A Zooarchaeological Analysis of the Mississippian Faunal Remains from the Normandy Reservoir

Neil Douglas Robison
University of Tennessee, Knoxville

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Charles H. Faulkner, Major Professor

We have read this thesis and recommend its acceptance:

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Accepted for the Council:

[Signature]

Vice Chancellor
Graduate Studies and Research
A ZOOARCHAEOLOGICAL ANALYSIS OF THE MISSISSIPPIAN FAUNAL REMAINS FROM THE NORMANDY RESERVOIR

A Thesis
Presented for the
Master of Arts
Degree
The University of Tennessee, Knoxville

Neil Douglas Robison
June 1977
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ABSTRACT

The faunal remains from the Mississippian components on three archaeological sites (40CF111, 40CF32, and 40CF5) along the Duck River in the Normandy Reservoir, Coffee County, Tennessee, were analyzed for this study. From the three sites combined, 56,664 pieces of bone were examined of which 1,903 were identifiable to at least the family level; a minimum of 18 species of mammals, 5 birds, 7 reptiles, 4 amphibians, and 8 species of fish were represented. In addition, 4,922 identifiable gastropod shells from 12 species and 30 freshwater mussel valves from 4 species were identified from 40CF111 and 40CF32. The faunal species represented at each site were similar enough in overall composition to be considered as depicting a typical Mississippian hunting pattern for the upper Duck River area. Large vertebrates, especially the white-tailed deer, were found to have been the major sources of meat, but smaller vertebrates and mollusks were utilized consistently and were an important source of additional protein in the Mississippian diet.

Also discussed are the Mississippian faunal exploitative patterns and the possible alterations that the raising of domestic plants (especially maize) had upon these patterns. This author hypothesizes that with the introduction of maize agriculture, there were no major selection changes in the overall types of game species hunted. At most, there might have been a slight rescheduling of the times when hunting was conducted. This hypothesis is in opposition to proposals that the introduction of agriculture brought about a focus of hunting on only a few of the larger game species which yielded greater amounts of meat.
Based on the numerous faunal reports for archaeological sites in eastern North America, there appears to have been a consistent hunting pattern for the aboriginal inhabitants from the Archaic cultural period through the Mississippian period.
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CHAPTER I

GENERAL SETTING

Introduction

Archaeological investigation in the Normandy Reservoir on the Duck River in Coffee County, Tennessee, was conducted by the University of Tennessee under the supervision of Drs. Charles H. Faulkner and Major C. R. McCollough from the years 1970 through 1975. During this period 25 sites were excavated, only four of which contained significant Mississippian cultural components. These four sites were the Parks site (40CF5), Eoff I site (40CF32), Banks III site (40CF108), and Banks V site (40CF111). Three of these sites (40CF5, 40CF32, and 40CF111) yielded quantities of Early Mississippian material remains (ca. A.D. 900 or earlier), while the Banks III component appears to be somewhat later (ca. A.D. 1200-1300). Faulkner and McCollough (1974: 580) have classified the Early Mississippian material in the Normandy Reservoir as the Banks phase. Unless otherwise noted, the following description of the Banks phase is taken from an unpublished manuscript by Faulkner (n.d.).

Radiocarbon dates for the Banks phase are very early with most dates falling before A.D. 1000. Cultural evidence in conjunction with these radiocarbon dates suggest that the Mississippian peoples moved into the upper Duck River locality about A.D. 800-900 at a time when the area was sparsely populated. The Banks phase settlement pattern appears to consist of small farmsteads of one or a very few houses located on first terraces overlooking the river floodplain. House types were generally
wall-trench or single post structures with open corners or a side entrance. Surrounding most of the houses are a number of shallow, amorphous shaped, refuse-filled pits that may have originally been borrow pits for wall daub. Few formal features have been found for Banks phase sites. The exception to this is a type of large, cylindrical storage pit or silo found on 40CF111 and 40CF32 and probably used for the storage of maize. Charred maize, in fact, is in evidence on all four Mississippian sites.

Material cultural remains for the Banks phase are similar to those of Early Mississippian cultures in the eastern Tennessee Valley (Lewis and Kneberg 1946; Salo, ed. 1969). The most common shell-tempered pottery vessels are plain loop handled jars and simple bowls. Salt-pan vessels are rare, and a blank-faced, hooded water bottle was recovered on only one of these Mississippian sites. Small, sometimes serrated, triangular arrow points, pointed poll celts, perforated mussel shells, and clay beads are also characteristic artifacts of the Banks phase.

This study involves a detailed examination of the Mississippian faunal remains from the Normandy Reservoir. Only the Parks site (40CF5), the Eoff I site (40CF32), and the Banks V site (40CF111) yielded sufficient Mississippian faunal remains to warrant an intensive analysis. It is important for a number of reasons that the faunal remains from these three sites be examined. First, to properly reconstruct the lifeway of the Mississippian peoples in the upper Duck River Valley, it is essential to know what animals occurred in the environment in which these people lived and which of these animals were being exploited for food and other purposes. Such an analysis would also verify the actual presence or absence of the faunal complex hypothesized by Faulkner and McCollough
(1973: 34-51) to have existed in the Normandy Reservoir during aboriginal occupation. The examination of the faunal remains from these sites will endeavor not only to show how extensively certain animals were being exploited by the Mississippian Indians, but also will attempt to answer questions about butchering patterns, minimum numbers of animals represented in the samples, and meat yield for the minimum numbers present. After describing the faunal exploitative patterns of the Mississippian peoples in the Normandy Reservoir area, their exploitative patterns will be compared to those of other aboriginal groups in the Southeast. Based on the above data, the hypotheses of Charles E. Cleland, who suggests that Mississippian peoples in eastern North America had a focal economy and exploited few meat resources other than white-tailed deer, will also be critically examined.

Environmental Background

The following environmental description of the upper Duck River Valley and Normandy Reservoir is drawn from Faulkner and McCollough (1973: 1-51) unless otherwise noted. Rather than repeat verbatim the detailed description of the environment given by them, only a skeletal outline will be proffered here. However, more detail will be devoted to the faunal lists enumerated by Faulkner and McCollough. The fauna they hypothesized as being exploited will later be compared with the actual animals found by the author as having been utilized by the Mississippian peoples in the Normandy Reservoir area.

The Tennessee Valley Authority's Normandy Dam and Reservoir was installed on the upper Duck River in Coffee County, Tennessee, with the
dam being located approximately eight miles north of Tullahoma, Tennessee (Figure 1) (Faulkner and McCollough 1973: xi). The section of the upper Duck River Valley inundated by the Normandy Reservoir lies in a transitional zone between the Nashville Basin and the Eastern Highland Rim physiographic sections of the Interior Low Plateaus physiographic province (Fenneman 1938). The valley floor is in the Nashville Basin while the surrounding ridges are part of the Highland Rim. Four biogeographical zones are found in this portion of the upper Duck Valley affected by the river impoundment: flood plain, older alluvial terraces, valley slopes and bluffs, and uplands. These varied biogeographical zones would have supplied a diverse number of faunal and floral eco-niches readily accessible for exploitation by the aboriginal inhabitants.

All three of the Mississippian sites under examination, 40CF5, 40CF32, and 40CF111, are located on the first river terrace in what is known as the "lower" reservoir zone (Figure 2). Faulkner and McCollough (1973: 333) define the "lower" reservoir zone as " . . . the Duck Valley below Carroll Creek where the flood plain is wider and the dissection of the bordering upland is intense . . . " The "upper" Duck Valley above Carroll Creek has narrow flood plains bordering the river. This distinction in the breadth of the flood plains is thought to be important because:

. . . the wider flood plain in the lower reservoir could have been more suitable for primitive horticulture whereas the narrower upper valley may have dictated the use of the flood plain for habitation since flooding may have been less intense and the higher terraces more restricted (Faulkner and McCollough 1973: 333).

Since 40CF5, 40CF32, and 40CF111 were the only excavated sites in the Normandy Reservoir to show substantial Mississippian occupations and
FIGURE I. LOCATION OF NORMANDY RESERVOIR

- CUMBERLAND PLATEAU
- HIGHLAND RIM
- NASHVILLE BASIN
Figure 2. Location of 40CF111, 40CF32, and 40CF5 in the lower Normandy Reservoir.
evidence of horticulture, their location in the broader flood plains of the lower reservoir would appear to support Faulkner and McCollough's hypothesis of the lower reservoir zone being more amenable to horticulture. The soil type of these sites would also be an important factor since primitive farmers could not have worked heavy clay soils with their simple agricultural techniques (Ward 1965: 43). The Armour silt loam soil on which 40CF5, 40CF32, and 40CF111 are located is a rich, easily worked soil that Ward (1965) sees as being one of the preferred soil types for Mississippian farmers.

Climatic conditions for the Normandy Reservoir area correspond to Koppen's (1931) designation of a humid, mesothermal subtropical climate. These climatic conditions in turn help to determine the makeup of the biota in the reservoir area. The Normandy Reservoir is located in the Carolinian biotic province, with a forest type of predominantly deciduous trees (Dice 1943). The prevailing deciduous forests of the Carolinian biotic province have been further divided into several forest regions. There is some question about the dominant forest type in the Normandy Reservoir area. The upper Duck Valley appears to lie in an ecotone area between the Mixed Mesophytic and the Western Mesophytic forest types (Braun 1950). DeSelm (C. H. Faulkner, personal communication) sees the Western Mesophytic forest extending from the Nashville Basin to the western edge of the Cumberland Plateau, while Braun (1950) sees the break between the Western and Mixed Mesophytic forests occurring at the transition between the dissected Highland Rim and the Nashville Basin. In either case, it would appear that the Mississippian sites under consideration lie within a portion of the Western Mesophytic forest type.
Regardless of where the transition between the Mixed and Western Mesophytic forests occurs, the Western Mesophytic forest itself is considered to be a rich ecotone between the Mixed Mesophytic forest to the east and the Oak-Hickory forest region to the west (Braun 1950: 35). The possibility of the Normandy Reservoir lying within an ecotone area is especially important since ecotones may have had greater carrying capacities for the aboriginal populations because of the increased number of plant and animal species they usually support.

In their description of the environment of the Normandy Reservoir, Faulkner and McCollough (1973: 34–41) listed the fauna that may have been available to the aboriginal inhabitants of the upper Duck River. There are a number of corrections that need to be made to this list. These consist mainly of species additions, especially for the mollusca and reptiles. A relisting of the fauna will also be useful in that the author plans later to compare the species found during his analysis with those Faulkner and McCollough hypothesized might have been exploited by the Normandy Reservoir inhabitants.

According to the listing given by Faulkner and McCollough (1973: 35), which they drew primarily from the TVA Final Environmental Statement Duck River Project (1972: L-9), the gastropods found in the Duck River today are *Pleurocera canaliculatum*, *Anculosa umbilicata*, *Goniobasis laqueata*, *Lithasia duttoniana*, *Lithasia fuliginosa*, *Leptoxis praerosa*, *Campeloma sp.*, *Lioplax sp.*, *Viviparus sp.*, *Physa sp.*, *Planorbis sp.*, *Gyraulus sp.*, *Helisoma sp.*, *Ferrissia sp.*, and *Lymnea sp*. Pelecypod fauna of the Duck River as listed in the TVA Duck River environmental impact statement (1972: L-9) and recorded by Faulkner and McCollough (1973: 35) include

An investigation of the published literature on the naiad fauna of the Duck River shows there are, or at least were, 25 mussel species present in addition to those listed in the TVA environmental impact statement and by Faulkner and McColough. The additional mussel species were compiled from reports by Ortmann (1924), Isom and Yokley (1968), and van der Schalie (1973). The 25 additional Duck River mussel species include Fusconaia barnesiana, Quadrula intermedia, Plethobasus cooperianus, Lexingtonia dolabelloides, Pleurobema oviforme, P. cordatum, Elliptio dilatatus, Lastena lata, Anodonta grandis, A. imbecillis, Alasmidonta calceolus, A. marginata, Ptychobranchus fasciolare, Actinonaias pectorosa, Carunculina moesta, Conradilla caelata, Medionidus conradicus, Villosa fabalis, V. iris nebulosa, V. taeniata, V. vanuxemi, Lampsilis fasciola, Dysnomia brevidens, D. florentina, and D. capsaeformis. It should also be noted at this point that the mussel species Corbicula manilensis, mentioned by Faulkner and McColough (1973: 35), is a recently introduced species, having its origin in the Old World.
The 54 aforementioned naiad species show the Duck River to be a very rich stream in the diversity of its mussel fauna, but it must be realized that this includes the Duck River system as a whole. The upper Duck River does not contain the total mussel fauna that the river as a whole supports. In fact, during their collections Ortmann (1924) and Isom and Yokley (1968) found considerably fewer naiad species in what is now the general locality of the Normandy Reservoir. In their Duck River collections, Isom and Yokley attempted to collect mussels at the same stations as did Ortmann in 1924. Isom and Yokley (1968: 36-38) list in their tables both the species they collected at certain river stations and those taken by Ortmann at approximately the same localities. Station 11 for Isom and Yokley (1969: 39) was upstream from the bridge at Normandy, Bedford County, Tennessee, on Duck River mile 245.5. Species collected from Station 11 by Ortmann and Isom and Yokley include Fusconaia barnesiana, Alasmidonta calceolus, Obovaria subrotunda, Actinonaias pectorosa, Medionidus conradicus, Villosa taeniata, V. vanuxemi, Lampsilis fasciola, Dysnoria capsaeformis, D. florentina, and Ptychobranchus subtentum. Isom and Yokley's (1968: 40) Station 12, which is located below Hiles Bridge on Duck River mile 249, Coffee County, Tennessee, was situated as closely as possible to Ortmann's original station in that locality. While Ortmann (1924: 28) found only two mussel species at this station, Carunculina cylindrella and Lexingtonia dolabelloides conradi, Isom and Yokley (1968: 40) collected Fusconaia barnesiana, Alasmidonta calceolus, Obovaria subrotunda, Actinonaias pectorosa, Medionidus conradicus, Villosa vanuxemi, Lampsilis fasciola, Dysnoria florentina, and D. capsaeformis. If the historic collections of mussels from
Stations 11 and 12 reflect the state of the naiad fauna in the Normandy Reservoir area during the prehistoric period, there were only a very limited number of naiad species available for human exploitation in the upper Duck River. The 13 mussel species collected at Stations 11 and 12 are small river or headwater forms that grow to only a small physical size. Since the upper Duck River contained only a very few mussel species, most of which attained only a small physical size, it is doubtful that freshwater mussels played an important part in the diet of the Mississippian Indians that occupied 40CF5, 40CF32, and 40CF111. Quite probably, freshwater mussels were a very minor dietary supplement and collected only infrequently.

When Faulkner and McCollough (1973: 36) described the fish that might have been utilized by the aboriginal occupants of the upper Duck Valley, they stated that 107 species of fish had been reported in the Duck River. Recent discussions with D. A. Etnier (personal communication) revealed that the number of reported fish species in the Duck River has been expanded to 122 with another 9 fish species expected to occur in the Duck River system but as yet not actually found. Faulkner and McCollough (1973: 36) list the following rough fishes as occurring in the Duck River and having potential as food sources for the Indian occupants: spotted gar (*Lepisosteus oculatus*), longnose gar (*Lepisosteus osseus*), gizzard shad (*Dorosoma cepedianum*), threadfin shad (*Dorosoma petenense*), river carpsucker (*Carpiodes carpio*), highfin carpsucker (*Carpiodes velifer*), white sucker (*Catostomus commersoni*), creek chub-sucker (*Erimyzon oblongus*), northern hog sucker (*Hypentelium nigricans*), smallmouth buffalo (*Ictiobus bubalus*), spotted sucker (*Minytrema melanops*), silver
The following are the game fish that Faulkner and McCollough (1973: 36) feel were probably utilized by the Duck River peoples: redfin pickerel (Esox americanus), chain pickerel (Esox niger), rock bass (Ambloplites rupestris), green sunfish (Lepomis cyanellus), warmouth (Lepomis gulosus), orangespotted sunfish (Lepomis humilis), bluegill (Lepomis macrochirus), longear sunfish (Lepomis megalotis), redear sunfish (Lepomis microlophus), smallmouth bass (Micropterus dolomieui), spotted bass (Micropterus punctulatus), largemouth bass (Micropterus salmoides), white crappie (Pomoxis annularis), sauger (Stizostedion canadense), and freshwater drum (Aplodinotus grunniens). Along with these game fish, Etnier anticipates that the walleye (Stizostedion vitreum) may also be found in the Duck River. Thus, of a possible 122
species of fish, 47 species of rough and game fish are seen as the species most likely to have been utilized. These species will later be compared to those actually found in Mississippian features.

Faulkner and McCollough (1973) do not mention amphibians in the Normandy Reservoir faunal description, but the author will do so here as a number of amphibian remains were recovered and identified on the Mississippian sites. According to the TVA Final Environmental Statement Duck River Project (1972: I-9), the amphibians inhabiting the Duck River area are as follows: pickerel frog (*Rana palustris*), green frog (*Rana clamitans melanota*), bullfrog (*Rana catesbeiana*), northern cricket frog (*Acris crepitans crepitans*), upland chorus frog (*Pseudacris triseriata feriarum*), spring peeper (*Hyla crucifer*), eastern gray treefrog (*Hyla versicolor versicolor*), northern leopard frog (*Rana pipiens pipiens*), eastern narrow-mouthed toad (*Gastrophryne carolinensis*), American toad (*Bufo americanus*), Fowler's toad (*Bufo woodhousei fowleri*), eastern spadefoot toad (*Scaphiopus holbrooki*), southern leopard frog (*Rana pipiens sphenoecephala*), spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), eastern tiger salamander (*Ambystoma tigrinum tigrinum*), small-mouthed salamander (*Ambystoma texanum*), mole salamander (*Ambystoma talpoideum*), red-spotted newt (*Diemictylus viridescens viridescens*), Ocoee salamander (*Desmognathus ocoee*), seal salamander (*Desmognathus monticola*), red-backed salamander (*Plethodon cinereus cinereus*), slimy salamander (*Plethodon glutinosus glutinosus*), four-toed salamander (*Hemidactylium scutatum*), northern spring salamander (*Gyrinophilus porphyriticus porphyriticus*), Tennessee cave salamander (*Gyrinophilus palleucus*), midland mud salamander (*Pseudotriton montanus*)
diastictus), northern red salamander (Pseudotriton ruber ruber), green salamander (Aneides aeneus), northern two-lined salamander (Eurycea bislineata bislineata), long-tailed salamander (Eurycea longicauda longicauda), and cave salamander (Eurycea lucifuga).

At least two additional species might be added to the aforementioned list of amphibians likely to be found in the Normandy Reservoir area. For some inexplicable reason the TVA environmental statement failed to list the hellbender (Cryptobranchus alleganiensis) and the mudpuppy (Necturus maculosus), two of the largest aquatic salamanders found in the Duck River and specifically the Normandy Reservoir locality (Conant 1975: 241-242).

Faulkner and McCollough (1973: 36-37) list 14 varieties of turtles that occur in the Duck River. Of these, three species, the alligator snapping turtle (Macroclemys temmincki), the smooth softshell (Trionyx muticus), and the Quachita map turtle (Graptemys pseudogeographica ouachitensis), are supposed to occur primarily only in the lower reaches of the Duck River. Another two varieties, the reeared turtle (Pseudemys scripta elegans) and the Cumberland turtle (Pseudemys scripta troosti), intergrade in the general area of the Normandy Reservoir. In addition to the two subspecies that possibly intergrade, nine other species of turtles may be found in the Normandy Reservoir area. These nine species are the common snapping turtle (Chelydra serpentina), eastern spiny softshell (Trionyx spinifer spinifer), map turtle (Graptemys geographic), slider (Pseudemys concinna hieroglyphica), midland painted turtle (Chrysemys picta marginata), stripe-necked musk turtle (Sternothaeus minor peltifer), stinkpot (Sternothaeus ordoratus), eastern mud turtle (Kinosternon subrubrum subrubrum), and the eastern
box turtle (*Terrapene carolina carolina*). The author disagrees only with the supposed distribution of the smooth softshell. Distribution maps in Conant (1975: 368) and Mount (1975: 311) show the smooth softshell as occurring in the area of the upper Duck River. Thus, the upper Duck River Mississippian peoples may have had an opportunity to exploit at least 12 varieties of turtles.

Faulkner and McCollough (1973) did not list any of the snakes that may have occurred in the reservoir area, but a list will be provided here since a large number of snake vertebrae and some skull elements were found in the bone samples. In the Final Environmental Statement Duck River Project, TVA biologists list 22 species of snakes that occur in the reservoir area and another 5 species that may possibly occur in the same area. The species that are definitely thought to occur in the Normandy Reservoir area are as follows: northern water snake (*Natrix sipedon sipedon*), queen snake (*Natrix septemvittata*), eastern garter snake (*Thamnophis sirtalis sirtalis*), eastern ribbon snake (*Thamnophis sauritus sauritus*), midland brown snake (*Storeria dekayi wrightorum*), northern red-bellied snake (*Storeria occipitomaculata occipitomaculata*), southern ringneck snake (*Diadophis punctatus punctatus*), southeastern crowned snake (*Tantilla coronata coronata*), northern black racer (*Coluber constrictor constrictor*), scarlet kingsnake (*Lampropeltis doliata triangulum*), prairie kingsnake (*Lampropeltis calligaster calligaster*), mole snake (*Lampropeltis calligaster rhombomaculata*), northern pine snake (*Pituophis melanoleucus melanoleucus*), corn snake (*Elaphe guttata guttata*), gray rat snake (*Elaphe obsoleta spiloides*), rough green snake (*Opheodrys aestivus*), eastern hognose snake (*Heterodon platyrhinos*),
northern copperhead (*Agkistrodon contortrix mokasen*), eastern cotton-mouth (*Agkistrodon piscivorus piscivorus*), timber rattlesnake (*Crotalus horridus horridus*), and the canebrake rattlesnake (*Crotalus horridus atricaudatus*). The five species of snakes that might occur in the reservoir area are the diamond-backed water snake (*Natrix rhombifera rhombifera*), eastern worm snake (*Carphophis amoenus amoenus*), rough earth snake (*Haldea striatula*), red milk snake (*Lampropeltis doliata sspila*), and western pigmy rattlesnake (*Sistrurus miliarius streckeri*).

