									1
c	2	015	0067		3								1
c	3	014	0032		3	2	1						1
c	4	014	0010	3			2			1	3	1	1
c	4	014	0010	3			1			1	1	1	1
c	4	014	0029	5	3		2						1
c	4	015	0047	2	3		2						1
c	8	014	0014		7							1	1
c	8	014	0048		3		2						1
c	8	014	0113	3			1						
c	8	015	0066	3									1
d	4	014	0014	3			1			1	2	1	1
d	6	014	0007				1						1
d	6	014	0010	3			2		1				1
d	6	014	0014										1
d	6	014	0014		7		1			1	2	1	1
d	6	014	0014		7		2			1	2	1	1
d	6	014	0014		7								1
d	6	014	0058	5			2						1
d	6	014	0062	1				1					1
d	6	014	0108	3			1						1
d	6	014	7								1	1	

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
d	6	015	0028										1
d	6	015	0030	1	3		1						1
d	6	015	0032	2			2		1				1
d	6	015	0114	3			1						1
e	4	014	0005				1						1
e	4	014	0009				1						1
e	4	014	0010	2						2		1	1
e	4	014	0012	3			1			1	2	1	1
e	4	014	0012	3			1			1	3	1	1
e	4	014	0012	3			1			1	4	1	1
e	4	014	0012	3			1			2	3	2	1
e	4	014	0025	6									1
e	4	014	0029		3		1						1
e	4	014	0032	3		1	4	1					1
e	4	014	0038	2			1						1
e	4	014	0045		3		1						1
e	4	014	0048		3								1
e	4	014	0055		2		1						1
e	4	014	0064		1			1					1
e	4	014	0065	3				3					1
e	4	014	0065		3			1					1
e	4	015	0014	3			1			2	3	1	1
e	4	015	0029		3								1
e	5	014	0012	3			1			1	3	2	1
e	5	014	0012	3			1			1	4	2	1
e	5	014	0065	3				1					1
e	5	014	0066					3					1
h	1	014	0001	1			2						1
h	1	014	0007				1						1
h	1	014	0010	3			1			1	1	1	1
h	1	014	0011							2		1	1
h	1	014	0011									1	1
h	1	014	0014		7		1			1	3	1	1
h	1	014	0014		7							1	1
h	1	014	0014				2			1	2	1	1
h	1	014	0014									1	1
h	1	014	0014									1	1
h	1	014	0014				1			1	3	1	1
h	1	014	0014				1			1	3	1	1
h	1	014	0030		3		2						1
h	1	015	0021				2						1
h	4	014	0010	3			2			2	1	1	1
h	4	014	0010	3			2			2	3	1	1
h	4	014	0011	3			2			1		1	1
h	4	014	0014		7							1	1
h	4	014	0014		7		1			2	3	1	1
h	4	014	0020	1			2						1
h	4	014	0062		3								1
h	4	015	0026		2								1
h	4	015	0067		4		2						1

area	date	gensp	element	frag1	frag2	frag3	sym	pfus	dfus	tpos	tnum	ttype	num
h	6	014	0010	3		2				2	1	1	1
h	6	014	0010	3			2			1	1	1	1
h	6	014	0014		8					2	2	1	1
h	6	014	0014	2	8								1
h	6	015	0014	3			1			2	2	1	1
h	8	014	0011				1			1		1	1
h	8	014	0014		7							1	1

VITA

Justin Samuel Elan Lev-Tov was born on April 29, 1967, in Washington, D.C. and lived in the area until moving to Israel in 1969. Justin lived in Israel for two years and then returned to the United States with his family in 1971. He grew up in Silver Spring, Maryland, where he attended Cresthaven Elementary School, Francis Scott Key Junior High School, and Springbrook High School. During high school, Justin was active in the Daniel AZA chapter of B'nai Brith Youth Organization, serving as treasurer for one year. In May of 1985 he was graduated from Springbrook and entered the University of Maryland, College Park, where he majored in Anthropology.

While in college, Justin had the opportunity to intern at the Smithsonian Institution's National Museum of Natural History, an experience that stimulated his interest in archaeology. He finished his Bachelor of Arts degree at the University of Maryland in May of 1990. Justin entered graduate school at the University of Tennessee, Knoxville, in August of 1990 and focused his studies on zooarchaeology. He was awarded a graduate assistantship under Dr. Walter E. Klippel for the 1992-1993 school year. Justin was graduated with a Master of Arts degree with a major in Anthropology in May, 1994.