According to the TVA environmental statement (1972: L-13 - L-17), 213 species of birds have been found in the Duck River area as permanent summer or winter residents or as migrants. While all 213 of these birds might have been potential food resources, Faulkner and McCollough (1973: 37-40) envision only a few of the larger species as being regularly exploited. The bird species that may have been utilized in the Normandy Reservoir area are as follows: pied-billed grebe (*Podilymbus podiceps podiceps*), great blue heron (*Ardea herodias*), green heron (*Butorides virescens virescens*), little blue heron (*Florida caerula caerula*), Canada goose (*Branta canadensis*), mallard duck (*Anas platyrhynchos platyrhynchos*), black duck (*Anas rubripes*), gadwall (*Anas strepera*), green-winged teal (*Anas crecca*), blue-winged teal (*Anas discors*), American wigeon (*Anas americana*), wood duck (*Aix sponsa*), ring-neck duck (*Aythya collaris*), lesser scaup (*Aythya affinis*), ruddy duck (*Oxyura jamaicensis rubida*), hooded merganser (*Lophodytes cucullatus*), turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), broad-winged hawk (*Buteo platypterus platypterus*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila*,
chrysaetos), marsh hawk (Circus cyaneus hudsonius), sparrow hawk (Falco sparverius), turkey (Meleagris gallopavo), bobwhite (Colinus virginianus), king rail (Rallus elegans elegans), sora rail (Prozana carolina), common gallinule (Gallinula chloropus cachinnans), American coot (Fulica americana), screech owl (Otus asio), great horned owl (Bubo virginianus), and the barred owl (Strix varia). Faulkner and McCullough (1973: 38-39) also suggest the use of certain other birds, now either extinct or extirpated in the Normandy Reservoir area; these include the passenger pigeon (Ectopistes migratorius) and the ruffed grouse (Bonasa umbellus umbellus).

Of the 44 species of mammals that now occupy the Duck River valley, Faulkner and McCullough (1973: 40-41) list 19 that may have been hunted regularly for meat and/or hides. In addition to these, they list another five large mammals, now extirpated in Middle Tennessee, that may have been utilized by the aboriginal inhabitants. The first 19 species are the white-tailed deer (Odocoileus virginianus), raccoon (Procyon lotor), bobcat (Lynx rufus), gray fox (Urocyon cineroargenteus), red fox (Vulpes fulva), mink (Mustela vison), otter (Lutra canadensis), spotted skunk (Spilogale putorius), striped skunk (Mephitis mephitis), long-tailed weasel (Mustela frenata), short-tailed weasel (Mustela erminea), beaver (Castor canadensis), muskrat (Ondatra zibethica), woodchuck (Marmota monax), eastern gray squirrel (Sciurus carolinensis), eastern fox squirrel (Sciurus niger), southern flying squirrel (Glaucomys volans), eastern cottontail (Sylvilagus floridanus), and the opossum (Didelphis marsupialis). The five species extirpated in Middle Tennessee are the elk (Cervus canadensis), mountain lion (Felis concolor), black bear (Ursus americanus), gray wolf (Canis lupus), and the fisher (Martes pennanti).
CHAPTER II

ANALYSIS BACKGROUND AND SITE ACCOUNTS

Previous Faunal Studies in Middle Tennessee

Only a limited amount of faunal analysis work has been undertaken on material from the Normandy Reservoir area, and virtually nothing has been written concerning the fauna of the Mississippian components. Part of the reason for the limited number of faunal studies is the poor preservation of most bone materials in the Normandy Reservoir area. The Mississippian bone material is better preserved than that from all other Normandy components, but as is apparent from the extremely high indeterminate bone counts, it still leaves much to be desired. Even if poorly preserved, the faunal remains from the three Mississippian components are quite valuable in establishing as accurately as possible the faunal exploitation system of the Mississippian Indians of the Normandy Reservoir.

There are two limited faunal studies which concern Normandy Mississippian material; both were done by Parmalee. The more extensive of the two studies was conducted on 242 bone fragments from two features at the Banks III site (40CF108). Only one bone, that of a white-tailed deer, was identifiable to the species level (Faulkner, et al. 1976: 222). The second study involved the radius of an eastern mole (Scalopus aquaticus) from the Banks V site (40CF111) which exhibited deep butchering cuts (Parmalee 1975: 37-40).

A number of other brief studies have been done on faunal material from the Normandy Reservoir. From the Banks III site (40CF108) Parmalee
analyzed small amounts of Late-Terminal Archaic and Middle Woodland faunal remains in addition to those of Mississippian origin (Faulkner, et al. 1976: 218-222). Other Normandy Reservoir faunal analyses by Parmalee include Rhoton Cave (40CF46), a predominantly Middle Woodland site (Faulkner and McCollough 1974: 152-153), and Nowlin II (40CF35), primarily a Terminal Archaic site (Parmalee, n.d.). Bogan (n.d.) analyzed the faunal remains from Wiser-Stephens I (40CF81), a multi-component site with occupations ranging from the Late Archaic to the Late Woodland periods.

Mention should be made at this point of several faunal studies of material from sites outside the Normandy Reservoir but in the Middle Tennessee area. Parmalee (1968a: 256-262; 1968b: 263-265; 1968c: 266-268) examined bone from three sites in the Tims Ford Reservoir. The Mason site (40FR8) was primarily a Late Woodland settlement, the Brickyard site (40FR13) contained Mississippian, Woodland, and Archaic components, and the Tucker Rock Shelter (40FR16) was occupied during the Archaic and Woodland periods. In addition, Guilday (n.d.) examined faunal remains from 40SW24, 40SW27, 40SW32, 40SW33, and 40SW43, sites that were excavated along the Cumberland River in Stewart County, Tennessee. Components on these sites ranged from the Late Archaic through the Mississippian periods. Although not an extensive report, the faunal analysis for the Archaic Eva site is yet another accounting of aboriginal animal exploitation in Middle Tennessee (Lewis and Lewis 1961: 17-24).

In the Nickajack Reservoir in the Tennessee River Valley of south-central Tennessee, Parmalee (1966a: 81-83; 1966b: 84-91) analyzed material from the Bible site (40MI15), a Late Archaic occupation, and
from the Lay site (40MI20), which is primarily of Early Woodland attribution. Also in the Nickajack Reservoir, Guilday and Tanner (1966: 138-145) reported on faunal material from the Westmoreland-Barber site (40MI11), which contained components ranging from Archaic to Late Woodland.

Much of the significance of the Mississippian components on 40CF5, 40CF32, and 40CF111 lies in their early radiocarbon dates. The average of radiocarbon date means for each site is as follows: 40CF5, A.D. 695 (2 dates); 40CF32, A.D. 1157 (3 dates); and 40CF111, A.D. 901 (6 dates). The individual radiocarbon dates will be listed later with the description of each site. A majority of these dates are extremely early for Mississippian occupation, especially since the sites are in the upper rather than the lower Duck River Valley. Previously it has been thought that Mississippian settlements occurred first along the larger rivers and later dispersed from these main river systems, reaching the headwaters of smaller tributaries such as the upper Duck River, at a later date (Caldwell 1958: x). To find typologically early Mississippian material on the upper Duck River at such an early time period is quite significant and warrants a detailed analysis of all its aspects, including the faunal remains. Background information for each of the three sites and tables listing the faunal material found on each will be presented in the following pages. Because of the similarity of the exploitative patterns found at 40CF5, 40CF32, and 40CF111, descriptions of the animals exploited, butchering patterns, and hunting methods will be discussed for this Mississippian population as a whole and not by individual sites. Descriptions of the exploitative patterns will be presented in Chapter III.
Methodology

The first step in the analysis involved sorting the bone from each excavated feature into the five vertebrate classes: mammal, bird, reptile, amphibian, and fish. If possible, each bone fragment was then identified as to which skeletal element it represented. Having decided what particular bone was being examined from a vertebrate class, an attempt was then made to identify the bone to family, genus, or species level. Identifiable bone elements were then sided, if possible, and notes were made on the presence of any butchering and/or skinning cuts and pathologies. All identification of bones was done by using the faunal skeletal collection housed in the Zooarchaeology Section, Department of Anthropology, The University of Tennessee, Knoxville.

Unidentifiable bone fragment totals were tabulated for each vertebrate class. For mammals the unidentifiable bone fragments were categorized as Indeterminate Large Mammal Bone Pieces and Indeterminate Small Mammal Bone Pieces. The determination of what were large and what were small mammal bone pieces involved subjective judgment on the part of the author. Large mammal bone pieces were considered to be those bone fragments that were large or thick enough to obviously have come only from animals such as elk, white-tailed deer, bear, cougar, or wolf. Small mammal bone pieces were those bone fragments obviously from small mammals such as foxes, raccoons, rabbits, and squirrels or from bones fragmented into such small pieces that it was impossible to speculate on the size of the animal from which they originated. Throughout the analysis the author recorded from each feature the amount of burned bone for each vertebrate class. It was thought the distribution of burned bone might shed light
on some specific cultural activity. However, the occurrence of burned bone was found in nearly all features examined and seemed only to suggest that the bone was burned during food preparation or after food consumption when scrap bone may have been thrown in the campfire.

A means of quantifying the importance of an animal species in the aboriginal diet is necessary for zooarchaeological interpretation. Most practitioners of zooarchaeology have rejected the fragments and the weight methods of quantification as being inadequate (Chaplin 1971: 64-69). Therefore, the minimum numbers method was used to estimate the relative importance of an animal in the diet of the Mississippian people. As used by the author, the minimum numbers method involves identifying the most abundant element of each species examined into left and right components, noting which side contains the greater number of pieces. The group containing the greater number of pieces is then used as the minimum number of individuals (MNI) for the species being examined. In an effort to calculate the minimum number of individuals as accurately as possible, the elements from the less numerous of the two groups are compared with those of the larger group. If any of the elements from the less numerous group fail to match those of the larger group because of differences in age, size, or sex, the minimum number of individuals can then be increased by the number of elements from the smaller group that obviously cannot be paired. In order to calculate the total amount of meat per species at each site, the minimum number of individuals for each species was multiplied times the pounds of usable meat from one animal of that species. Data on processed meat weights of animals were obtained from White (1953a: 397-398) and Parmalee (personal communication). Meat weights were not
figured for animals not considered food items or those for which data were not available. Estimated pounds of meat for fish was especially difficult to calculate due to the fragmented condition of the fish sample and because comprehensive data on weights of numerous fish species are lacking.

The Banks V Site (40CF111)

The Banks V site (40CF111) is a multicomponent site located in the lower Normandy Reservoir zone just upstream from the dam axis (Figure 2 on page 6). Site components range from the Late Archaic to the Early Mississippian periods. Situated on the first terrace of the Duck River, the site has an elevation of 820 feet AMSL (Faulkner and McCollough 1973: 346). The predominant site soil type is Armour silt loam. Excavation of 40CF111 was conducted during a six month field season in the summer and autumn of 1973. After a controlled surface collection and subsurface testing were conducted, power equipment was utilized to remove the plow-zone from the site area of approximately three acres to expose the features for excavation. Thirty-three of the 200 excavated features (pit installations) contained Mississippian material. Twenty-seven of the 33 Mississippian features contained faunal remains. The principal features of this very small Early Mississippian settlement (farmstead) were a single, small, rectangular wall-trench house with open corners and a side entrance, an ossuary containing 14 interments, a cylindrical storage pit or silo, and a number of large, irregular "clay borrow" pits filled with trash and garbage. All feature material was water screened, in most instances by using a window screen (1 x 1.5 mm) mesh. Those features
containing large amounts of plant and animal remains had at least a 2.5 gallon bucket of their fill processed by the water flotation technique (Struver 1965). A minimum of 12 species of gastropods, 4 pelecypods, 9 fishes, 3 amphibians, 4 turtles, 2 snakes, 4 birds, and 15 mammals are represented in the sample. The total bone count from 40CF111, including both identifiable and unidentifiable bone, is 20,086 pieces. Of this total, 892 bones or 4 percent of the total bone count were identifiable to at least order level.

The utilization of fine mesh water screens and the water flotation technique brought about the recovery of tremendous amounts of extremely small bones and bone fragments, which resulted in a large percentage of unidentifiable pieces. For example, from site 40CF111 there were 2,064 indeterminate large mammal bone fragments and 15,327 indeterminate bone fragments from either small mammals or extremely fragmented larger bones. If either hand sifting or a larger screen mesh had been used, a majority of the indeterminate small mammal bone fragments would have been lost, along with most of the extremely small identifiable animal bones. Therefore, while the use of fine mesh water screens and water flotation may multiply the sample's number of indeterminate bone fragments, these techniques will also present a more accurate picture of the aboriginal exploitation system through nearly complete bone recovery. Due to the utilization of these recovery methods, there were also high percentages of indeterminate small animal remains found at sites 40CF32 and 40CF5, making the three sites well suited for detailed comparison among themselves.
Tables I and II list respectively the gastropods and the pelecypods from 40CF111, enumerating the total pieces, minimum number of individuals, and the percentage each species comprises of the total sample. The vertebrates encountered in the faunal sample from 40CF111 are treated in Table III; included are the number of bone fragments for each species, the percentage this number represents of all identifiable bone, the minimum number of individuals of each species, the estimated pounds of meat derived from each species, and the percentage this amount represents of the total calculable meat available at the site. Table III also includes the number of indeterminate bone fragments for each vertebrate class, but these totals were not used in determining the percentages calculated for this table. The total numbers of bone fragments found for each of the five vertebrate classes at 40CF111, 40CF32, and 40CF5 are tabulated in Table IV. Table IV also lists the percentage of identifiable material from each of the five classes and the percentage each class makes up of the site's total bone sample.

The radiocarbon dates for 40CF111 are listed in Table V. A majority of the dates from 40CF111 are similar and cluster at approximately A.D. 900. This "average" date is in agreement with the estimates of Faulkner and McCollough (personal communication) as the inception period of Early Mississippian culture in the Normandy Reservoir.

The Eoff I Site (40CF32)

The multicomponent Eoff I site (40CF32) is located in the lower Normandy Reservoir zone near the confluence of Carroll Creek and the Duck River (Figure 2 on page 6). Site components range from the Middle Archaic
<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marine Gastropods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marginella apicina</td>
<td>1</td>
<td>1</td>
<td>.03</td>
</tr>
<tr>
<td>Olivella cf. jaspidia</td>
<td>2</td>
<td>2</td>
<td>.05</td>
</tr>
<tr>
<td>Total Marine Gastropods</td>
<td>3</td>
<td>3</td>
<td>.08</td>
</tr>
<tr>
<td><strong>Terrestrial Gastropods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anguisspira alternata</td>
<td>9</td>
<td>9</td>
<td>.22</td>
</tr>
<tr>
<td>Mesomphix sp.</td>
<td>4</td>
<td>4</td>
<td>.09</td>
</tr>
<tr>
<td>Zonitoides sp.</td>
<td>1</td>
<td>1</td>
<td>.03</td>
</tr>
<tr>
<td>Stenotrema sp.</td>
<td>5</td>
<td>5</td>
<td>.12</td>
</tr>
<tr>
<td>Mesodon clausus</td>
<td>2</td>
<td>2</td>
<td>.05</td>
</tr>
<tr>
<td>Total Terrestrial Gastropods</td>
<td>21</td>
<td>21</td>
<td>.51</td>
</tr>
<tr>
<td><strong>Freshwater Gastropods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anculosa cf. subglubosa</td>
<td>161</td>
<td>161</td>
<td>4.00</td>
</tr>
<tr>
<td>Goniobasis sp.</td>
<td>104</td>
<td>104</td>
<td>2.58</td>
</tr>
<tr>
<td>Lithasia cf. fuliginosa</td>
<td>2,709</td>
<td>2,709</td>
<td>67.30</td>
</tr>
<tr>
<td>Pleurocera sp.</td>
<td>940</td>
<td>940</td>
<td>23.35</td>
</tr>
<tr>
<td>Viviparus sp.</td>
<td>87</td>
<td>87</td>
<td>2.16</td>
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<tr>
<td>Total Freshwater Gastropods</td>
<td>4,001</td>
<td>4,001</td>
<td>99.39</td>
</tr>
<tr>
<td>Total Ident. Gastropods</td>
<td>4,025</td>
<td>4,025</td>
<td>99.98</td>
</tr>
<tr>
<td>Indet. Terrestrial Gastropods</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indet. Freshwater Gastropods</td>
<td>2,356</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Gastropod Pieces</td>
<td>6,384</td>
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## TABLE II

PELECYPODA FROM THE BANKS V SITE (40CF111)

<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent Of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amblema plicata</td>
<td>1</td>
<td>1</td>
<td>3.33</td>
</tr>
<tr>
<td>cf. Amblema plicata</td>
<td>3</td>
<td>2</td>
<td>10.00</td>
</tr>
<tr>
<td>Cyclonaias tuberculata</td>
<td>1</td>
<td>1</td>
<td>3.33</td>
</tr>
<tr>
<td>Obovaria subrotunda</td>
<td>3</td>
<td>2</td>
<td>10.00</td>
</tr>
<tr>
<td>cf. Villosa sp.</td>
<td>22</td>
<td>11</td>
<td>73.33</td>
</tr>
<tr>
<td>Total Identifiable Pelecypods</td>
<td>30</td>
<td>17</td>
<td>99.99</td>
</tr>
<tr>
<td>Indet. Pelecypod Fragments</td>
<td>465</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Pelecypod Pieces</td>
<td>495</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
TABLE III

VERTEBRATE FAUNA IDENTIFIED FROM THE BANKS V SITE (40CF111)

<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent Of Total</th>
<th>Est. Lbs. of Meat</th>
<th>Percent of Total Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Opossum, Didelphis marsupialis</td>
<td>3</td>
<td>1</td>
<td>.34</td>
<td>8.50</td>
<td>.53</td>
</tr>
<tr>
<td>Eastern Mole, Scalopus aquaticus</td>
<td>1</td>
<td>1</td>
<td>.11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Black Bear, Ursus americanus</td>
<td>7</td>
<td>2</td>
<td>.78</td>
<td>420.00</td>
<td>26.20</td>
</tr>
<tr>
<td>Striped Skunk, Mephitis mephitis</td>
<td>1</td>
<td>1</td>
<td>.11</td>
<td>5.00</td>
<td>.31</td>
</tr>
<tr>
<td>cf. Gray Fox, Urocyon cinereouar genteus</td>
<td>1</td>
<td>1</td>
<td>.11</td>
<td>4.50</td>
<td>.28</td>
</tr>
<tr>
<td>Fox, sp.</td>
<td>2</td>
<td>-</td>
<td>.22</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Domestic Dog, Canis familiaris</td>
<td>1</td>
<td>1</td>
<td>.11</td>
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<td>.53</td>
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<tr>
<td>Bobcat, Lynx rufus</td>
<td>1</td>
<td>1</td>
<td>.11</td>
<td>15.00</td>
<td>.94</td>
</tr>
<tr>
<td>Woodchuck, Marmota monax</td>
<td>2</td>
<td>1</td>
<td>.22</td>
<td>5.60</td>
<td>.35</td>
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<tr>
<td>Gray/Fox Squirrel, Sciurus spp.</td>
<td>39</td>
<td>3</td>
<td>4.44</td>
<td>1.80</td>
<td>.11</td>
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<td>Beaver, Castor canadensis</td>
<td>5</td>
<td>2</td>
<td>.56</td>
<td>77.00</td>
<td>4.80</td>
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<tr>
<td>Deer Mouse, Peromyscus sp.</td>
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<td>1</td>
<td>.11</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Species</td>
<td>Pieces</td>
<td>MNI</td>
<td>Percent Of Total</td>
<td>Est. Lbs. of Meat</td>
<td>Percent of Total Meat</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------</td>
<td>-----</td>
<td>------------------</td>
<td>-------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Rice Rat,</td>
<td>5</td>
<td>2</td>
<td>.56</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Oryzomys palustris</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>cf. Rice Rat,</td>
<td>6</td>
<td>-</td>
<td>.67</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Oryzomys palustris</td>
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</tr>
<tr>
<td>Vole,</td>
<td>1</td>
<td>1</td>
<td>.11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Microtus sp.</td>
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<td>Small Rodents, spp.</td>
<td>11</td>
<td>1</td>
<td>1.23</td>
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<tr>
<td>Cottontail,</td>
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</tr>
<tr>
<td>Sylvilagus cf. floridanus</td>
<td>10</td>
<td>2</td>
<td>1.12</td>
<td>3.50</td>
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<tr>
<td>White-tailed Deer,</td>
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<tr>
<td>Odocoileus virginianus</td>
<td>395</td>
<td>10</td>
<td>44.28</td>
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<td>492</td>
<td>31</td>
<td>55.19</td>
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<td>Indet. Large Mammal Bone Pieces</td>
<td>2,064</td>
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<td>Indet. Small Mammal Bone Pieces</td>
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<tr>
<td>Total Mammal Bone</td>
<td>17,883</td>
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</tr>
</tbody>
</table>

**Birds**

<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent Of Total</th>
<th>Est. Lbs. of Meat</th>
<th>Percent of Total Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bobwhite,</td>
<td>3</td>
<td>1</td>
<td>.34</td>
<td>.29</td>
<td>.02</td>
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<td>Colinus virginianus</td>
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<td>Turkey,</td>
<td>89</td>
<td>6</td>
<td>9.98</td>
<td>51.00</td>
<td>3.18</td>
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<td>Meleagris gallopavo</td>
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<tr>
<td>Passenger Pigeon, Ectopistes migratorius</td>
<td>1</td>
<td>1</td>
<td>.11</td>
<td>.40</td>
<td>.03</td>
</tr>
<tr>
<td>Species</td>
<td>Pieces</td>
<td>MNI</td>
<td>Percent Of Total</td>
<td>Est. Lbs. Of Meat</td>
<td>Percent of Total Meat</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------</td>
<td>-----</td>
<td>------------------</td>
<td>-------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Passerine, spp.</td>
<td>19</td>
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<td>2.13</td>
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<tr>
<td>Total Ident. Bird Bone Pieces</td>
<td>112</td>
<td>10</td>
<td>12.56</td>
<td>51.69</td>
<td>3.23</td>
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<tr>
<td>Indet. Bird Bone Pieces</td>
<td>652</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Total Bird Bone</td>
<td>764</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Reptiles

- **Musk Turtle**, *Sternotherus* sp.  
  - Pieces: 11  
  - MNI: 2  
  - Percent of Total: 1.23  
  - Est. Lbs. of Meat: -  
  - Percent of Total Meat: -
- **Turtle**: Kinosternidae  
  - Pieces: 13  
  - MNI: -  
  - Percent of Total: 1.46  
  - Est. Lbs. of Meat: -  
  - Percent of Total Meat: -
- **Turtle**: Pseudemys/Graptemys/Chrysemys spp.  
  - Pieces: 10  
  - MNI: 1  
  - Percent of Total: 1.12  
  - Est. Lbs. of Meat: 1.50  
  - Percent of Total Meat: 0.09
- **Box Turtle**, *Terrepene carolina*  
  - Pieces: 6  
  - MNI: 1  
  - Percent of Total: 0.67  
  - Est. Lbs. of Meat: 0.40  
  - Percent of Total Meat: 0.03
- **Box Turtle**, cf. *Terrepene carolina*  
  - Pieces: 2  
  - MNI: -  
  - Percent of Total: 0.22  
  - Est. Lbs. of Meat: -  
  - Percent of Total Meat: -
- **Softshell Turtle**, *Trionyx* sp.  
  - Pieces: 3  
  - MNI: 1  
  - Percent of Total: 0.32  
  - Est. Lbs. of Meat: -  
  - Percent of Total Meat: -
- **Turtle**, spp.  
  - Pieces: 19  
  - MNI: 1  
  - Percent of Total: 2.13  
  - Est. Lbs. of Meat: -  
  - Percent of Total Meat: -
- **Snake**: Crotalidae  
  - Pieces: 2  
  - MNI: 1  
  - Percent of Total: 0.22  
  - Est. Lbs. of Meat: -  
  - Percent of Total Meat: -
- **Snake**: Colubridae  
  - Pieces: 45  
  - MNI: 1  
  - Percent of Total: 5.04  
  - Est. Lbs. of Meat: -  
  - Percent of Total Meat: -
- **Snake**, spp.  
  - Pieces: 4  
  - MNI: -  
  - Percent of Total: 0.45  
  - Est. Lbs. of Meat: -  
  - Percent of Total Meat: -
| Total Ident. Reptile Bone Pieces | 115    | 8   | 12.88            | 1.90              | 0.12                 |
### TABLE III (Continued)

<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent Of Total</th>
<th>Est. Lbs. Of Meat</th>
<th>Percent of Total Meat</th>
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</thead>
<tbody>
<tr>
<td><strong>Amphibians</strong></td>
<td></td>
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<tr>
<td>Eastern Spadefoot Toad,</td>
<td>62</td>
<td>7</td>
<td>6.95</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Scaphiopus holbrooki</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toad,</td>
<td>2</td>
<td>1</td>
<td>.22</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Bufo</em> sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toad,</td>
<td>8</td>
<td>-</td>
<td>.90</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Scaphiopus/Bufo</em> spp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frog,</td>
<td>4</td>
<td>1</td>
<td>.45</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Rana</em> sp.</td>
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</tr>
<tr>
<td>Toad/Frog spp.</td>
<td>18</td>
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<tr>
<td>Total Ident. Amphibian Bone Pieces</td>
<td>94</td>
<td>10</td>
<td>10.54</td>
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<td>-</td>
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<tr>
<td>Indet. Amphibian Bone Pieces</td>
<td>3</td>
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<tr>
<td>Total Amphibian Bone</td>
<td>97</td>
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<td></td>
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<td><strong>Fish</strong></td>
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<td>Gar,</td>
<td>1</td>
<td>1</td>
<td>.11</td>
<td>-</td>
<td>-</td>
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<tr>
<td><em>Lepisosteus</em> sp.</td>
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<td></td>
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<tr>
<td>Pickerel,</td>
<td>2</td>
<td>1</td>
<td>.22</td>
<td>-</td>
<td>-</td>
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<tr>
<td><em>Esox</em> sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chub,</td>
<td>3</td>
<td>2</td>
<td>.34</td>
<td>-</td>
<td>-</td>
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<tr>
<td><em>cf. Hybopsis</em> sp.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>River Redhorse,</td>
<td>2</td>
<td>2</td>
<td>.22</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Moxostoma</em> <em>cf. carinatum</em></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>Pieces</td>
<td>MNI</td>
<td>Percent Of Total</td>
<td>Est. Lbs. Of Meat</td>
<td>Percent of Total Meat</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------</td>
<td>-----</td>
<td>------------------</td>
<td>------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Redhorse, Moxostoma sp.</td>
<td>20</td>
<td>3</td>
<td>2.24</td>
<td>-</td>
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<tr>
<td>Sucker spp., Catostomidae</td>
<td>34</td>
<td>-</td>
<td>3.81</td>
<td>-</td>
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<tr>
<td>Blue/Channel Catfish, Ictalurus sp.</td>
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<td>1</td>
<td>0.11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bullhead, Ictalurus sp.</td>
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<td>1</td>
<td>0.11</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Catfish, Ictalurus sp.</td>
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<td>-</td>
<td>1.12</td>
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<td>Madtom, Noturus sp.</td>
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<td>1</td>
<td>0.11</td>
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<tr>
<td>Bass, Micropterus sp.</td>
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<td>1</td>
<td>0.11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sunfish spp., Centrarchidae</td>
<td>1</td>
<td>1</td>
<td>0.11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Freshwater Drum, Aplodinotus grunniens</td>
<td>2</td>
<td>1</td>
<td>0.22</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Ident. Fish Bone Pieces</td>
<td>79</td>
<td>15</td>
<td>8.83</td>
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<td>-</td>
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<td>Indet. Fish Bone Pieces</td>
<td>1,148</td>
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<td>Total Fish Bone</td>
<td>1,227</td>
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<tr>
<td>Total All Ident. Bone</td>
<td>892</td>
<td>74</td>
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<td>1,602.99</td>
<td>100.00</td>
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<tr>
<td>Total All Indet. Bone</td>
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<tr>
<td>Total All Bone</td>
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</table>
## TABLE IV

THE MISSISSIPPIAN FAUNA AT THE CLASS LEVEL

<table>
<thead>
<tr>
<th>Vert. Class</th>
<th>Total No. Pieces</th>
<th>Percent of Class Identifiable</th>
<th>Percent of Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4OCF111</td>
<td>4OCF32</td>
<td>4OCF5</td>
</tr>
<tr>
<td>Mammal</td>
<td>17,883</td>
<td>33,161</td>
<td>1,101</td>
</tr>
<tr>
<td>Bird</td>
<td>764</td>
<td>257</td>
<td>11</td>
</tr>
<tr>
<td>Reptile</td>
<td>115</td>
<td>280</td>
<td>5</td>
</tr>
<tr>
<td>Amphibian</td>
<td>97</td>
<td>31</td>
<td>-</td>
</tr>
<tr>
<td>Fish</td>
<td>1,227</td>
<td>1,413</td>
<td>19</td>
</tr>
<tr>
<td>Total Bone</td>
<td>20,086</td>
<td>35,142</td>
<td>1,136</td>
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</tbody>
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TABLE V
40CF111 RADIOCARBON DATES

<table>
<thead>
<tr>
<th>Feat. No.</th>
<th>Sample No.</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feat. 131</td>
<td>UGa-653</td>
<td>1000 ± 75 B.P.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A.D. 950)</td>
</tr>
<tr>
<td>Feat. 131</td>
<td>UGa-647</td>
<td>905 ± 90 B.P.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A.D. 1045)</td>
</tr>
<tr>
<td>Feat. 104</td>
<td>UGa-731</td>
<td>1035 ± 170 B.P.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A.D. 915)</td>
</tr>
<tr>
<td>Feat. 46</td>
<td>UGa-732</td>
<td>1070 ± 100 B.P.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A.D. 880)</td>
</tr>
<tr>
<td>Feat. 50</td>
<td>UGa-733</td>
<td>1070 ± 75 B.P.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A.D. 880)</td>
</tr>
<tr>
<td>Feat. 74-3</td>
<td>UGa-1005</td>
<td>1215 ± 145 B.P.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A.D. 735)</td>
</tr>
</tbody>
</table>
to the Early Mississippian periods. Its location at the confluence of these two streams places 40CF32 at the break point between the upper and lower reservoir geographic zones. Positioned on a large, slightly rolling first river terrace, 40CF32 has an elevation of between 835 and 848 feet AMSL (Faulkner and McCollough 1973: 362). Armour silt loam is the predominant soil type. Test excavations conducted in 1972 and 1973 yielded evidence of a Mississippian occupation at 40CF32. During the summer of 1975 power equipment was used to strip the plowzone from almost all of the 25 acre site area. Fifty-nine of the 219 excavated features contained Mississippian material. Thirty-seven of the 59 Mississippian features contained faunal remains. The principal Mississippian features of the site consisted of two cylindrical storage pits or silos, a number of "clay borrow" pits, and a house, which was a rectangular structure with small posts in a trench or individually placed around a depressed floor (Faulkner 1976: 90). All feature material was water screened, generally with the use of a window screen (1 x 1.5 mm) mesh. Those features containing large amounts of plant and animal remains had a 2.5 gallon bucket of their fill processed by water flotation. A minimum of 5 species of gastropods, 6 fishes, 2 amphibians, 5 turtles, 2 snakes, 4 birds, and 15 species of mammals are represented in the sample. The total bone count from 40CF32, including both identifiable and unidentifiable remains, is 35,142 pieces. Of this total, 967 or 3 percent of the total bone count were identifiable to at least an order level. The overwhelming majority of the indeterminate bone fragments in the bone sample came from the extremely small and fragmented bone pieces caught in the fine mesh of the water screen.
Tables VI and VII should be consulted for more detailed information on the types and quantity of invertebrate and vertebrate remains found at 40CF32. Data on the 40CF32 Mississippian fauna at the class level can be found in Table IV on page 33.

The radiocarbon dates for 40CF32 are presented in Table VIII. At this time (1977), only three radiocarbon dates have been obtained for the Mississippian features on this site. These dates are rather confusing and inconclusive. Sample UGa-1303 yielded a date for Feature 98 of A.D. 515, obviously much too early for any known phase of the Mississippian culture. Since it is apparent that much of the cultural material from Feature 98 is Mississippian in origin, the radiocarbon date must be regarded as having been run on older charcoal incorporated in the pit fill. The radiocarbon samples from Feature 511 present yet another dating problem. Feature 511 was a large cylindrical storage pit, 5 feet in diameter and 3.3 feet in depth. A mass of charred cane was sealed below a clay cap in a middle zone of the pit fill (Level IV), in direct association with charred maize and Early Mississippian pottery. A single large sample of charred cane from Feature 511 was divided equally and each half was sent to a different laboratory for dating. The sample sent to the University of Georgia laboratory, UGa-1306, was dated at A.D. 980 ± 100 years, while the other sample sent to the Geochron laboratory, GX-4333, was dated at A.D. 1335 ± 130 years. The cause for this large discrepancy in the dates is unknown, but Faulkner and McCollough (personal communication) believe that the A.D. 980 ± 100 years date is the more accurate. This belief stems in large part from the A.D. 980 date agreeing most closely with the dates from 40CF111, which had an average date
<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent Of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marine Gastropods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olivella cf. jaspidea</td>
<td>3</td>
<td>3</td>
<td>.33</td>
</tr>
<tr>
<td>Total Marine Gastropods</td>
<td>3</td>
<td>3</td>
<td>.33</td>
</tr>
<tr>
<td><strong>Freshwater Gastropods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anculosa cf. subglubosa</td>
<td>7</td>
<td>7</td>
<td>.78</td>
</tr>
<tr>
<td>Goniobasis sp.</td>
<td>14</td>
<td>14</td>
<td>1.56</td>
</tr>
<tr>
<td>Lithasia cf. fuliginosa</td>
<td>777</td>
<td>777</td>
<td>86.62</td>
</tr>
<tr>
<td>Pleurocera sp.</td>
<td>96</td>
<td>96</td>
<td>10.70</td>
</tr>
<tr>
<td>Total Freshwater Gastropods</td>
<td>894</td>
<td>894</td>
<td>99.66</td>
</tr>
<tr>
<td><strong>Total Ident. Gastropods</strong></td>
<td>897</td>
<td>897</td>
<td>99.99</td>
</tr>
<tr>
<td>Indet. Freshwater Gastropods</td>
<td>3,211</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Gastropod Pieces</td>
<td>4,108</td>
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<td>-</td>
</tr>
</tbody>
</table>
TABLE VII
VERTEBRATE FAUNA IDENTIFIED FROM THE EOFF I SITE (40CF32)

<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent Of Total</th>
<th>Est. Lbs. Of Meat</th>
<th>Percent of Total Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opossum, <em>Didelphis marsupialis</em></td>
<td>4</td>
<td>2</td>
<td>.41</td>
<td>17.00</td>
<td>.89</td>
</tr>
<tr>
<td>Shorttail Shrew, <em>Blarina brevicauda</em></td>
<td>7</td>
<td>3</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Bear, <em>Ursus americanus</em></td>
<td>12</td>
<td>3</td>
<td>1.24</td>
<td>630.00</td>
<td>32.91</td>
</tr>
<tr>
<td>Raccoon, <em>Procyon lotor</em></td>
<td>7</td>
<td>1</td>
<td>.72</td>
<td>17.50</td>
<td>.91</td>
</tr>
<tr>
<td>Striped Skunk, <em>Mephitis mephitis</em></td>
<td>2</td>
<td>1</td>
<td>.21</td>
<td>5.00</td>
<td>.26</td>
</tr>
<tr>
<td>cf. Striped Skunk, <em>Mephitis mephitis</em></td>
<td>1</td>
<td>-</td>
<td>.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fox, sp.</td>
<td>5</td>
<td>1</td>
<td>.52</td>
<td>4.00</td>
<td>.21</td>
</tr>
<tr>
<td>cf. Domestic Dog, <em>Canis familiaris</em></td>
<td>1</td>
<td>1</td>
<td>.10</td>
<td>8.50</td>
<td>.44</td>
</tr>
<tr>
<td>Woodchuck, <em>Marmota monax</em></td>
<td>2</td>
<td>1</td>
<td>.21</td>
<td>5.60</td>
<td>.29</td>
</tr>
<tr>
<td>Gray/Fox Squirrel, <em>Sciurus spp.</em></td>
<td>24</td>
<td>2</td>
<td>2.48</td>
<td>1.20</td>
<td>.06</td>
</tr>
<tr>
<td>Beaver, <em>Castor canadensis</em></td>
<td>1</td>
<td>1</td>
<td>.10</td>
<td>38.50</td>
<td>2.01</td>
</tr>
<tr>
<td>Rice Rat, <em>Oryzomys palustris</em></td>
<td>2</td>
<td>1</td>
<td>.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>Pieces</td>
<td>MNI</td>
<td>Percent Of Total</td>
<td>Est. Lbs. Of Meat</td>
<td>Percent of Total Meat</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>--------</td>
<td>-----</td>
<td>------------------</td>
<td>------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Meadow Vole, <em>Microtus cf. pennsylvanicus</em></td>
<td>2</td>
<td>1</td>
<td>.21</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Small Rodents, spp.</td>
<td>12</td>
<td>1</td>
<td>1.24</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cottontail, <em>Sylvilagus cf. floridanus</em></td>
<td>8</td>
<td>1</td>
<td>.83</td>
<td>1.75</td>
<td>.09</td>
</tr>
<tr>
<td>Elk, <em>Cervus canadensis</em></td>
<td>1</td>
<td>1</td>
<td>.10</td>
<td>350.00</td>
<td>18.28</td>
</tr>
<tr>
<td>White-tailed Deer, <em>Odocoileus virginianus</em></td>
<td>502</td>
<td>8</td>
<td>51.91</td>
<td>800.00</td>
<td>41.79</td>
</tr>
<tr>
<td>Total Ident. Mammal Bone Pieces</td>
<td>593</td>
<td>29</td>
<td>61.31</td>
<td>1,879.05</td>
<td>98.14</td>
</tr>
<tr>
<td>Indet. Large Mammal Bone Pieces</td>
<td>1,516</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indet. Small Mammal Bone Pieces</td>
<td>31,052</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Total Mammal Bone</td>
<td>33,161</td>
<td></td>
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</tr>
</tbody>
</table>

**Birds**

<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent Of Total</th>
<th>Est. Lbs. Of Meat</th>
<th>Percent of Total Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bobwhite, <em>Colinus virginianus</em></td>
<td>1</td>
<td>1</td>
<td>.10</td>
<td>.29</td>
<td>.02</td>
</tr>
<tr>
<td>Turkey, <em>Meleagris gallopavo</em></td>
<td>19</td>
<td>3</td>
<td>1.96</td>
<td>25.50</td>
<td>1.33</td>
</tr>
<tr>
<td>Common Crow, <em>Corvus brachyrhynchos</em></td>
<td>1</td>
<td>1</td>
<td>.10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Passerine, sp.</td>
<td>3</td>
<td>1</td>
<td>.31</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Species</td>
<td>Pieces</td>
<td>MNI</td>
<td>Percent Of Total</td>
<td>Est. Lbs.</td>
<td>Percent of Total Meat</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------</td>
<td>-----</td>
<td>-----------------</td>
<td>----------</td>
<td>-----------------------</td>
</tr>
<tr>
<td><strong>Total Ident. Bird Bone Pieces</strong></td>
<td>24</td>
<td>6</td>
<td>2.47</td>
<td>25.79</td>
<td>1.35</td>
</tr>
<tr>
<td><strong>Indet. Bird Bone Pieces</strong></td>
<td>233</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Total Bird Bone</strong></td>
<td>257</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Reptiles**

- **Snapping Turtle, Chelydra serpentina**
  - Pieces: 1
  - MNI: 1
  - Percent Of Total: 0.10
  - Est. Lbs.: 7.50
  - Percent of Total Meat: 0.39

- **Turtle: Kinosternidae**
  - Pieces: 5
  - MNI: 1
  - Percent Of Total: 0.52
  - Est. Lbs.: -
  - Percent of Total Meat: -

- **Map Turtle, Graptemys, sp.**
  - Pieces: 3
  - MNI: 1
  - Percent Of Total: 0.31
  - Est. Lbs.: -
  - Percent of Total Meat: -

- **Turtle: Pseudemys/Graptemys/Chrysemys spp.**
  - Pieces: 20
  - MNI: 1
  - Percent Of Total: 2.07
  - Est. Lbs.: 1.50
  - Percent of Total Meat: 0.08

- **Box Turtle, Terrepene carolina**
  - Pieces: 10
  - MNI: 2
  - Percent Of Total: 1.03
  - Est. Lbs.: 0.40
  - Percent of Total Meat: 0.02

- **Softshell Turtle, Trionyx sp.**
  - Pieces: 2
  - MNI: 1
  - Percent Of Total: 0.21
  - Est. Lbs.: -
  - Percent of Total Meat: -

- **Turtle, spp.**
  - Pieces: 29
  - MNI: 1
  - Percent Of Total: 3.00
  - Est. Lbs.: -
  - Percent of Total Meat: -

- **Snake: Crotalidae**
  - Pieces: 4
  - MNI: 1
  - Percent Of Total: 0.41
  - Est. Lbs.: -
  - Percent of Total Meat: -

- **Snake: Colubridae**
  - Pieces: 97
  - MNI: 1
  - Percent Of Total: 10.03
  - Est. Lbs.: -
  - Percent of Total Meat: -

- **Snake, spp.**
  - Pieces: 109
  - MNI: -
  - Percent Of Total: 11.27
  - Est. Lbs.: -
  - Percent of Total Meat: -

<p>| <strong>Total Ident. Reptile Bone Pieces</strong> | 280 | 10 | 28.95 | 9.40 | 0.49 |</p>
<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent Of Total</th>
<th>Est. Lbs. Of Meat</th>
<th>Percent of Total Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amphibians</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hellbender/Mudpuppy,</td>
<td>4</td>
<td>1</td>
<td>.41</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cryptobranchus alleganiensis/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Necturus maculosus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Spadefoot Toad,</td>
<td>16</td>
<td>4</td>
<td>1.65</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Scaphiopus holbrooki</td>
<td>2</td>
<td>1</td>
<td>.21</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Toad, Bufo sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toad, Scaphiopus/Bufo spp.</td>
<td>8</td>
<td>2</td>
<td>.83</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Total Ident. Amphibian Bone Pieces</td>
<td>30</td>
<td>8</td>
<td>3.10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Indet. Amphibian Bone Pieces</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Amphibian Bone</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minnow spp., Cyprinidae</td>
<td>3</td>
<td>2</td>
<td>.31</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Redhorse, Moxostoma sp.</td>
<td>2</td>
<td>1</td>
<td>.21</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sucker spp., Catostomidae</td>
<td>14</td>
<td>2</td>
<td>1.45</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Catfish, Ictalurus sp.</td>
<td>10</td>
<td>2</td>
<td>1.03</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Species</td>
<td>Pieces</td>
<td>MNI</td>
<td>Percent Of Total</td>
<td>Est. Lbs. Of Meat</td>
<td>Percent of Total Meat</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------</td>
<td>-----</td>
<td>------------------</td>
<td>------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Madtom, Noturus sp.</td>
<td>1</td>
<td>1</td>
<td>.10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bass, Micropterus sp.</td>
<td>1</td>
<td>1</td>
<td>.10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sunfish spp., Centrarchidae</td>
<td>4</td>
<td>2</td>
<td>.41</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Freshwater Drum, Aplodinotus grunniens</td>
<td>5</td>
<td>1</td>
<td>.52</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Ident. Fish Bone Pieces</td>
<td>40</td>
<td>12</td>
<td>4.13</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Indet. Fish Bone Pieces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Fish Bone</td>
<td>1,373</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total All Ident. Bone</td>
<td>967</td>
<td>65</td>
<td>99.96</td>
<td>1,914.24</td>
<td>99.98</td>
</tr>
<tr>
<td>Total All Indet. Bone</td>
<td>34,175</td>
<td></td>
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</tr>
<tr>
<td>Total All Bone</td>
<td>35,142</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE VIII
40CF32 RADIOCARBON DATES

<table>
<thead>
<tr>
<th>Feat. No.</th>
<th>Sample No.</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feat. 98</td>
<td>UGa-1308</td>
<td>1435 ± 255 B.P. (A.D. 515)</td>
</tr>
<tr>
<td>Feat. 511</td>
<td>UGa-1306</td>
<td>970 ± 100 B.P. (A.D. 980)</td>
</tr>
<tr>
<td>Feat. 511</td>
<td>GX-4333</td>
<td>585 ± 130 B.P. (A.D. 1365) Uncorrected</td>
</tr>
<tr>
<td></td>
<td></td>
<td>615 ± 130 B.P. (A.D. 1335) C13 Corrected</td>
</tr>
</tbody>
</table>

of ca. A.D. 900, and from comparable assemblage content at the two sites. Also, radiocarbon determinations for Early Mississippian components at the Yearwood and Mound Bottom sites in Middle Tennessee, processed recently by the Dicar Laboratory at Case Western Reserve University, appear to corroborate the Normandy chronology (Brian M. Butler, personal communication). When the analysis of the Mississippian material from 40CF32 is completed and more radiocarbon samples have been dated, the chronological problems for the site will hopefully be resolved.

The Parks Site (40CF5)

The Parks site (40CF5) is a multicomponent site located in the lower Normandy Reservoir Zone (Figure 2 on page 6). Features excavated at 40CF5 ranged in time from the Late Archaic to the Early Mississippian periods. In addition, surface collections have yielded Paleo-Indian through Middle Archaic projectile points, which suggest even earlier
occupations. Located along the Duck River on a long but relatively narrow first terrace, the site covers approximately 25 acres at an elevation of between 820 and 830 feet AMSL (Faulkner and McCollough 1973: 353). The major soil type for the site is Armour silt loam. A program of controlled surface collection and subsurface testing was conducted at 40CF5 during 1973 and 1974. Excavation of 40CF5 was carried out during the summer and fall of 1974, after first utilizing power equipment to remove the plowzone. Only 4 features from 40CF5, out of a total of 335 excavated pits and other installations, were referable to the Mississippian period. These features comprise a small (8 x 13 feet), rectangular wall-trench dwelling with a central hearth, and three nearby large irregular "clay borrow" pits filled with trash. These are the only Mississippian data in evidence on the extensively investigated Parks site. This small unit of occupation could be interpreted as a single family farmstead of the very early Mississippian Banks phase (Faulkner and McCollough, personal communication). Of these four features, only the "clay borrow" pits contained faunal material. Feature fill was processed through a water screen using primarily a window screen (1 x 1.5 mm) mesh. A minimum of two species of turtles, one snake, one bird, and three mammals are represented in the sample. The total bone count from 40CF5, including both identifiable and unidentifiable bone, is 1,136 pieces. Of this total, 45 bones or 4 percent of the total bone count were identifiable to at least order level. Once again, the high counts of unidentifiable bone are due mainly to the small and badly fragmented pieces caught in the water screen's fine mesh.

Table IX should be examined at this point for more detailed information concerning the types and quantities of vertebrate remains
<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent of Total</th>
<th>Est. Lbs. of Meat</th>
<th>Percent of Total Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bobcat, <em>Lynx rufus</em></td>
<td>2</td>
<td>1</td>
<td>4.55</td>
<td>15.00</td>
<td>4.76</td>
</tr>
<tr>
<td>Small Rodent, sp.</td>
<td>1</td>
<td>1</td>
<td>2.27</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>White-tailed Deer,</td>
<td>35</td>
<td>3</td>
<td>79.54</td>
<td>300.00</td>
<td>95.12</td>
</tr>
<tr>
<td><em>Odocoileus virginianus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Ident. Mammal Bone Pieces</td>
<td>38</td>
<td>5</td>
<td>86.36</td>
<td>315.00</td>
<td>99.88</td>
</tr>
<tr>
<td>Indet. Large Mammal Bone Pieces</td>
<td>112</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indet. Small Mammal Bone Pieces</td>
<td>951</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Total Mammal Bone</strong></td>
<td>1,101</td>
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</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passerine, sp.</td>
<td>1</td>
<td>1</td>
<td>2.27</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Ident. Bird Bone Pieces</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indet. Bird Bone Pieces</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Bird Bone</strong></td>
<td>11</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
### TABLE IX (Continued)

<table>
<thead>
<tr>
<th>Species</th>
<th>Pieces</th>
<th>MNI</th>
<th>Percent Of Total</th>
<th>Est. Lbs. Of Meat</th>
<th>Percent of Total Meat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reptiles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turtle: Kinosternidae</td>
<td>2</td>
<td>1</td>
<td>4.55</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Box Turtle,</td>
<td>1</td>
<td>1</td>
<td>2.27</td>
<td>.40</td>
<td>.12</td>
</tr>
<tr>
<td><em>Terrepene carolina</em></td>
<td>1</td>
<td>1</td>
<td>2.27</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Snake: Colubridae</td>
<td>1</td>
<td>1</td>
<td>2.27</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total Reptile Bone</strong></td>
<td>5</td>
<td>4</td>
<td>11.36</td>
<td>.40</td>
<td>.12</td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indet. Fish Bone Pieces</td>
<td>19</td>
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<td></td>
</tr>
<tr>
<td><strong>Total Fish Bone</strong></td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total All Ident. Bone</strong></td>
<td>44</td>
<td>10</td>
<td>99.99</td>
<td>315.40</td>
<td>.12</td>
</tr>
<tr>
<td><strong>Total All Indet. Bone</strong></td>
<td>1,092</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total All Bone</strong></td>
<td>1,136</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
identified from 40CF5. Information on the Mississippian fauna from 40CF5 at the class level is presented in Table IV on page 33.

Radiocarbon dates for 40CF5, listed in Table X, are extremely early for the Mississippian culture, possibly too early. The date of A.D. 745 ± 195 from UGa-1002 would be in the correct time range for Early Mississippian only if the plus factor for the standard deviation was added to A.D. 745. Otherwise, the date of A.D. 745 would probably be too early for what is now recognized as the chronological limits for Early Mississippian. However, a similar date of A.D. 735 (UGa-1005) was obtained from Feature 74-3 at 40CF111. A.D. 645 ± 110 for UGa-1026 appears to be too early for the Mississippian culture.

TABLE X
40CF5 RADIOCARBON DATES

<table>
<thead>
<tr>
<th>Feat. No.</th>
<th>Sample No.</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feat. 164</td>
<td>UGa-1002</td>
<td>1205 ± 195 B.P. (A.D. 745)</td>
</tr>
<tr>
<td>Feat. 184</td>
<td>UGa-1026</td>
<td>1305 ± 110 B.P. (A.D. 645)</td>
</tr>
</tbody>
</table>
CHAPTER III

DISCUSSION OF THE FAUNAL REMAINS RECOVERED
FROM 40CF111, 40CF32, AND 40CF5

The fauna exploited by the Mississippian peoples of the upper Duck River Valley may be divided into two groups, the Mollusca (mollusks) and the Chordata (vertebrates). Representatives of two classes in the phylum Mollusca, the snails (Gastropoda) and the bivalves (Pelecypoda), appear in the faunal samples from 40CF111, 40CF32, and 40CF5. In the phylum Chordata, the following classes were represented in the faunal sample: Mammalia (mammals), Aves (birds), Reptilia (reptiles), Amphibia (amphibians), and Osteichthyes (boney fish). Within each of these classes a number of species were exploited, some more heavily than others, depending on the species' importance to the Mississippian peoples and/or the relative sizes of available species populations. A review of those animals represented in the faunal sample, their role within aboriginal culture, preferred habitats, average size or weight, mode of capture, and means of preparation (i.e., butchering patterns), would be germane to understanding their position or significance in the subsistence of the Mississippian culture of the upper Duck River Valley.

Mollusca

Studies by Ortmann (1924), Isom and Yokley (1968), and van der Schalie (1973) have shown the molluscan fauna of the Duck River to have been abundant and varied. Although studies are lacking on the subject,
it is reasonable to suppose that the terrestrial molluscan fauna was equally rich. The Mollusca recovered from 40CF111 and 40CF32 can be divided into two major classes, Gastropoda (snails) and Pelecypoda (bivalves). Freshwater bivalves and the remains of marine, terrestrial, and freshwater gastropods were recovered from 40CF111 and 40CF32.

Gastropoda

One of the most interesting discoveries was the presence of marine shells at 40CF111 and 40CF32. From a single feature at 40CF111, one rim shell (*Marginella apicina*) and two jasper dwarf olive shells (*Olivella cf. jaspidea*) were recovered. A feature at 40CF32 produced three *Olivella cf. jaspidea* shells. Swanton (1946: 252) notes that *Marginella* and *Olivella* shells were used as beads for necklaces by many Southeastern aboriginal groups. This would seem to be the case here since all aforementioned marine shells show signs of having been worked. All of the *O. cf. jaspidea* shells had the top of the spire cut off so that a string could have been run completely through the body whorl. In the case of the *M. apicina* specimen, the body whorl, on the ventral side near the shell aperture, had been ground away so that a thread could have been strung through the shell. Both *M. apicina* and *O. jaspidea* are common along the Gulf and Atlantic coasts as far north as North Carolina (Morris 1956: 212-214). The presence of these marine shells at 40CF111 and 40CF32 gives ample evidence of wide-ranging trade contracts or, although less likely, actual trips by Mississippian Indians of the upper Duck River to the Gulf or Atlantic coast. Swanton, in his Indians of the Southeastern United States (1946: 259) mentions that Indians living on the coast gathered *Marginella* shells in the summer for trade with inland
aboriginal groups. Thus, it is most probable that the Marginella and Olivella shells in the Mississippian features in the Normandy Reservoir reached these sites by trade from the coast to the inland areas.

At least five species of terrestrial gastropods were recovered from features at 40CF111, but none were found at 40CF32 or 40CF5. Mesomphix, Stenotrema, and Mesodon are genera that often inhabit forested areas, while Anguispira and Zonitoides are found in a variety of habitats (Leonard 1959). The presence of terrestrial gastropods in the Mississippian features, mixed with aquatic freshwater gastropods, does not necessarily mean they were part of the aboriginal diet. It is quite likely that the terrestrial gastropods crawled into the features to feed and were not discarded there by the Indians. According to Leonard (1959: 77), "... most terrestrial gastropods are herbivorous, and it is said that the mycelia of fungus forms a large part of their diet ... ." If these snails had been utilized by the Indians, they were relatively unimportant to the diet as a whole, since only 24 individuals were in the total faunal sample.

Although a large number of identifiable freshwater gastropods were recovered from features at 40CF111 and 40CF32, no aquatic snails were found at 40CF5. The freshwater gastropod genera represented at both 40CF111 and 40CF32 included Lithasia, Pleurocera, Goniobasis, and Anculosa. Shells of Viviparus, another freshwater snail, were found only at 40CF111. The above-mentioned gastropod genera are almost all endemic to clear, free flowing creeks and rivers where they cling to moss covered rocks and gravel in shallow water (Parmalee, personal communication). Snails of these types can be found congregated in large
numbers, often with the different genera intermixed. The collection of freshwater gastropods would only have entailed scraping the snails off the rocks into a container for transport back to the habitation site where they could be processed. Because of the proximity of the Mississippian sites to the Duck River, the collection of snails should have been a convenient and simple procedure.

The freshwater snails recovered from 40CF111 and 40CF32 are strictly aquatic and could not have accidently occurred in such large numbers in the Mississippian features. Although an occasional flood may have covered the first river terrace on which the Mississippian sites were located, this could not explain the presence of the snails since a large number of them show signs of burning, as from cooking or disposal in the fire after consumption. Freshwater snails then were undoubtedly gathered as a food supplement. Methods of preparing snails for eating have not been described in any Southeastern Indian ethnographies. Swanton (1946: 252) merely mentions that snails could have been a Southeastern aboriginal food source, but he is uncertain of their significance in the aboriginal diet. Since no Southeastern Indian ethnographic accounts on the culinary preparation of snails are available, the author will relate how the Igorot, a Philippine farming group, prepare the snails they collect (Stapleton, personal communication). Igorot women gather snails as they work the rice paddies, bringing them back to the village when they return from the fields. Placed in pots, the snails are boiled until they are considered fit for eating. The top of the snail shell is then broken against a hard object so that the snail can be sucked out more easily. The Mississippian peoples may have prepared snails in the same way as
the Igorot. Because of the difficulty in removing snails from their shells before cooking, it is almost certain that the Mississippian Indians would have heated them by some means before consumption. Swanton (1946: 279) mentions that freshwater mussels were boiled for long periods to soften them for eating; possibly snails were prepared in a like manner. The snails were probably sucked out without breaking the shell spire since most of the shells show no damage.

**Pelecypoda**

Identifiable freshwater pelecypods were restricted to 40CF111. There was a total of 30 identifiable mussel valves, representing four species, found at this site. Of these four species, *Amblema plicata*, *Cyclonaias tuberculata*, and *Obovaria subrotunda* are generalized in their habitat requirements and may be found in both large and small rivers. The habitat of most species of *Villosa* is more restricted, occurring mainly in creeks and small to medium sized shallow rivers (Parmalee 1967: 75-76). All the aforementioned mussels have been noted by Isom and Yokley (1968: 40) as being forms collected in the upper Duck River, and thus were probably available to the Mississippian Indians living within the Normandy Reservoir area. However, the value of mussels in the Mississippian diet is questionable. Only very negligible amounts of mussel shell were recovered from the three sites in this study. No pelecypod remains were recovered from 40CF5, and 40CF32 contained only a very few indeterminate and badly crushed valves. The 30 identifiable valves and 465 nearly pulverized pelecypod fragments from 40CF111 do not speak highly of the importance of mussels in the diet of the upper Duck River Mississippian people. Since the pelecypods of the upper Duck River are small
headwaters forms, they would not yield as much meat as the larger forms and species found downstream from the Normandy Reservoir. Because of the small size of the pelecypods recovered and their paucity in the faunal sample, it may be assumed that mussels were only a minor meat supplement to the Mississippian diet. This hypothesis is based upon the assumption that when the Mississippians gathered freshwater pelecypods they brought them back to the habitation site still in the shells. If, in fact, the Mississippians usually removed the mussels from their shells before bringing them back to the site, no evidence of their use would be found in the site features. Therefore, mussels could have played a much larger role in Mississippian subsistence.

Research into ethnographic accounts for the Southeastern Indians produced only one report of how freshwater mussels may have been prepared for consumption. Swanton (1946: 279), quoting Lawson, notes that the Indians boiled the shellfish for five or six hours to make them tender for eating. Even then, Lawson is in some doubt as to whether the boiling process makes them acceptably palatable to most Europeans.

Freshwater pelecypods played more than just a dietary role in the Mississippian culture. One of the hallmarks of the Mississippian material culture is its shell tempered pottery, which is the overwhelmingly predominant Mississippian ware at 40CF111, 40CF32, and 40CF5. In all likelihood the shell for the pottery temper was procured from pelecypods taken in the upper Duck River. In addition, two of the valves from 40CF111, a large left valve each of *Amblem a plicata* and *Cyclonaias tuberculata*, have large holes drilled in them and were obviously utilized as tools. More detailed information on these two shells will be given in the section on worked shell and bone.
Mammals were the most important vertebrates in the diet of the Mississippian Indians of the upper Duck River Valley. The remains of 18 species of mammals were recovered from 40CF111, 40CF32, and 40CF5; possibly all 18 species represent potential sources of food, hides, and other usable byproducts. A major percentage of the identifiable animal bone recovered from the Mississippian features (55.19 percent from 40CF111, 61.31 percent from 40CF32, and 86.36 percent from 40CF5) was that of mammals. An examination of the total bone counts (identifiable and indeterminate bone fragments) for each site revealed that a major percentage of the total vertebrate faunal material was also made up of mammal bone; 87.22 percent at 40CF111, 94.39 percent at 40CF32, and 96.92 percent at 40CF5. In addition, mammals, at all three sites, account for the largest minimum number of individuals and estimated pounds of meat available for any of the five vertebrate classes.

Opossum (*Didelphis marsupialis*) remains consisted of three identifiable bone elements from at least one individual at 40CF111, and four identifiable bone elements from at least two individuals at 40CF32. Wooded, but not densely wooded, localities near streams are generally the preferred habitat for opossums. Nocturnal scavengers, opossums maintain themselves primarily on an omnivorous diet (Schwartz and Schwartz 1959: 20-21). Average live weight for an opossum is given by White (1953a: 397) as 12 pounds, with 8.5 pounds of this weight representing usable meat. In the Southeast, many Indian groups ate opossums, but others, such as the Chickasaw, tabooed the animal as an impure food
(Swanton 1946: 297). Other cultural functions for the opossum included
dying its hide various colors and fashioning the skin into a hat (Grant
1925: 156). Means of hunting or trapping opossums are not well docu-
mented, but Swanton (1946: 330) does mention the use of dogs in chasing
the animals. He feels, however, that this practice was a later historic
trait and not one commonly used in pre-European contact periods. Judging
from the low frequency of opossum remains in the faunal samples, the
Mississippian Indians neither tabooed the use of the animal nor frequently
sought to procure it.

Only at 40CF111 was a skeletal element from the eastern mole
(Scalopus aquaticus) recovered. Usually not considered a food item, the
mole is most often thought to be an intrusive animal that died within the
confines of the site (Parmalee 1959: 7). However, the mole radius recov-
ered from 40CF111 exhibits definite butchering cuts near its proximal
end, demonstrating that it was part of some cultural activity performed
by these Indians. Whether the mole was used as food or desired for its
pelt is unknown. Although at 40CF111 the Mississippian Indians obviously
used the mole for some purpose, Adair (1930: 139) states that many South-
ern Indian groups would not even allow their children to touch moles out
of fear that the children would go blind. Parmalee (1975: 37-40) in his
article "Mole Food?" makes more extensive comments on aboriginal uses
of moles and the mole radius in question.

The black bear (Ursus americanus) is represented at 40CF111 by 7
skeletal elements from at least 2 individuals, while 12 skeletal elements
from at least 3 individuals were found at 40CF32. The black bear was at
one time widely distributed over most of North America, especially in
heavily wooded regions. Omnivorous in nature, the black bear exploits a variety of plant and animal foods, depending on their availability (Schwartz and Schwartz 1959: 269-270). One of the largest mammals in the Eastern Woodlands region, the black bear would have represented a valuable food source to the prehistoric Indians. White (1953a: 397) estimates the average live weight for a black bear at 300 pounds, with 210 pounds of this being usable meat. The black bear was hunted extensively by historic Indians of the Southeast, but not so much for its meat as for its fat. Oil derived from bear fat was used by the Indians to anoint their hair and bodies and was also the base of a sauce in which other food was dipped (Swanton 1946: 249, 371). Bear meat for many Southeastern Indians was considered a desirable food only if the bear was rather lean when killed. In addition to use of the meat and fat of the black bear, the animal's claws were used as ear ornaments, the heavy hide was made into winter robes, bed coverings, and moccasins, and the twisted bear "guts" were utilized as bow strings (Swanton 1946: 249).

In reviewing methods of hunting bears, Swanton (1946: 321-324) noted that the Natchez, Creeks, and Alabama Indians hunted bears mainly in the winter when the animals were at their fattest. When the bear dens were located, the animals were usually driven out by fire and upon their emergence, they were shot by the hunters. Seemingly less used was the "surround" method of hunting; in this technique the bear was driven through the woods to a waiting hunter who would dispatch the animal. Mention was also made of chases using dogs, but this is thought to have been a recent hunting method (Swanton 1946: 324)
A great deal of ceremonialism was associated with the killing of bears for many North American Indian groups. Part of this ceremonialism included a ritual disposal of the bear's skeleton away from the everyday food garbage and the scavenging of dogs. Possibly as a result of this activity, bear skeletal remains are rarely found during the excavation of prehistoric aboriginal sites. Whether ceremonies to propitiate the bear's spirit existed in the Southeast is uncertain. Hallowell (1926) makes no mention of Southeastern Indian ceremonies concerning bears nor could any accounts of their preferential treatment be found in Southeastern ethnographic reports. Guilday, Parmalee, and Tanner (1962: 66) feel that bear ceremonialism declined among many Indian groups after white contact, possibly due to firearms acquisition and the fur trade. Indian groups in the Southeast acculturated quickly and it is possible that their former ceremonies involving the disposal of bear remains may already have been lost before the information could be recorded. It is also possible that many Southeastern Indians never had elaborate ceremonies concerning the killing of bears and the disposal of their remains.

Bear skeletal remains from 40CF111 were recovered from five features and consist mainly of foot bones and one right mandible. At 40CF32 the bear skeletal remains occurred in three features and the fill from a house floor. The bear remains from 40CF32 are more varied, with all long bones but the humerus represented in the sample, in addition to assorted foot bones and two molar teeth. Little ceremony would seem to have been accorded these varied bear skeletal elements since they were found mixed with other animal scrap bone and refuse. The season in which the Mississippians killed these bears cannot be determined, but if they followed
the pattern of historic Southeastern groups, the bears would have been most often taken when at their fattest in the winter. Bears, because of their large size and numerous uses, would have been one of the more important game animals for the upper Duck River Valley Mississippian population.

Raccoon (*Procyon lotor*) skeletal elements were found only at 40CF32 and consist of seven bone fragments representing, at most, one individual. The raccoon is generally a nocturnal animal that has an omnivorous diet. Dens are established in hardwood forests of various densities near water sources. Live weight for a raccoon averages about 25 pounds, with 17.5 pounds of this weight being usable meat (White 1953a: 397). Southeastern Indian groups used the raccoon in a variety of ways: its flesh was a meat supplement to their diet, its fur was used in the manufacture of clothing and pouches, and its claws were sometimes thrust through the ear lobes as ornaments (Swanton 1946: 250). Swanton (1946: 330) mentions that raccoons were hunted with dogs by some historic Indian groups, but he feels this practice was one acquired in historic times from the Europeans. Most probably, prehistoric Southeastern groups exploited raccoons by using deadfall traps. Judging from their environmental requirements, raccoons should have occurred in relatively large numbers in the upper Duck River Valley. Yet there was a paucity of their remains in the faunal material from the Normandy Reservoir. The reason for the lack of raccoon utilization locally is inexplicable considering that in other regions raccoons were a favored Mississippian game animal (Smith 1975: 42-52).

The striped skunk (*Mephitis mephitis*) is represented by one bone at 40CF32 and two bones from at least one individual (plus one probable
skunk skeletal element) from 40CF111. The striped skunk is a nocturnal and omnivorous animal, and its habitat is generally semi-open country such as mixed woods, brushland, and open prairie (Burt and Grossenheider 1964: 70). Schwartz and Schwartz (1959: 302) felt that skunks in Missouri have increased in number in the last 100 years due to clearing of the land, which created a more favorable habitat for them. This condition then might also be true for Tennessee; fewer skunks may have been present in prehistoric periods than are encountered at present. The paucity of skunk skeletal material in the Normandy Mississippian faunal sample may be directly related to a formerly less favorable habitat if the river valley was covered by a dense forest. Striped skunks, in White's (1953a: 397) estimations, average seven pounds live weight and yield approximately five pounds of meat per individual. Skunk meat, which does not carry the smell produced by the animal's scent glands when it is alive, was utilized by many Southeastern Indian groups as a meat supplement in their diet (Swanton 1946: 277, 297). No mention could be found in ethnographic accounts of the skunk's hide being used for clothing or decoration. But the skunk's scent gland did serve a unique function, at least for the Cherokee. According to Mooney (1900: 265-266), the odor given off by a skunk was thought to ward off contagious diseases. Therefore, the skunk's scent gland was removed, punctured slightly, and placed above the house doorway where the scent slowly oozed out. The means of capturing skunks was not documented, but it is probable that deadfalls or snares were most often used. Skunks, for the Mississippian peoples, probably provided at least a supplemental meat to the diet, and although it cannot be documented, skunks might also have been secured for a medicinal function.
Two halves of a single striped skunk mandible were found at 40CF32. Such a find would not usually be significant, but in this case the right half of the skunk mandible was found in level IV (bottom) of Feature 500—a large, cylindrical, stratified storage pit—while the left half of the mandible was found in level I (top) of Feature 511, a nearly identical cylindrical pit located 14 feet away. Beyond a doubt, the right and left mandible halves belong together; the dentition of each was worn down to the dentine layer and could only have belonged to a skunk of unusually advanced age. Features 500 and 511 were obviously contemporaneous and had been filled with refuse at nearly the same time. Feature 511 was already nearly filled to the ground surface as evidenced by the occurrence of the left half of the skunk mandible in level I; deposition of material in Feature 500 had just begun as indicated by the inclusion of the right half of the skunk mandible in level IV, the lowest layer of the feature.

Fox skeletal remains from 40CF111 and 40CF32 are from either the gray fox (*Urocyon cinereoargenteus*) or the red fox (*Vulpes fulva*). On the basis of incomplete postcranial remains, the two species are extremely difficult to differentiate. Therefore, with the exception of a metapodial which compared with gray fox, all fox skeletal fragments were grouped together as fox species. Only two bone fragments from an indeterminate fox species and one possibly from a gray fox were recovered at 40CF111, while five elements from an unknown species of fox were found at 40CF32. Both the gray and the red fox inhabit open forest and brushland habitats. Almost entirely carnivorous, both foxes subsist on a variety of small game animals. Average live weight for the red fox is estimated at eight pounds, with four pounds of usable meat, while the
gray fox averages nine pounds live weight and four and one half pounds of usable meat per individual (White 1953a: 397). Although few Southeastern ethnographic records mention the eating of foxes, they undoubtedly were consumed when taken. Swanton (1946: 250) does state that fox skins were made into pouches or bowman's wrist guards. The means by which historic Southeastern Indians usually captured foxes is poorly documented, but snares or deadfalls are two possibilities. In all likelihood, the Mississippian peoples used foxes in a manner similar to that of historic Southeastern Indians.

The domestic dog (Canis familiaris) was poorly represented at the three Mississippian sites under study. One domestic dog skeletal element was recovered from 40CF111, and a bone fragment possibly from a domestic dog was found at 40CF32. Due to the paucity of skeletal material, no estimation could be made on the size of the domestic dogs that were associated with the upper Duck River Valley Mississippian people. Dogs appear to have served no crucial function in Southeastern Indian societies. Swanton (1946: 330) records that dogs were used by historic Indians to run down certain types of game, but he was uncertain as to the antiquity of this practice. While dogs appear not to have been a regular fare in the Indian diet, they were consumed at social or ceremonial feasts (Swanton 1946: 251). No butchering cuts appear on the dog skeletal remains recovered at 40CF111 and 40CF32, leaving the animal's function in the local Mississippian culture unknown. Guilday (1971: 12) has suggested that dogs may have been kept by Indians mainly as garbage scavengers, alarms against enemy intrusion, and for food.

Remains of the bobcat (Lynx rufus) were recovered on only two of the sites, 40CF111 and 40CF5. At 40CF111 one bobcat tibia was found,
while single innominate and mandible fragments occurred at 40CF5. The bobcat is a solitary, generally nocturnal hunter that lives in heavy forest cover, with a territory of about five square miles (Schwartz and Schwartz 1959: 314). Considering the bobcat's habits, it is doubtful that the Mississippian Indians often encountered this felid. Swanton (1946: 250) states that the bobcat was sometimes eaten and that its skin might have been worn by Indians in the Southeast. Although the bobcat yields 15 pounds of processed meat, it does not appear to have always been a desired aboriginal food source. Swanton (1946: 297), in fact, quotes Lederer as saying that bobcat flesh tasted rank. The Mississippian means of preparing bobcat flesh is unknown, but some Indian groups appear to have cooked the animal without first skinning and gutting it (Swanton 1946: 368). Considering the scarcity of bobcat remains, this felid was probably only an occasional food supplement to the Mississippian peoples.

Two woodchuck (Marmota monax) skeletal elements were found at both 40CF111 and 40CF32; these represented only a single individual at each site. According to White (1953a: 398), woodchucks average eight pounds live weight and yield approximately 5.6 pounds of usable meat per individual. A burrowing, slow moving animal with a fairly high meat yield, the woodchuck would seem to be a relatively easy and desirable animal for the Indians to trap or snare. Yet research of Southeastern Indian ethnographic accounts failed to yield a single mention of the woodchuck being utilized by historic Indian groups. An examination of the four faunal analyses which have been completed for sites in the Normandy Reservoir produces only two elements of woodchuck. In 10 Middle
and south central Tennessee sites (previously mentioned in Chapter II, pages 19-20) from which the faunal remains have been analyzed, only 35 elements of woodchuck were recorded, representing approximately 10 individuals. The lack of mention or utilization of woodchucks may not reflect the popularity of the animal as an aboriginal food source, but may instead denote that woodchucks were formerly more scarce than at the present. Schwartz and Schwartz (1959: 116) make the following statement:

When North America was first settled, woodchucks were scarce, but as timbered areas were opened and woodland edge, fence rows, and meadows increased (the present preferred habitat of woodchucks), the range expanded and the animals prospered. If the Mississippian Indians of the upper Duck River Valley lived in heavily timbered river valley areas with few open clearings, the woodchuck population would then be expected to be low and there would have been few animals to exploit.

Squirrel skeletal elements were some of the most common bones to appear in the Mississippian faunal sample. Thirty-nine squirrel bone fragments from at least three individuals were recovered at 40CF111, while 24 squirrel bone fragments were found at 40CF32, representing at least two individuals. These squirrel skeletal fragments were from either the eastern gray squirrel (Sciurus carolinensis) or the eastern fox squirrel (Sciurus niger). There is considerable size overlap between these two squirrel species, and on the basis of postcranial skeletal elements, they are often impossible to differentiate. Since in the locality of the Normandy Reservoir the ranges of the gray and fox squirrel overlap, the squirrel skeletal remains recovered from this area have been recorded as Sciurus species. Both the gray and fox
squirrels subsist primarily on nut crops, wild fruits, berries, tree bark, and occasional insects (Schwartz and Schwartz 1959: 139, 147). Habitat for the gray and fox squirrels is also similar, consisting of a mixed hardwood forest with oak and hickory trees predominating. Gray squirrels, however, tend to be most prolific in the bottomlands along streams, while fox squirrels are found in greater numbers along the higher ridges (Schwartz and Schwartz 1959: 145).

Parmalee (1965: 5) calculated the estimated amount of meat a fox squirrel might yield to be 1.3 pounds per individual, while a gray squirrel is estimated to yield 0.6 pounds of meat per individual. In calculating the estimated pounds of meat per species, the lesser weight of the gray squirrel was used. Both the gray and the fox squirrel may have been available to the Mississippians of the upper Duck River Valley, but it is impossible to state which species was utilized from the skeletal elements recovered.

As can be seen from the following quotation, Indians in the Southeast made extensive use of squirrels:

Squirrels were a favorite article of food and their skins were sewed into various sorts of clothing. The claws were thrust through apertures in the ears as ornaments. A twisted skin frequently did duty as a bowstring (Swanton 1946: 250).

Swanton (1946: 331) mentions that squirrels were most often hunted by small boys using blowguns and bows and arrows, but snares and traps may also have been used. At times Southeastern Indians only singed the hair off of squirrels to prepare them for cooking and did not bother skinning or gutting the animals (Swanton 1946: 368-369). It might be assumed that the Mississippian Indians procured and utilized squirrels in much the same manner as the historic Indians.
Skeletal remains of the beaver (*Castor canadensis*) were found at 40CF111 and 40CF32. One skeletal element was found at 40CF32, while five elements representing two individuals, were found at 40CF111. An adult beaver is a fairly large animal, averaging 55 pounds live weight with 38.5 pounds of usable meat per individual (White 1953a: 398). Beavers, semi-aquatic animals, were numerous in the early historic period and found distributed over most of North America's waterways and lakes. Generally nocturnal animals, beavers feed mainly on bark from trees which they cut down along the riverbanks at night. Although beavers will travel up to 600 feet from the water's edge to cut trees and obtain food, they are probably most easily trapped nearer to their dens (Schwartz and Schwartz 1959: 167). Swanton (1946: 330) comments that several Southeastern aboriginal groups caught beavers by setting snares near the beaver dams. Although many aboriginal groups utilized the beaver's pelt, fashioned its incisor teeth into chisels, and consumed its flesh, Adair (1930: 139) noted that at least the Chickasaw tabooed use of the beaver as a polluted food source. However, the Mississippian Indians of the Normandy Reservoir area appear to have utilized the beaver when it could be obtained. Beaver, because of the large amount of usable meat per individual, would have constituted an extremely valuable meat supplement to the Mississippian diet.

The shorttail shrew (*Blarina brevicauda*), the rice rat (*Oryzomys palustris*), the meadow vole (*Microtus cf. pennsylvanicus*), the deer mouse (*Peromyscus sp.*), and the indeterminate small rodent remains recovered from 40CF111, 40CF32, and 40CF5 will be discussed as a group. The remains of these small insectivores and rodents have been considered in most
faunal reports as being intrusive in the site area and not representing any human activity. Small rodents are exceedingly common in the wild, and in prehistoric periods as well as now, probably plagued man by constantly raiding his food stores. A search of Southeastern Indian ethnographic accounts failed to find any mention of Indian use of small rodents such as rats and mice or insectivores such as shrews. At the three sites examined, none of the recovered bones from the insectivores (excepting the mole radius) or the small rodents displayed scored marks. The mole radius, with its butchering cuts, stands as a reminder that one cannot completely write off these small animals as possible food sources, especially when more preferred food animals were scarce and times were hard. An excellent example of this condition may be seen in the human feces recovered from Salts Cave, Kentucky, where six of the fecal specimens contained small mouse or rodent skeletal remains (Watson 1969: 55). Whether the small rodents and insectivores represented at 40CF111, 40CF32, and 40CF5 were intrusive in the sites or constitute the remains of human consumption cannot be proven one way or the other. If small rodents and insectivores were a food source, they are few in number and would have been only an incidental meat supplement to the Mississippian diet.

Rabbit remains from the Mississippian features consist of 10 skeletal elements (MNI: 2) from 40CF111 and 8 skeletal elements (MNI: 1) from 40CF32. Although the eastern cottontail (Sylvilagus floridanus) is probably the predominant rabbit species in the upper Duck River Valley, the range of the swamp rabbit (Sylvilagus aquaticus) does overlap that of the cottontail (Burt and Grossenheider 1964: 219, 223). Cottontail
and swamp rabbit feeding habits are similar, with the dominant foods being green vegetation in the summer and bark and twigs in the winter. Eastern cottontail habitat consists of heavy brush, strips of forest with nearby open areas, weed patches, and the edges of swamps. Habitat for the swamp rabbit includes swamps, marshes, and wet bottomlands (Burt and Grossenheider 1964: 219, 223). Mature swamp rabbits are considerably larger in size and weight than mature cottontails, and this is reflected in a larger bone structure for the swamp rabbit than that of the cottontail. This size difference is difficult to distinguish in immature individuals and in badly broken bone elements. Although the rabbit skeletal elements examined were probably those of the eastern cottontail, all rabbit material has been listed as Sylvilagus cf. floridanus because of the possible presence of swamp rabbit bones in the sample.

Nearly all Southeastern Indian groups seem to have eaten rabbits, since no taboos are recorded forbidding their consumption (Swanton 1946: 297). Rabbits constituted a meat supplement to the aboriginal diet and sometimes their hides were sewn into robes (Swanton 1946: 250). The most common means of capturing rabbits was by the use of snares or traps according to Swanton (1946: 330) who quotes Elvas as saying that rabbits were often snared in the Indian cornfields, especially in the winter. On the upper Duck River the Mississippian Indians probably followed a pattern similar to that of the historic groups by setting snares to capture rabbits and consuming them whenever available. Snaring rabbits would have been a relatively easy means of acquiring additional meat protein through very little physical labor or inconvenience.
The elk or wapiti (*Cervus canadensis*) was represented in the faunal sample by only a single molar tooth found at 40CF32. Because the elk was extirpated so swiftly during European settlement in the eastern United States, there is very little information on this species' former abundance and distribution. Generally the elk is a herd animal with 25 or more individuals per group. The elk is similar to the white-tailed deer in food habits, feeding primarily on grasses, herbs, twigs, and bark. Habitat preference includes semi-open forest, mountain meadows, foothills, plains, and valleys (Burt and Grossenheider 1964: 238). In much of the eastern United States, deer and elk had overlapping ranges, but elk were apparently never as plentiful as white-tailed deer. Swanton (1946) lists numerous accounts of animals the Southeastern Indians depended upon for their meat diet. In each of these accounts the white-tailed deer heads the list, but elk are only occasionally mentioned. If elk had been available in large numbers, they surely would have been mentioned more often in ethnographic accounts; because of their large meat yield per animal, they would have been of great importance in the aboriginal diet. White (1953a: 397) estimates the average processed meat yield for an elk at 350 pounds. When and where available, elk do seem to have been exploited. Adair (1930: 446, 452) mentions eating elk flesh with the Indians and that they used elk hides as bedding. Swanton (1946: 277, 289, 290, 297, 328) notes that the Choctaw, Creeks, and Chickasaw all hunted elk and that elk had been seen by early settlers on the Lower Tennessee River and in the "Barrens" region of Middle Tennessee. Located in Middle Tennessee near the Duck River, the Elk River by its name would suggest the former presence of this large herbivore in the region.
Elk may have been used more by the Mississippian Indians than the archaeological record for the Normandy Reservoir would suggest if the "schlepp effect" is applicable here. The "schlepp effect," as proposed by Daly (1969: 149), applies to large game animals too heavy to be carried back to camp in one piece after being killed. For these animals, such as elk, only the hide, meat, and other usable portions of the animal are returned to camp with unwanted skeletal parts being left at the kill site. This practice would result in an underrepresentation of skeletal remains of large game animals in the fauna sample. But while the "schlepp effect" may have resulted in elk being underrepresented in the Mississippian fauna sample, there is no means of proving this and it can only be assumed that elk were taken infrequently.

The white-tailed deer (Odocoileus virginianus) was the major meat staple of the Mississippian Indians of the upper Duck River Valley. At 40CF111, 40CF32, and 40CF5, the white-tailed deer accounted for the largest number of identifiable bone fragments recovered, the largest minimum number of individuals, and the greatest amount of meat provided by any species. In addition, a majority of the indeterminate large mammal bone fragments from these three sites were probably those of deer too badly fractured to identify specifically. There were 395 identifiable white-tailed deer bone fragments representing at least 10 individuals and 1,000 pounds of processed meat at 40CF111. From 30CF32 there were 502 identifiable white-tailed deer bone fragments representing at least 8 individuals and 800 pounds of meat; features at 40CF5 contained 35 identifiable deer bone fragments from at least 3 individuals which accounted for an estimated 300 pounds of meat. White (1953a: 397)
estimates the average live weight of a white-tailed deer at 200 pounds which results in approximately 100 pounds of usable meat per individual. White-tailed deer are found over most of North America in forest and swamp habitats that have open edge areas nearby. In these edge areas, deer feed upon twigs, shrubs, fungi, acorns, grass, and herbs as they become seasonally available (Burt and Grossenheider 1964: 230). During the summer and fall, generally only two or three deer can be found together, while in the winter 25 or more individuals may congregate. In the North, some deer migrate to swamps in the winter (Burt and Grossenheider 1964: 230).

The white-tailed deer was probably the most important animal in the subsistence economies of both historic and prehistoric Indians of the Southeast. In the following passage, Swanton (1946: 249) gives some idea of the importance of white-tailed deer and the extent to which they were used by historic Indian groups. Prehistoric groups probably made similar or even more extensive uses of the deer.

The most important food animal was the deer, and deerhide probably formed the most important single material entering into native dress. One of the bones from a deer's foot was used to remove the hair from skins. The head and neighboring parts were turned into a decoy for stalking other members of the deer tribe. The ribs were made into bracelets, part of the horn mounted on a club, and tips of the horns formed one of the commonest types of arrow points. The heads of drums were usually made by stretching a deer skin over a pot, keg, or cypress knee. Balls used in the great southern ball game were covered with deer hide, and the rattles which women wore about their ankles in dances were sometimes made of the hoofs of deer. Flutes or flageolets were sometimes made of the deer's tibia. The sinews, skin, or entrails were employed as thread or string, and bowstrings, fish nets, and the cords to fasten ballsticks together were constructed by their means. According to Strachey, bows were scraped by the use of a twisted deer hide. Parts of the horns and
bones were made into needles, and the brains were employed in tanning skins. Ornaments were made from the horn, deer bones were worn stuck through the hair in Florida, and toward the north stained deer's hair was metamorphosed into crests for warriors. Deer horn was also boiled to make glue, and glue was extracted from deerskins to dilute coloring matter.

Indians of the Southeast hunted deer by at least two methods—surrounding the animal and stalking. In the stalking method, the hunter would creep toward the deer, often using a deer head/skin decoy and a deer call, until he was within range to shoot the animal. Stalking of deer was usually done by a single hunter. When employing the surround hunt, a number of hunters deployed themselves in the woods and set fire to a portion of the forest so as to drive the game, especially deer, towards a nearby body of water. At this body of water, other hunters were waiting to shoot the fleeing animals as they emerged from the burning forest.

Deer mandibles and antlers may be used in determining the season(s) during which a site was occupied and when the hunting of deer was practiced. From 40CF111, 40CF32, and 40CF5 there were 13 deer mandibles complete enough to be aged. Table XI lists the site distribution, ages, and sides for each of the 13 mandibles. The archaeological deer mandibles were aged by using deer mandibles of known age and the criteria established by Severinghaus (1949), which are based upon tooth eruption, replacement, and wear. While it is known that differential wear occurs in deer dentition in various geographical areas due to vegetation and diet differences, it was assumed for this study that the dental aging criteria used for Severinghaus' New York deer population essentially apply to the deer found in Middle Tennessee. A majority of the deer
### TABLE XI

DEER MANDIBLE AGE DISTRIBUTION

<table>
<thead>
<tr>
<th>Age Categories</th>
<th>40CF111 Right Mandible</th>
<th>40CF111 Left Mandible</th>
<th>40CF32 Right Mandible</th>
<th>40CF32 Left Mandible</th>
<th>40CF5 Right Mandible</th>
<th>40CF5 Left Mandible</th>
</tr>
</thead>
<tbody>
<tr>
<td>9½ - 10 mo.</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 mo.</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2½ yr.</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3½ yr.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4½ yr.</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6½ yr.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7½ yr.</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
mandibles recovered fell within the 2½ to 3½ years of age category, with the extremes for the sample being 9½ - 10 months to 7½ years of age. Schwartz and Schwartz (1959: 324) feel that the prime years of life for deer are between 2½ and 7½ years of age, making all but the two youngest deer in the sample fully adult and in their prime. The two mandibles in the 7½ years of age category were found in the same feature; although they are both fractured anteriorly and cannot be articulated, the mandibles compare quite well and undoubtedly belong to the same animal. Deer develop their complete adult dentition at approximately two years of age. Up to this time, deer can be aged accurately within one or two months of their correct chronological age since the replacement and development of their teeth is a consistent and predictable process. Assuming that does in Tennessee follow the time sequence found in Missouri, fawns are born most often in late May or early June (Schwartz and Schwartz 1959: 328). If the birth date for fawns in Tennessee is late May or early June, the deer aged at 9½ - 10 months was killed in March or April, while the deer aged at 17 months was killed in November or December.

Deer develop and lose their antlers with fair regularity at certain times of the year. Seasonality of aboriginal occupations can sometimes be hypothesized by the presence of antler that is either attached to the skull or has been shed naturally. Antler growth generally begins in April or May, with full development being reached in August or September. Shedding of the antler takes place between the last of December to mid-February (Schwartz and Schwartz 1959: 318). During the early months of antler development, between May and July, the antler is still rather soft and is less likely to be preserved if the animal was slain during
this period. In the later months of antler development, August through September and after the velvet is shed, antler becomes very hard and compact and generally preserves well at archaeological sites. A number of attached and shed deer antlers, in varying states of preservation, were found at 40CF111 and 40CF32. Two nearly complete left antlers still attached to frontal bone fragments were recovered at 40CF32, plus one frontal bone fragment with a very small portion of an antler still attached, and the base section of an antler that had obviously been shed. The two nearly complete antlers attached to frontal bone fragments suggest that the animals were killed between August and February, late summer through mid-winter. The small section of antler fragment still attached to the frontal bone suggests that it was fairly well developed, implying that the animal was also probably killed between August and February. The shed antler could have been picked up at any time of the year. However, shed antlers would have to be picked up rather quickly since exposure to rain and moisture softens them and rodents quickly gnaw them away for their mineral content (Calhoun and Loomis 1975: 13). The frontal bone fragment with one of the complete attached antlers and the shed antler were found in the same level of Feature 511. From the evidence offered by the presence of antler at 40CF32, a late summer through winter occupation of the site might be implied. At 40CF111 only the base of a naturally shed antler was recovered, suggesting that it may have been picked up by the site occupants in the late winter or early spring months.

**Aves**

Birds appear not to have played a very important part in the subsistence pattern of the Mississippian peoples in the Normandy Reservoir
area. While bird bones were found at all three of the sites under study, only 40CF32 and 40CF111 possessed bird bones identifiable to at least the generic level. One bird bone at 40CF5 was identifiable to the Order Passeriformes. The number of identifiable bird bones at each of the sites was small: 24 from 40CF32, 112 from 40CF111, and 1 from 40CF5. The total bird bone count (identifiable and unidentifiable bone) from each of the sites is as follows: 40CF111, 764 bones; 40CF32, 247 bones; and 40CF5, 11 bones. Poor preservation of the fragile bird bones may account for their meager representation in the overall vertebrate bone sample from the three sites. But more likely, the small number of bird bones in the sample is a true reflection of the degree of utilization of birds by the Mississippian Indians.

The turkey is the only bird with a substantial meat yield to have been utilized by the Mississippian Indians of the upper Duck River Valley. Unexpectedly, no remains of ducks, geese, or swans appeared in the faunal samples from any of the three Mississippian sites. This lack of waterfowl is probably due mainly to the upper Duck River being outside the major migratory flyway routes (Bellrose 1976: 22). Few waterfowl would thus migrate through the area and be available to the Mississippian Indians. The only permanent Duck River waterfowl resident is the wood duck, which is usually solitary and probably did not gather in large enough numbers to make its collection easy or economically productive for the time spent in the endeavor. Of all the Normandy sites for which faunal analyses have been conducted, only the Nowlin II site (40CF35), a Terminal Archaic station, was found to contain skeletal elements of waterfowl. In his analysis of the Nowlin II material, Parmalee found
three elements of an indeterminate species of goose (Parmalee, n.d.). Such a paucity of waterfowl remains would help to substantiate the hypothesized poor availability of waterfowl in the upper Duck River Valley. When waterfowl were abundant enough to make their collection worthwhile, Mississippian Indians apparently exploited them heavily (Smith 1975: 64-76).

As stated previously, the turkey was the only bird to have been exploited to any great degree by the Mississippian Indians of the upper Duck River Valley. Turkey remains accounted for 79 percent of the total identifiable bird bones from both 40CF32 and 40CF111. Based upon the figures for total pounds of usable meat per species, turkeys were the fourth largest meat source at 40CF111 with 51 pounds represented and the fifth largest meat source at 40CF32 with 25.5 pounds represented. Turkeys then were an important source of food because of the amount of usable meat per individual, 8.5 pounds average (White 1953a: 398) and also because of the large numbers that probably would have been available throughout the year in what is now the reservoir area. Schorger (1966: 60-61) estimates that the turkey population in Tennessee may have averaged eight individuals per square mile; he does, however, concede that his estimations are quite conservative and that some areas may have supported more than this number. In the upper Duck River Valley, there would probably have been more than adequate mast, seed, and insect crops for a large turkey population to flourish. While turkeys may wander over a considerable area in search of food, they do not migrate seasonally and thus would be available for exploitation throughout the year. A number
of methods were enumerated by Schorger (1966: 377-379) as being used by historic Indians to obtain turkeys; these include circular hunts, snares, driving the birds into trees, and the use of turkey calls.

Birds other than turkeys were seldom used by the Mississippian Indians of the upper Duck River Valley. Bobwhite quail were represented by three bone elements at 40CF111 and by one bone element at 40CF32. While bobwhites yield a large amount of meat for their small size, 4.2 ounces average, their small physical size may also have made their capture difficult. Bobwhites are birds that avoid deep forests and prefer habitats of brush, abandoned fields, and open pinelands (Robbins, et al. 1966: 90). The quail and the turkey are gallinaceous birds that prefer similar open or "edge" habitats (Robbins, et al. 1966: 82). It might be assumed then that if turkeys were fairly numerous in an area, the area's habitat might also favor the presence of a healthy population of quail. The small number of bobwhite elements in the bone samples from 40CF111 and 40CF32 may denote that the Mississippian hunters did not prefer bobwhite quail as a food resource or that the acquisition of quail was difficult with the hunting methods they could employ.

The passenger pigeon (*Eudocimustes migratorius*) was represented by only one bone, an ulna, found at 40CF111. Information is rather scanty on the probable number and habits of early historic populations of the passenger pigeon in the Southeast. No historic records exist that show any major roosts located in Tennessee, although Ganier (1933: 44) suggests that some passenger pigeons may have been at least winter residents in the state. Little substantial evidence can be given on the primary migration corridors of the passenger pigeon, if such corridors even
existed; possibly no major migrations may have occurred through the upper Duck River Valley. Whatever the reasons, few passenger pigeons seem to have been exploited by the Mississippian Indians in the Normandy Reservoir area.

A single bone of the common crow (Corvus brachyrhynchos) was found at 40CF32. The crow could have been utilized as a food item; possibly elements of the bird served as part of ceremonial or social paraphernalia such as a portion of a medicine bundle or as part of a headdress. Based upon the one crow element recovered, it is obvious that these corvids were not sought after on a regular basis.

The second most frequently encountered bird remains were those of representatives of the Order Passeriformes, the perching birds. Passerine remains were found at all three sites; but because of the incomplete condition of the bones or lack of diagnostic elements, identification to even the generic level was not attempted. The passerine birds present at the sites may or may not represent food remains. Because of their small size, even if passerines were utilized as food, the amount of meat they would have yielded is negligible. Very possibly some of the more brightly feathered passerines were caught and used in the production of decorative or ceremonial items.

Reptilia

The reptile bone fragments represented at 40CF5, 40CF32, and 40CF111 can be divided into two major categories—turtles and snakes. Neither group of reptiles would represent a major aboriginal meat source, but both turtles and snakes were probably utilized as meat supplements when available. Snakes would be available during only the warm weather months
from late spring to early fall, while turtles could be taken in Tennessee nearly all year long, given the mild winters which are the rule. The author has, in fact, netted specimens of *Pseudemys* in freezing January weather on the Clinch River. Aquatic turtles were probably caught in nets or fish weirs at the same time as fishing activities were conducted. Terrestrial turtles and snakes would have been picked up as they were encountered by the natives on forays outside the village.

Turtle remains represented 9.09 percent of the total identifiable bone at 40CF5, 7.24 percent at 40CF32, and 7.17 percent at 40CF111. Snake remains represented 2.27 percent of the total identifiable bone at 40CF5, 21.71 percent at 40CF32, and 5.71 percent at 40CF111. Turtle and snake skeletal fragments make up a large percentage of identifiable bone from the three sites but represent only a very few individuals. The high percentages of identifiable bone for these reptiles is in part due to the fact that all pieces of a single turtle shell can be recognized as turtle. The same situation is true for the great number of vertebrae and ribs present in a single snake. In both groups of reptiles, when an individual's skeleton is broken up or disarticulated and scattered, it can account for a large number of identifiable bone elements but will still represent only one individual in the minimum numbers count.

The snapping turtle (*Chelydra serpentina*) is represented by only one large carapace fragment found at 40CF32. Found in most permanent bodies of water, snapping turtles generally leave their aquatic habitat only to lay eggs (Mount 1975: 264). Adult snapping turtles average 30 pounds in weight and the meat is considered by many persons to be good eating (Carr 1952: 63). It is surprising that the snapping turtle, a
common species potentially large in size and meat yield, was not more heavily exploited by the Mississippian peoples.

On the other hand, the Kinosternidae turtles, small in size and considered undesirable as food by most modern persons, are represented in the faunal samples by large numbers of bone fragments (MNI: 5). The three members of the mud and musk turtle family said to occur in the Duck River are the stripe-necked musk turtle (*Sternotherus minor peltifer*), the stinkpot turtle (*Sternotherus odoratus*), and the eastern mud turtle (*Kinosternon subrubrum subrubrum*) (Faulkner and McCollough 1973: 36-37). At 40CF111, 11 skeletal elements could be identified to the genus *Sternotherus*, representing either the stripe-necked musk turtle and/or the stinkpot turtle. The other 13 elements from 40CF111, 5 from 40CF32, and 2 from 40CF5 could be identified only to the family level, Kinosternidae. Members of this family are bottom dwelling turtles which most frequently inhabit shallow, slow-moving to still waters (Carr 1952: 75-110). Of the three Kinosternidae members in the Duck River, only the eastern mud turtle frequently leaves the water to wander on land (Mount 1975: 300). Thus, the capture of most of these turtles was probably accomplished with the use of nets or fish wiers. Conant (1975: 39) does mention, however, that Kinosternids can be hooked by fishermen on occasion. The fact that the Mississippian Indians used these turtles with some frequency is of interest since the greatest length for any of the species encountered in the Duck River is only 4½ inches (Conant 1975: 40-43). To make them even more unappetizing, most members of the family Kinosternidae, when captured, are able to exude a potent musky secretion from several glandular openings on each side of their bodies.
Elements from aquatic turtles in the genera *Pseudemys* (cooters and sliders), *Graptemys* (map and sawback turtles), and *Chrysemys* (painted turtles) were well represented in the faunal material recovered from 40CF111 and 40CF32. No recognizable bone elements from these three genera were found at 40CF5. Badly fragmented carapace and plastron pieces from species within the genera *Pseudemys*, *Graptemys*, and *Chrysemys* are extremely difficult to identify even to the generic level, and therefore, it is best to group them together. Skulls and elements of the appendicular skeleton are easier to separate to the generic level, but only at 40CF32 were there three elements present which could be definitively assigned to the genus *Graptemys*. Identifiable bone counts for the *Pseudemys*, *Graptemys*, and *Chrysemys* group were relatively high, with 23 fragments from 40CF32 and 10 fragments from 40CF111; the minimum numbers for the same genera were very low—two individuals for 40CF32 and one for 40CF111. Most members of the genera *Pseudemys* and *Graptemys* grow to a fairly large size and are entirely aquatic, emerging from water only to sun themselves and lay eggs. Members of the genera *Chrysemys* are much smaller but are equally aquatic. Faulkner and McCollough (1973: 36-37), in their environmental background statement, list the following representatives of the above genera as occurring in the Normandy Reservoir: *Pseudemys scripta elegans*, *P. scripta troosti*, *P. concinna hieroglyphica*, *Graptemys geographica*, and *Chrysemys picta marginata*. Sexual dimorphism is common in species of these three genera of turtles, with the female being considerably large. Of the species from this group occurring in the Normandy Reservoir, *Pseudemys concinna hieroglyphica* is the largest with the adult female averaging 13 inches in length, and *Chrysemys picta*
marginata is the smallest with the female averaging 5½ inches in length (Conant 1975: 54-69). Adult turtles, especially females, of the above three genera would probably yield enough meat to make excellent supplements to the Indian diet.

Remains of the box turtle (Terepene carolina) appear at all three sites studied. Of all the turtle species in the faunal samples, the box turtle would have been the easiest to collect. A strictly terrestrial animal, the box turtle appears frequently in open woodlands near brooks or ponds (Carr 1952: 142). The sexes of the box turtle are fairly uniform in size and an adult provides about 0.4 pounds of meat when processed. Box turtles were probably useful for other than culinary purposes. Many Indian groups utilized box turtle shells as dippers and sometimes rattles (Swanton 1946: 252), but no pieces of worked box turtle shell were encountered during this study.

The softshell turtles (Trionyx) are represented by three skeletal elements at 40CF111 and two skeletal elements at 40CF32. No Trionyx skeletal material was found at 40CF5. In their environmental background statement for the Normandy Reservoir, Faulkner and McCollough (1973: 36-37) state that the spiny softshell (Trionyx spinifer spinifer) has been reported in the headwaters of the Duck River and that the smooth softshell (Trionyx muticus) has been found mainly on the lower Duck River. This may represent a sampling error, however, since Conant (1975: 369) and Mount (1975: 311) both show on their distribution maps the smooth and spiny softshells occurring in the upper Duck River region. The Trionyx skeletal material recovered from the two sites was too fragmentary to identify to the species level. Thus, it will be assumed that the
Mississippian Indians of the upper Duck River Valley could have utilized both the smooth and spiny softshells.

Softshell turtles are thoroughly aquatic, only occasionally emerging from the water to sun themselves or lay eggs. For the genus *Trionyx*, sexual dimorphism is the rule with the female being much larger than the male. Adult females of *Trionyx muticus* average between 7-14 inches in length, while females of *Trionyx spinifer spinifer* average between 7-17 inches in length (Conant 1975: 77-78). Adult softshells, especially the females, are large enough in size to have provided a good meat supplement to the Mississippian diet.

The snake skeletal remains from 40CF111, 40CF32, and 40CF5 could be recognized as being from individuals belonging to two families, the Crotalidae (poisonous snakes) and the Colubridae (nonpoisonous snakes). With the exception of three fragmentary skull bones from 40CF32, only snake vertebrae and ribs were recovered, and these are extremely difficult to identify beyond the family or generic level. On the basis of precaudal vertebrae, poisonous snakes can be differentiated from non-poisonous snakes by the greater development of the haemal spine. Snake ribs, on the other hand, could not be separated and were simply recorded as Snake spp. Minimum number counts of snakes are nearly impossible to estimate when only vertebrae and ribs are found. When the large numbers and varying sizes of vertebrae of a single snake are scattered, it is usually impossible to state whether the vertebrae came from one or possibly a dozen different individuals. As previously mentioned in the environmental background section (pages 15-16), there are 5 species of poisonous snakes and 30 species of nonpoisonous snakes which might be
found inhabiting the Normandy Reservoir locality. The Mississippian Indians, therefore, had a large number of snake species to choose from for exploitation.

A large proportion of recovered snake vertebrae, both poisonous and nonpoisonous, along with ribs, show evidence of burning. This evidence would argue against all of the snakes being naturally intrusive in the sites. Several Southeastern tribes, according to Swanton (1946: 252), ate snake flesh and used snake skins as decorative items of dress. Timberlake (1927: 72) relates eating rattlesnakes on several occasions and enjoying the taste of the meat. Snakes were probably picked up when encountered and brought back to the Mississippian camp as food supplements.

**Amphibia**

Amphibian remains represent 10.54 percent of the identifiable faunal sample from 40CF111 and 3.10 percent from 40CF32. No amphibian remains were found at 40CF5. It is doubtful that amphibians contributed much, if anything, to the Mississippian subsistence system. At best they would have provided only a very minor dietary supplement during the warm weather months of the year.

The most common of the amphibian remains found at 40CF111 and 40CF32 were those of the eastern spadefoot toad (*Scaphiopus holbrooki*). Spadefoot toads were represented by 62 skeletal elements at 40CF111 and 16 elements at 40CF32. One of the most numerous vertebrates in either site's faunal sample was the spadefoot toad, with a minimum number of seven individuals from 40CF111 and four from 40CF32. The spadefoot toad may have been consumed, but this is highly improbable. Spadefoot toads are
secretive, burrowing animals that rarely leave their burrows except on heavily overcast days and at night (Mount 1975: 83). Their burrows are characteristically found in sandy or other loose soil types (Conant 1975: 299). Thus, the spadefoot toad remains found in the various features are probably the result of individuals burrowing into the loose feature fill and dying there. Conant (1975: 299) states that many people suffer an allergic reaction from handling spadefoot toads, and this may be a possible reason for their not being utilized by the Mississippian Indians.

The remains of the spadefoot toad are relatively diagnostic and are usually easy to separate from other toad skeletal material. But the American toad (Bufo americanus) and the Fowler's toad (Bufo woodhousei fowleri), which have overlapping ranges in Tennessee, are nearly impossible to separate in samples of fragmentary osteological material. Thus, because of the identification problems, the remains of these two toads were listed as Bufo species. When they could not be separated from those of the spadefoot, they were recorded as Toad species. However categorized, the American and Fowler's toads were poorly represented in the faunal sample, and as in the case of the spadefoot toad, their economic importance, if any, must be considered minor. Toads were probably intrusive in the sites and not the result of Indian exploitation.

Frog remains were present in small numbers at 40CF111 only. The frog elements recovered were too fragmentary to be diagnostic to species level, but there are nine species of frogs known to occur in the reservoir area (see page 13) and thus probably to have been available for Mississippian exploitation. While many persons today consider frogs'
legs a gourmet dish, the ethnographic record for the Southeast makes little note of their use. Beyond a reference that the Lower Cherokee sometimes referred to the Upper Cherokee as "frog-eaters," few data are available on the Indian use of frogs (Schwartz 1923: 55). In any case, so few frog remains were found that it can be assumed that they played only a very inconsequential, if any, part in the Mississippian Indian's diet.

Four vertebrae of a hellbender (Cryptobranchus alleganiensis) or a mudpuppy (Necturus maculosus) were found at 40CF32. The vertebrae of these two amphibians are similar morphologically and present certain problems in identification when incomplete. Both the hellbender and the mudpuppy are aquatic salamanders which inhabit similar riverine habitats (Conant 1975: 197-199). There is no ethnographic evidence for Southeastern Indian use of these large salamanders, but they are edible if not visually appetizing. Hellbenders or mudpuppies may have been taken accidentally in nets while fishing or possibly by hook and line.

Osteichthyes

The Duck River, as judged from current studies, probably supported a large and varied fish population during the Mississippian and earlier aboriginal occupations. Fish bones, in fact, were recovered from all three Mississippian sites under examination, but only 40CF32 and 40CF111 contained elements identifiable to the family or more specific levels. Feature fill was water screened through fine mesh screen at all three sites, so the samples from each are comparable and it cannot be assumed that the lack of identifiable fish bone from 40CF5 resulted from inconsistent recovery techniques. The number of fish bones recovered from
each of the sites is as follows: 40CF111, 1,227 bones; 40CF32, 1,413; and 40CF5, 19 bones. Of these fish bones only a small number from each site were identifiable to even the family level; for example, only 79 from 40CF111 and 40 from 40CF32 but none from 40CF5. In addition, there were 736 unidentifiable fish scales from 40CF111 and 265 from 40CF32. The large number of unidentifiable fish bones resulted from the difficulty of identifying fragmented skull elements and the nearly impossible task of distinguishing among most fish species on the basis of their postcranial skeletal parts, especially vertebrae and ribs. For only a few species, such as gars and the bowfin, are postcranial remains diagnostic to even the generic level. Because of the fragmented condition of the fish bone remains, no estimates of lengths and weights of the various species were attempted.

Fish utilized by the Mississippian Indians of the upper Duck River were probably taken by a variety of methods. No fishing apparatus was recovered in any Mississippian features from the three sites under consideration, so hypotheses on the methods of fishing will have to be based largely on ethnomographic data concerning the Southeastern Indians. Erhard Rostlund (1952) has written what is considered by many to be the most definitive work on North American Indian fishing methods, and many of the following comments will be derived from his book, *Freshwater Fish and Fishing in Native North America*.

According to Rostlund (1952: 81), the most economical and convenient method of taking large numbers of fish is with nets. Small hand nets, dip nets, and scoop nets are known to have been used by many North American Indian groups, but it is uncertain whether large seine and gill
nets were employed before the arrival of Europeans (Rostlund 1952: 83). This uncertainty is caused by confusing ethnographic accounts and the lack of preserved archaeological examples of large nets. Rostlund (1952: 87) notes that there are no good ethnographic accounts of the Choctaw, Creek, Yuchi, Cherokee, or other Southeast interior tribes using large seine or gill nets. Interior tribes of the historic period are reported to have utilized only small dip nets and grapevine drags, but the historic fishing industry may not accurately reflect the prehistoric Southeastern Indians' utilization of fish resources. A number of factors introduced by Europeans, ranging from firearms acquisition to the fur trade, may have changed the traditional Indian cultural patterns of fish exploitation. In a discussion of archaeologically derived artifacts interpreted by many as net sinkers, Rostlund (1952: 88) states the following:

But some of the sinkers found in the Northeast, the Ohio Valley, the Tennessee River region, or elsewhere in the Southeast I believe do constitute fair evidence of fish nets; it would be incredible to think that none of these stones was so used. A point that has not received sufficient attention is that if these stones are accepted as proof of fish nets they must imply large seines or gill nets, for sinkers are not required on small hand nets, dip nets, scoop nets, and the like. If the premise is true, a rather interesting conclusion follows. The distribution of sinkers in the region south of the Great Lakes... would mean that large fish nets were once widely used in that region in prehistoric time. But there is no historical evidence of the use of large nets, seines, or gill nets in that region at the time of contact with the Europeans, and the inference must be that a change in the net fishery had occurred before the coming of the whites.

The author does not agree completely with Rostlund that the use of large fish nets necessarily ceased before the arrival of Europeans in North America. Cultural change, here the cessation of fishing with
large nets, may have occurred swiftly and would therefore not appear in the few extant ethnographic accounts. Many of the more detailed ethnographic accounts, such as those by Timberlake, Adair, and Bartram, were written after extensive alterations from European influence had already occurred in the aboriginal cultures. Fishing with large nets may have been common among prehistoric Mississippian groups.

Other means of fishing which might have been employed by the Mississippian groups inhabiting the Normandy Reservoir area were weirs and traps. While there is no archaeological evidence on the upper Duck River of fish weirs or traps, there is, according to Rostlund's distribution map (1952: 292), ethnographic evidence of their use by historic Indian groups in the Middle Tennessee area. Rostlund (1952: 102), in fact, feels that traps and weirs were employed in almost every region where any fishing was done.

The practice of spear fishing was widespread among most historic Indian groups in the Southeast so the same may have been true for prehistoric groups (Rostlund 1952: 293). No evidence of fishing spears was found during the excavation of 40CF5, 40CF32, and 40CF111, but this does not mean they did not exist. According to Adair (1930: 433), "Those Indians who are unacquainted with the use of barbed irons, are very expert in striking large fish out of their canoes, with long sharp pointed green canes, which are well bearded, and hardened in the fire." Cane fishing spears, no matter how extensively used, would usually not be preserved unless they were accidently burned. Even if widespread, fishing with spears would not be as economically beneficial as the use of nets, traps, or weirs unless the waters were abounding in fish. Rostlund
(1952: 105) feels that "... habitual deep water or bottom feeding species, or fishes in muddy water, or for that matter in clear water that happens to be dark, cannot readily be captured by spears." Thus, to be economically significant, the spearing of fish on the upper Duck River would have to take place when large numbers of fish were present and easily visible, as during the spring sucker runs. Spectacular annual runs of this kind have been documented for the Normandy Reservoir section of the upper Duck River (Raymond J. Duke, personal communication).

The use of the hook and line in fishing is quite popular today and was not unknown to historic and prehistoric Indians in the Southeastern United States. While Rostlund (1952: 124) feels that there was a decline in the use of fishhooks by Southeastern Indians in very late prehistoric times, he admits that the Southeastern archaeological record shows considerable evidence of their use. Most of the fishhooks found in archaeological context in the Southeast are of a U shaped, single piece, bone construction. Composite hooks are not unknown but seem to be from a later date than the single piece hooks. Fish gorges were also used by some groups (Rostlund 1952: 120). While fishing with a single hook and line may now be the popular and "sporting" way, it is uneconomical if a number of persons must be fed from such labor. Using a trot line with a number of hooks would be a remedy for the inefficiency of the single hook and line, but it is uncertain whether prehistoric Indians used such a method. Rostlund (1952: 116), however, cites ethnographic evidence that the Yuchi in Tennessee used trot lines with gorges and that the Acolapissa in Louisiana used trot lines with hooks. The Mississippian Indians of the upper Duck River Valley may have used hooks and possibly even trot
lines in catching fish, but this cannot be proven since no hooks were found during the excavation of Mississippian features.

In addition to the previously mentioned fishing methods, Rostlund (1952: 127) notes that fish poisoning was a common practice among many historic Southeastern Indian groups. But the origin of fish poisoning, he feels, is almost certainly of European derivation introduced to the Indians after contact (Rostlund 1952: 132). Since there is no possibility of finding archaeological evidence of fish poison, the problem of its origin will remain open to question.

Fish, especially rough fish, were an important dietary supplement to the Mississippian Indians of the upper Duck River Valley. Remains of fish were found at all three sites studied, although 40CF5 contained no identifiable pieces. Members of the families Catostomidae (suckers) and Ictaluridae (catfishes) were especially prevalent in the bone sample. Suckers made up 71 percent of the total identifiable fish remains from 40CF111 and 40 percent of those from 40CF32. Suckers are a bottom feeding fish found in a variety of aquatic habitats, ranging from cold mountain streams to warm, nearly stagnant waters (Kuhne 1939: 34). The family Catostomidae contains a large number of species that are available in the Duck River. However, all the bone elements found that were identifiable to a generic level came from fishes belonging to the genus Moxostoma, the redhorses. The redhorses and other suckers would have been available in the Duck River throughout the year but were probably most readily accessible during the spring spawning runs. When these runs occur, the suckers migrate by the thousands to the shallower waters of tributary streams and river headwaters to spawn (Eddy 1969: 145). At
this time, when crowded closely together and easily seen from the surface, the suckers would have been most accessible for Indian exploitation. When abundant in shallow waters, the suckers could have been easily netted, speared, or dipped from the streams.

Based upon total identifiable bone counts, catfish remains were the second most prevalent fish type represented in the samples from 40CF32 and 40CF111. Catfish made up 16 percent of the total identifiable fish remains from 40CF111 and 28 percent from 40CF32. The majority of these catfish remains could be identified only to the genus level, Ictalurus, but a few elements could be more specifically classified as blue/channel catfish, bullhead, and madtom. Catfish are primarily bottom feeders and can be found in most river habitats throughout Tennessee. Since suckers and catfish share similar riverine habitats and feeding patterns, techniques for their capture such as traps, weirs, nets, and the use of spears would probably have been much the same. But unlike the suckers, catfish do not congregate in large groups to spawn in the spring, so their capture in large numbers at any given time would have been more difficult.

Representatives of the family Centrarchidae, the sunfishes, constitute the third most numerous fish remains found at 40CF32 and 40CF111. While sunfish are presently popular game fish, they do not seem to have been heavily used at these sites. Sunfish made up 12 percent of the total identifiable fish remains from 40CF32 and 3 percent from 40CF111. Adult sunfish spawn during the spring, but never gather in runs as do the suckers (Kuhne 1939: 96). While sunfish may not have been a preferred food fish, it is possible that their small representation was due
to their not gathering en masse at any one time of the year. They could have been caught by a number of methods, however, including hook and line, nets, traps, and weirs. A majority of the sunfish skeletal remains could be identified to only the family level, Centrarchidae, but one element from each site was identified to the genus *Micropterus*. Species designation, as to whether these were smallmouth, spotted, or largemouth bass, could not be determined.

Based upon total identifiable bone counts, remains of the freshwater drum, *Aplodinotus grunniens*, were the fourth most abundant of all fish species encountered from 40CF32 and 40CF111. At 40CF111 the freshwater drum made up 3 percent of the identifiable fish remains, while at 40CF32 it constituted 12 percent of the total. A bottom feeder, the adult freshwater drum subsists almost entirely on mollusks (Kuhne 1939: 115). They may reach extremely large size, sometimes weighing up to 60 pounds (Kuhne 1939: 115), and their remains are often encountered in considerable numbers at archaeological sites. The Mississippian Indians occupying 40CF32 and 40CF111 apparently did not take freshwater drum in any appreciable numbers. Freshwater drum represented in the sample could have been taken by a variety of methods including nets, spears, traps, weirs, and hook and line.

The minnows, family *Cyprinidae*, are the fifth most common type of fish represented in the bone samples from 40CF111 and 40CF32. Minnows made up 8 percent of the total identifiable fish remains from 40CF32 and 4 percent from 40CF111. An examination of the minnow pharyngeal arches from 40CF111 shows that some were from species belonging to the genus *Hybopsis*, commonly known as chubs. While some members of the
genus *Hybopsis* reach a length of 10 inches, the vast majority of the chubs in Tennessee attain a length of only 4 inches or less (Eddy 1969: 98-106). The small size of the pharyngeal arches recovered indicates that the fish to which they belonged were four inches or less in length. To capture such small fish, nets, traps, or weirs almost had to be used.

Elements of two additional species of fish, gar and pickerel, were found at 40CF111 and are represented by one and two skeletal elements, respectively. Gars tend to inhabit warm and sluggish and sometimes even stagnant waters (Eddy 1969: 39). Pickerel prefer quieter waters, such as weedy ponds and lakes, but may be found in rivers as well. Unlike gars, pickerel cannot tolerate muddy or silty waters (Rostlund 1952: 35). Although it is a very tentative hypothesis, the presence of gar and pickerel might suggest that the Mississippian Indians fished to some degree in backwater and shallow waters. Nets, spears, traps, weirs, and hook and line could all be used to catch gars and pickerel.

An examination of the fish species and the frequencies in which they were found may tell something about the seasonality and methods used in their capture. The great preponderance of suckers in the sample (71 percent of the total identifiable fish bone for 40CF111 and 40 percent for 40CF32) would suggest that at least some of the fishing activity took place in the spring during the sucker spawning runs. Not all species of suckers spawn at the same time, however. While there is some overlap of spawning activity, each species of sucker has a critical water temperature that must be reached before spawning will occur (Jenkins 1970: 47-48). Spawning activity for most sucker species probably does not last longer than a two-week period (D. A. Etnier, personal communication). A
majority of the sucker skeletal remains that could be identified to
generic level were from the genus *Moxostoma*. D. A. Etnier (personal
communication) has limited records on the occurrence of spawning in
Tennessee for two species of *Moxostoma*. For three different years, he
found *Moxostoma erythrurum* spawning on May 5, April 26, and April 27,
suggesting that the end of April is the most typical spawning period for
this species. In a single account, spawning behavior for *Moxostoma*
carinatum was recorded on May 18. Of the suckers whose critical water
temperature for spawning is known, both *Moxostoma erythrurum* and
*Moxostoma carinatum* are rather late spawners (Jenkins 1970: 47). Thus,
it might be assumed that most of the fishing, at least for the suckers
belonging to the genus *Moxostoma*, took place in late April and early May.

Fishing activity for Mississippian groups has been suggested by
Smith (1975: 121) to be a seasonal occupation which occurred primarily
during the spring spawning runs and secondarily during the dry periods of
the summer when water levels were low, making the fish more accessible.
While certain times of the spring and summer were probably the periods
of most intensive fishing activity, no doubt fishing did occur throughout
most of the year. If scheduled so as not to interfere with the procure-
ment of other seasonal food resources, fishing could have been practiced
the year round as a means of obtaining additional meat supplements.
Swanton (1946: 332) states: "There seems to have been no taboo against
fish eating anywhere in the Southeast, and fish were an item in the native
bill of fare in practically all seasons." In close conjunction with the
seasonality of Mississippian fishing is the matter of fish preservation.
When the Mississippian Indians did make a catch, was it consumed imme-
diately or was at least a portion of it preserved in some manner for
future use? Swanton (1946), in his study of the Southeastern Indians, provides several references to Indian methods of preserving fish. William Strachey, as quoted in Swanton (1946: 377), makes the following observations on the means of Powhatan meat preservation:

Powhatan and some others that are provident, roast their fish and flesh upon hurdells, and reserve of the same untill the scarce tymes; commonly the fish and flesh they boyle, either very tenderly, or broyle yt long on hurdells over the fier, or ells (after the Spanish fashion) putt yt on a spitt and turne first the one side, then the other, till yt be as dry as their jerkin beef in the West Indies, and so they maye keepe yt a monethe or more without putrifying.

Dumont de Montigny, in another quote from Swanton (1946: 377-378), describes how the Natchez smoked the fish they caught to preserve them for future consumption. While the Natchez method of preserving fish was similar to that of the Powhatan, Dumont makes no comment on how long the smoked fish would last. Speck, as quoted in Swanton (1946: 378), makes a reference to the Yuchi method of preserving fish.

When large hauls of fish were made, by using vegetable poison in streams in the manner described, or more game was taken than was needed for immediate use, it is said that the surplus flesh was artificially dried over a slow smoky fire or in the sun, so that it could be laid away against the future.

Rostlund (1952: 139) is uncertain whether or not the inland tribes of the Southeast regularly dried and stored fish, and notes that there are no definite reports of it by the Cherokee, Creek, Choctaw, and Chickasaw. It is doubtful that the Mississippian Indians would have relied upon preserved fish as a major food item if their stores began to putrify after only a month, as did those of the Powhatan. While some fish may have been preserved, it is possible that the most of the fish caught were consumed immediately or soon after their capture.
In examining the mixed collection of fish species found at the three sites, hypotheses might be advanced as to their mode of capture. Finding bottom feeders such as suckers and catfish with gars, pickerel, and sunfish, all predacious fish, would suggest that some method of mass capture was used. Suckers, catfish, gars, and possibly pickerel might be easily speared, but sunfish would be more difficult to spear because of their smaller size. From the presence of such small species as madtoms and minnows, it would seem that the vehicle used in their capture would preclude the escape of small fishes. Nets, traps, and weirs are all nonselective methods of capture whereby fish of varied habitats, feeding habits, and sizes can be taken at the same time. While either nets, traps, or weirs may have been the preferred means of obtaining fish, this is not to say that spearing or line fishing might not also have been commonly used. The evidence preserved and available for this study does not allow for a definitive answer on the fishing techniques used.

Butchering Patterns

A number of skeletal elements in the faunal samples from 40CF111, 40CF32, and 40CF5 show evidence of having been cut by using stone implements. These cut marks are generally interpreted as having been inflicted on the bone during the processes of skinning and butchering the animals. White (1952, 1953b, 1954, 1955, 1956) was among the first to demonstrate that skinning and butchering marks on bone from an archaeological site generally reflect a consistent and recognizable behavioral pattern for the dismemberment of game animals. Guilday, Parmalee, and Tanner (1962), in their classic article on the butchering patterns at the Eschelman site in
Pennsylvania, clarified and expanded upon the earlier work of White. In appearance, skinning and butchering marks are similar and the two may actually be differentiated only by their locations on the skeletal parts. Skinning marks are those cuts inflicted on bones during the process of removing the animal's hide. Butchering marks are those cuts made while dismembering an animal and removing the meat for consumption. The criteria used in this study for recognizing butchering cuts were taken from Guilday, et al. (1962: 63):

To qualify as a butchering mark, two criteria were applied: (1) repetition in specimen after specimen at precisely the same location on the bone; (2) there was some anatomically dictated reason why a particular mark should occur at any given spot.

The frequency with which skinning and butchering cuts appear on skeletal elements is dependent on the skill of the operator and the amount of time and care he was willing to put into the processing procedure (Guilday, et al. 1962: 64).

In the combined faunal samples from 40CF111, 40CF32, and 40CF5, skinning or butchering cuts appeared on skeletal elements of only five animal species—the white-tailed deer, beaver, raccoon, eastern mole, and the turkey. Only in the case of the white-tailed deer were there available enough bones exhibiting butchering cuts to suggest any pattern for the butchering process. Butchering cuts were found on only one element each of the beaver, raccoon, and eastern mole, while similar cut marks occurred on four turkey bones. In addition to skeletal elements cut during the skinning and butchering processes, mention might be made of the bones altered by the gnawing of rodents. A shed deer antler from 40CF32 and a deer right proximal humerus shaft from 40CF111 both showed evidence of rodent gnawing.
From 40CF111, 40CF32, and 40CF5 combined, there were 32 deer skeletal elements displaying butchering marks. One of the 32 butcher marked deer skeletal elements was recovered from 40CF5, while 40CF111 and 40CF32 produced 18 and 13 cut bone elements, respectively. A marked intra-site consistency in the positioning of butchering cuts on certain deer skeletal elements makes it possible to suggest a traditional Mississippian butchering technique for deer in the Normandy Reservoir area. This pattern is similar in most respects to that described by Guilday, et al. (1962) for the Eschelman site. In an examination of the skull area, a number of knife scored bones were recovered which suggest the technique used to dismember the white-tailed deer. From 40CF111, an occipital bone was recovered that bore a number of cut marks just above the left occipital condyle. Cuts would have been made at this anatomical position in order to separate the skull from the atlas and thus remove the head from the carcass. An axis vertebra from 40CF5, bearing heavy cut marks on the sides of its superior articular surfaces, would also have received these cut marks during the process of removing the deer's head. One right mandible from 40CF111 was found with heavy cut marks on its exterior ascending ramus. Cut marks at this point would have been made during the process of severing the masseter muscle to remove the mandible from the skull. From the number of broken skull fragments recovered, it might be suggested that deer skulls were smashed to aid in the removal of the brain.

There were at least three butchering procedures utilized to partition the deer's forelegs. The forelimbs would appear to have been removed from the carcass at the shoulder by separating the humerus from
the scapula. At both 40CF111 and 40CF32 were recovered two scapulae bearing cut marks, a right and a left at each site. All four of these scapulae bore cut marks on the ventral border of the neck of the scapula; the triceps brachii were severed to separate the humerus from the scapula (Guilday, et al. 1962: 73). As a second step in disarticulating the front legs, the ulna and the radius were separated from the humerus. The distal humerus was the deer element most often found exhibiting cut marks. Six distal humeri, two rights and four lefts, inscribed with scored marks were recovered from 40CF111, while three, one right and two lefts, were found at 40CF32. Cut marks found on the anterior, lateral, and medial surfaces of the distal humerus were made during the procedure of cutting the tendons and ligaments present at the "elbow" joint in order to separate the humerus from the radius and ulna. A third process, removal of the feet, involved separating the carpals and metacarpals from the radius and the ulna. Evidence for the separation of this joint was found on a distal radius fragment from 40CF111 in the form of cut marks on the medial side of the shaft just above the articular surface.

With regard to butchering the hindquarters, the only evidence of the procedure used involved one right innominate fragment from 40CF111. Cut marks appeared on the lateral side of the ischium and were probably inflicted while removing the thigh from the pelvis. No cut marks were found on the rim of the acetabulum fragments, nor were there any butchering cuts on the few femur fragments which were recovered at 40CF111, 40CF32, and 40CF5. In the case of the tightly formed hock joint, involving the tibia, calcaneum, astragalus, tarsal central plus four, and metatarsal, numerous cut marks were found. The hock joint was severed
to separate the metatarsal, which has a low meat yield, from the tibia, which has a high meat yield. One left distal tibia from 40CF111 had cut marks on the anterior portion of its shaft just above the articular surface. Four astragali with scored marks were recovered, two rights and one left from 40CF32 and one left from 40CF111. Cuts on the four astragali were noted on the lateral, medial, and/or dorsal surfaces. Three calcanea possessed butchering cuts, two rights from 40CF111 and one right from 40CF32. Cut marks were found on the lateral and medial sides of the calcanea, near their proximal point of articulation.

Almost all elements of the deer skeleton were represented in the faunal samples from 40CF111, 40CF32, and 40CF5, suggesting that the entire animal was brought back to camp for butchering. When butchering the animal, division of the carcass was made by dismembering the body at the joints. Divisions of the carcass at points other than those discussed were most certainly made, but no other cut elements were found to prove this was done. The remains of deer long bones are extremely fragmentary with only the dense proximal and distal ends being recovered. It may be presumed that the long bones were broken open for their marrow content, accounting for their fragmentary condition.

In addition to those of the deer, skeletal elements of three other mammals bore skinning or butchering cuts. One right raccoon radius was found at 40CF32 with cut marks on the posterior and anterior sides of the distal end and on the posterior side of the head. The cut marks roughly encircling the distal end of the radius could have been made as skinning cuts during removal of the pelt, but the cuts on the head of the radius suggest cuts made to remove the forelimb below the humerus.
A right beaver femur with deep cut marks on the posterior and medial sides of the shaft at the lesser trochanter was found at 40CF111. These cut marks were probably inflicted while attempting to separate the femur from the innominate. A third mammal bone found to possess butchering cuts was a mole radius recovered from 40CF111. Cut marks were found on the radius shaft near its proximal end. These cut marks, according to Parmalee (1975: 39), might have resulted from efforts to remove the mole's front foot, possibly after the skin had been removed.

Four elements of the turkey were the only bird bones noted with butchering cuts. A right tibiotarsus was recovered from 40CF32 bearing cut marks on its distal medial condyle, while a tibiotarsus from 40CF111 exhibited scored marks on its distal anterior surface just above the condyles. Cuts in this area would have been made during removal of the tarsometatarsus, which has no meat content, from the tibiotarsus, which yields a large amount of meat. Two right humeri with butchering cuts were also noted, one each from 40CF111 and 40CF32. Butchering cuts on the humerus occurred on the proximal end near the pneumatic foramen and on the ventral margin just below the head. These cuts around the humerus head would probably have been made while removing the wing from the body.

**Bone Pathologies**

During the analysis of the faunal remains from 40CF111, 40CF32, and 40CF5, only two pathological bones, both from 40CF111, were noted. A pathology is expressed as an abnormal condition of the bone resulting from either a trauma or a disease that affects its structure. The two bones from 40CF111 exhibiting pathological conditions are a thoracic
vertebra of a white-tailed deer and a black bear metapodial (Figure 3). Both skeletal elements exhibit arthritic-like conditions. In the deer thoracic vertebra, the anterior portion of the centrum displays severe bone buildup or lipping along its margin. Posteriorly the centrum's margins are broken away and it is impossible to assess the existence or extent of lipping in this area. The bear metapodial shows a similar extensive buildup of boney concretions around its proximal and distal articulating surfaces and along the dorsal surface of the shaft. It is unknown whether it was trauma or disease that caused the pathological conditions noted in these two bones.

Shell and Bone Artifacts

Mississippian faunal material that has been altered to make tools or artifacts can be divided into two major categories, worked shell and worked bone. Worked shell from the Mississippian features includes both marine and freshwater mollusks. Of the five vertebrate classes represented in the faunal samples, only mammal and bird bones were found to be altered. While 40CF111 and 40CF32 produced examples of both worked shell and bone, 40CF5 samples contained no altered elements. Because of the basic similarities in the worked shell and bone samples from 40CF111 and 40CF32, the worked material from the two sites will be discussed together rather than separately. The appearance of worked marine shells, splinter awls, and decorative bone pins at both 40CF111 and 40CF32 help to tie the sites together even more closely.

Worked marine shells recovered from the Mississippian sites include one Marginella apicina and two Olivella cf. jaspidea shells from 40CF111,
Figure 3. A. Pathological white-tailed deer thoracic vertebra. B. Pathological black bear metapodial.
and three *Olivella* cf. *jaspidea* shells from 40CF32. All the *O*. cf. *jaspidea* shells have had their spires ground off so that they might be strung, possibly as a necklace. The *M. apicina* has had the ventral side of the body whorl, near the shell aperture, ground away so that a string could have been run through the hole. Both the *Marginella* and *Olivella* shells are common trade items found at archaeological sites and are recorded by Swanton (1946: 252) to have been used by historic Southeastern tribes as beads for necklaces (Lewis and Kneberg 1946: 128).

A total of four cut shell beads were recovered from two refuse filled features at 40CF111. All four shell beads are circular discs cut from large mollusk shells. Whether the beads were cut from a freshwater or a marine mollusk shell is indeterminable. Each bead has had the center of the disc drilled out a maximum of three millimeters for stringing; no one disc is over 4 millimeters in thickness or 10 millimeters in diameter. Cut shell disc beads commonly occur in Mississippian contexts and have been recorded from a number of sites such as Hiwassee Island (Lewis and Kneberg 1946: 129).

Among the shell artifacts recovered from 40CF111 were two shell "hoes" or "scrapers" found in a refuse filled, irregularly shaped, basin-like feature (Figure 4). Each artifact is the left valve of a freshwater mussel, one a *Cyclonaias tuberculata* (purple warty-back) and the other an *Amblema plicata* (three-ridge). A hole was punched through the *C. tuberculata* valve between the lateral and pseudocardinal teeth, just in front of and partly extending into the beak cavity. At its greatest width, the hole is 18 millimeters across, very ragged and rough in appearance, and bears no evidence of smoothing or polish along its margins. A portion of the posterior margin of the shell has been broken away, and the
Figure 4. A. *Amblema plicata* shell "hoe" or "scraper," left valve, exterior view. B. *Cyclonaias tuberculata* shell "hoe" or "scraper," left valve, interior view.
posterior pedal retractor and posterior adductor muscle scars along with a small portion of the lateral teeth are missing. Only slight wear can be noted on the existing outer margin or edge of the shell. In the *A. plicata* valve, a hole was also punched between the lateral and pseudo-cardinal teeth, just in front of the beak cavity. The hole in the *A. plicata* valve is nearly round in shape and has a smoother margin than the one found in the *C. tuberculata* valve. At its greatest width, the hole in the *A. plicata* valve is 17 millimeters wide. Part of the posterior margin of the valve has been broken away, including the posterior pedal retractor and posterior adductor muscle scars and part of the lateral teeth. Very heavy wear is apparent on part of the outer margin or edge of the shell.

Deliberately perforated freshwater mussel shells are quite common at Mississippian sites in Tennessee and neighboring states. In many site reports these artifacts are referred to as shell hoes and are thought to be associated with agricultural activities. Griffin (1943: 200), in his work on the Fort Ancient culture, found shell hoes to be common, as did Lewis and Kneberg (1946: 131) in the Hiwassee Island and Dallas components of the Hiwassee Island site. Not all perforated valves were thought by Lewis and Kneberg (1946: 131) to have been hoes; the smaller valves, they suggested, might have been used as hafted scrapers. In the Tellico Reservoir a number of perforated freshwater mussel shells were recovered from Mississippian components at the Martin Farm and Bat Creek sites and were described by Salo (1969: 133) and Schroedl (1975: 255-256) as being shell hoes. In the Nickajack Reservoir, Faulkner and Graham (1965: 75-76; 1966: 107-198) found a number of perforated mussel valves in the
Mississippian component of the Pittman-Alder site and in the Late Woodland component of the Westmoreland-Barber site. In their discussion of these sites, Faulkner and Graham (1966: 107-108) offer several alternate explanations on the possible functions of perforated freshwater mussel shells, other than their use as agricultural hoes.

Perhaps the sharp edges [of the perforation] served as a shaft-straightener or a sinew-shredder. The wear in the perforation could also be the result of tying the shells on a fish net or line for weights.

The two perforated valves recovered from 40CF111 would have made poor hoes since both are small in size and the holes in them are not large enough to permit hafting on a handle substantial enough to till soil. The slight wear in the perforation of the Amblema plicata shell may have resulted from the edges of the perforation being used as a tool or more likely from the shell being hafted on a wooden handle. Both mussel valves display some outer edge wear and were very possibly bound on small handles. It is therefore likely, as suggested by Lewis and Kneberg (1946: 131), that these pelecypod valves might have served as scraping instruments used to deflesh or dehair animal skins.

The bone splinter awl, with two examples at each site, was one of the more common tool types found at 40CF111 and 40CF32 (Figure 5). These awls were made from large mammal bone splinters of various sizes and shapes, modified and pointed at only one end; the remainder of the splinter appeared unworked. A common tool type, the splinter awl has been found on numerous sites of varying ages throughout North America. Functionally, these so-called awls could have served a number of theorized purposes, ranging from use as leather punches to basketry or weaving tools.
Figure 5. A-B. Bone splinter awls recovered from 40CF111. C-D. Bone splinter awls recovered from 40CF32.
One of the more numerous worked bone items found at both 40CF111 and 40CF32 was a type of bone pin (Figure 6). A complete pin and a shaft fragment were found in two features at 40CF32, while five pointed distal pin fragments and three shaft fragments were found in four features at 40CF111. All the pin fragments from both sites greatly resemble the complete pin recovered from 40CF32. This complete example was fashioned from a large mammal long bone splinter carefully carved into a tapering, bipointed shaft that is circular in cross-section and slightly thicker near one end. The surface finish of the pin is essentially uniform; shallow or slight scrape marks run the entire length (145 mm) of the shaft. No part of the artifact's surface exhibits extensive polish or evidence of use. All of the other bone pin fragments appear very similar to the complete pin so that it might be assumed they all were used for the same function. While the complete pin and the distal pin fragments were pointed, the points were much blunter than the perforating points found on the awls. Because of the time and effort obviously expended in the manufacture of these pins and the lack of evidence for their use as tools, it is possible that they served as decorative items such as hair pins.

One of the more unusual worked bone tools was a beamer recovered from a feature at 40CF111 (Figure 7A). Made from a deer metatarsal, the beamer is rather poorly preserved, and both the proximal and distal ends have disintegrated. To construct the beamer, a large bone section was removed lengthwise from the posterior portion of the metatarsal shaft. Near the center of the tool, the section removed from the posterior portion of the shaft was larger and more dished out. This working area of
Figure 6. A. Bone pin from 40CF32. B-E. Distal end fragments of bone pins from 40CF111.
Figure 7. A. Deer metatarsal beamer. B. Indeterminate mammal bone "handle" or "scraper." C. Probable white-tailed deer left tibia shaft fragment bearing a deeply cut groove. D. Cut antler tine from 40CF111. E. Cut antler tine from 40CF32.
the beamer is worn smooth and exhibits a considerable degree of polish as the probable result of intensive use. Beamers are hypothesized to have been utilized as drawshavers or scrapers for the purpose of defleshing animal hides (Griffin 1943: 199). While beamers are frequently reported from archaeological sites in the northern states such as Ohio, Indiana, and Illinois (Faulkner 1972: 102; Griffin 1943: 199), Faulkner (personal communication) reports that these tools are rarely found at Tennessee archaeological sites. Although an unusual "beamer-like" tool made from a turkey tibiotarsus was found at 40CF111, no other deer bone beamers were recovered from 40CF111, 40CF32, and 40CF5. It is, therefore, difficult to state whether the use of beamers was widespread among the Mississippian Indians of the upper Duck River Valley.

One of the worked bone items from 40CF32 is rather problematical in both species identification and cultural function (Figure 7B). The worked piece greatly resembles and approximates a large mammal radius such as that of the bear but does not compare well with radii of any of the large mammals expected to be found in the Middle Tennessee area. Possibly the bone was anomalous or pathological before its alteration, which would account for the difficulty in attempting specific identification. Alteration to the unidentifiable bone consisted of having the diaphysis cut in half at an angle, exposing the marrow cavity, and having the face of the cut area highly polished. No other modification is evident on the surface of the bone. The end of the bone shaft opposite the worked area is in fragmentary condition, having partially disintegrated. Lewis and Kneberg (1946: 125) describe several bone implements found in the Dallas component at Hiwassee Island which greatly resemble
this tool found at 40CF32. Functionally, they believe the Dallas tools were bone scrapers used to remove the hair from animal hides. While the worked bone might have been a hide scraper, another function could be suggested. The worked bone is about the right size for a tool handle and the exposed hole in the marrow cavity is large enough to socket a small blade or tool bit.

The other worked bone pieces consist of three fragments, two from 40CF111 and one from 40CF32. One of the pieces from 40CF111 is probably a left tibia shaft fragment from a white-tailed deer (Figure 7C). A deeply cut groove runs lengthwise down the medial side of the bone shaft; numerous smaller, parallel scratches occur on either side of the groove. The cutting of this groove into the deer tibia fragment appears to have been a first step in removing a bone splinter. Work was halted and for some reason the bone fragment was discarded before the splinter could be detached. Also, a very small burned mammal bone fragment having a high degree of polish and a number of scrape marks running its length was found on 40CF111. Possibly this fragment was formerly part of a tool. A small cut bone fragment 35 mm long and 5 mm wide, triangular in cross-section, and showing a high degree of polish plus fine striations running lengthwise down the piece was recovered at 40CF32. The original function of this piece is unknown, but it may have been part of an awl or pin.

Worked antler was of infrequent occurrence at 40CF111 and 40CF32—only one cut antler tine was recovered at each site (Figure 7D, E). Both of the antler tines were small and neither was hollowed out for socketing. Rather than serving as tools, these antler tines were probably waste by-products discarded during the construction of tools from the main antler beams.
Two pieces of worked bird bone recovered from two features at 40CF111 were the only such avian pieces found on any of the Normandy Reservoir Mississippian sites. One of the worked bird bones is a nearly complete turkey radius, with the distal end broken away (Figure 8A). Modification of the bone is very slight and consists of numerous shallow scrape marks running lengthwise from the head down the length of the shaft. The purpose of such slight alteration to this radius is unknown. If the missing distal end of the bone had been sharpened, possibly the artifact might have been used as a pin or an awl.

A right turkey tibiotarsus with its proximal and distal articulating ends broken off is the second worked bird bone from 40CF111 (Figure 8B). On the medial side of the tibiotarsus shaft, a bone section 75 mm long and 6 mm wide has been removed. The margins of the cut area, where the section of bone was removed, have been smoothed or rounded probably as a result of frequent use of the bone as a tool. The type of alteration and wear that is apparent on the turkey tibiotarsus is suggestive of its production and use as a beamer. A search of the literature has shown no other large bird bones worked or utilized in such a manner, and its function remains problematical.

Summary of Normandy Reservoir Faunal Material

While it is realized that the three settlements considered in this study at 40CF111, 40CF32, and 40CF5 may not be strictly contemporary, each contains very similar Early Mississippian cultural material; because of their close geographic locations, the Mississippian occupants should have shared a similar faunal exploitative system. An examination of the
Figure 8. A. Turkey radius with scrape marks running the length of the shaft. B. "Beamer-like" tool manufactured from a right turkey tibiotarsus.
faunal lists for each site shows that the animal remains and their percentages are similar for all three. Because there are more similarities than differences in the faunal complexes for the three sites, the Mississippian exploitative system will be discussed as a whole rather than by the individual sites.

In the Normandy Reservoir area, the Mississippian Indians had a wide selection of fauna available for possible exploitation. Certain animal groups or species were exploited more heavily than others possibly because of a cultural bias. Those animals most desired or preferred by a group of people for food or other products would be the species most heavily hunted or gathered, and consequently, represented in the faunal samples. In the faunal samples, the poor representation or lack of representation of certain animal species which would seem to be excellent meat resources might be attributable to a number of factors. Numerical availability of certain animal species and the competence, by means of a given technology, to capture or collect them would affect the animals' representation in faunal samples as would, for example, special disposal of animal remains at locations separate from the everyday garbage.

Faulkner and McCollough (1973: 41-42) appear to have been accurate in their view that freshwater mussels would not have been important to aboriginal diets in the upper Duck River area, as evidenced by the very few valves which were recovered from the Mississippian features. Although more numerous, freshwater snails could also be placed in this category since they often share much the same environment as the mussels and were probably collected at the same time. The mussel species collected on the upper Duck River by Ortmann (1924), Isom and Yokley (1968), and
van der Schalie (1973), and the valves recovered from the Mississippian archaeological features would support Faulkner and McCollough's hypothesis that the mussels available in the upper Duck River were probably of small size and limited in the number of species present. Numerically, there may have been large numbers of mussels available, but they would have been small headwaters forms which, because of their limited meat yield, might not have encouraged their collection as a major dietary supplement. Those freshwater mussels and snails which were utilized would most likely have been gathered during the summer months when the river level was low, making their gathering easier.

Mammals, and specifically the white-tailed deer, were the most important animals in the Mississippian diet and accounted for a majority of the total calculable meat available at each site. In addition, mammal remains made up the largest percentage of indeterminate and identifiable bone from 40CF111, 40CF32, and 40CF5. The 18 species of mammals represented at the sites inhabited a variety of habitats, including riverine, forest, and forest edge, suggesting that the Mississippian peoples traveled throughout the upper Duck River Valley and surrounding uplands in search of game. Because of its high meat yield per individual and the many uses for its hide and other body parts, the white-tailed deer was probably the most sought after game animal. But this is not to say that the Mississippian Indians hunted deer to the exclusion of other animals with smaller meat yields. An examination of the faunal lists for each of the three sites shows that the Mississippian peoples were not averse to obtaining other animal species as dietary supplements when deer were not available.

While a majority of the mammals hypothesized by Faulkner and McCollough
(1973: 40–41) as having been used by the aboriginal inhabitants of the Normandy Reservoir area were present in the faunal samples from the Mississippian sites, a number of species such as the muskrat, mink, otter, mountain lion, and wolf were for some reason not represented.

The scant utilization of birds by the Mississippian peoples in the Normandy Reservoir area was unexpected. Faulkner and McCollough (1973: 37) had hypothesized that at least 35 larger bird species would have been available and very possibly utilized by the aboriginal inhabitants. However, the turkey was the only bird which appeared to have been a regular fare in the diet while the bobwhite, a common game bird of semi-open areas, was poorly represented. Especially surprising was the total lack of waterfowl remains and the recovery of only one passenger pigeon element. Little is known of the migration habits of the now extinct passenger pigeon; possibly neither it nor the waterfowl frequented the upper Duck River Valley in large enough numbers to make the time spent in their exploitation worthwhile. The remains of other bird species are incidental in the faunal samples and were either infrequent dietary supplements or used for other purposes.

Snakes and turtles also figured as supplements in the Mississippian diet. Faulkner and McCollough (1973) made no speculations as to the species of snakes that might have been utilized as aboriginal food resources, but remains of both poisonous and nonpoisonous snakes were found in the faunal samples. Turtle remains were found commonly at 40CF111, 40CF32, and 40CF5 with all the genera predicted by Faulkner and McCollough (1973: 36–37) represented. Most aquatic turtles prefer quiet to sluggish waters suggesting that those taken by the Mississippian
Indians might have been collected in the limited backwater sloughs of the Duck River. In shallow backwater areas, fishing would also have been easier; fish and turtles might have been caught together if nets were used. Box turtles were probably picked up whenever the Indians encountered them in the woods. Snakes and turtles, being cold blooded animals, would have been taken primarily during the warmer months of the year, although some aquatic turtles were perhaps available during a portion of the colder months.

Amphibians would have been of negligible importance to the Mississippian diet. Only the frog and hellbender/mudpuppy remains represent possible food items. The various toads were most likely intrusive in the sites and do not represent culturally deposited material.

Fish were probably an important dietary supplement for the Mississippian Indians. Faulkner and McCollough (1973: 42) hypothesized that large numbers of rough and game fish should have been available in the upper Duck River. Of these two generalized fish groups, they felt that the rough fish would have been more easily captured, at least on a seasonal basis. An examination of the fish bones recovered from 40CF111 and 40CF32 tend to support this hypothesis. Rough fish remains are considered to be all species of suckers, catfish, and gar; they made up 89 percent of the total identifiable fish bone from 40CF111 and 68 percent from 40CF32. A majority of the rough fish remains were those of suckers, suggesting that the major fishing season may have been during the spring months when suckers spawn and are often found massed in smaller streams and rivers. The occurrence of smaller fish species, such as minnows and madtoms, implies that a nonselective means of fishing, such as the use of nets or weirs, may have been practiced.
Faunal evidence from 40CF111, 40CF32, and 40CF5, in conjunction with floral evidence from 40CF111, suggests that the Mississippian settlements of the upper Duck River Valley were inhabited throughout the year. Two deer mandibles were recovered that could be aged accurately enough to determine the season in which the deer were killed. One mandible from 40CF111 shows that the animal was killed in March or April, while the other mandible from 40CF32 establishes the animal's date of death as probably November or December. Both attached and shed deer antler were recovered, suggesting that the Mississippian sites may have been occupied anytime from late summer through the early spring months. Based on these data plus the evidence for probable intensive fishing in the spring, there appears to have been a late summer through spring occupation of the Mississippian sites by at least some of the inhabitants.

When both the floral and faunal remains are taken into account, a year round occupation of the Mississippian sites seems almost certain. Large samples of the floral remains recovered from 40CF111 have been analyzed. Fragments of fall nut crops such as acorns, black walnuts, and hickory nuts were recovered. Maize was also frequently found, along with some squash (Andrea Shea, personal communication). The frequency in which these cultigens appear indicates that these Mississippian peoples were intensive horticulturalists. People had to occupy the sites at least during the spring for maize planting and the fall for harvesting the crop. During the summer some individuals would probably have remained in the villages to tend and guard the growing maize. If the maize crop was at all substantial, it would have been stored at the sites for winter and spring use rather than being transported elsewhere. The large cylindrical
storage pits found at 40CF32 (Features 500 and 511) and 40CF111 (Feature 131) were probably constructed for the storage of maize. Thus, in the upper Duck River Valley the Mississippian hunters of 40CF111, 40CF32, and 40CF5 strongly relied on the white-tailed deer, and to a lesser degree, on other vertebrates and mollusks for their meat resources. This pattern of faunal exploitation was not something new adopted after the transition to intensive horticulture but was probably a continuation of hunting patterns practiced over most of eastern North America since at least the Late Archaic period. A more detailed accounting of Mississippian hunting patterns and their possible antiquity is presented in the following chapter.
A number of hypotheses have been advanced concerning the nature of the changes that took place in the Indian subsistence system with the introduction of intensive maize agriculture into eastern North America. Of primary interest here are those theories concerned with the supposed alterations that occurred in hunting patterns. A critical review will be made of the research and models that have been presented in the few publications on this subject. Since the Mississippian peoples are the first group in eastern North America known to have definitely practiced intensive maize agriculture, a special effort will be made to compare their hunting patterns with those of earlier aboriginal peoples.

This author proposes that, even with the introduction of maize agriculture, there were no major selection changes made in the overall types of animal species exploited by the Indians in eastern North America. At most, there might have been a slight rescheduling of the times when hunting was conducted. This proposal is in opposition to hypotheses that contend the introduction of agriculture into eastern North America brought about a shift from a diffuse hunting and gathering economy, one that relied on numerous animal species for meat resources, to a focal economy where only a few of the larger game species that yielded greater amounts of meat were being exploited (Cleland 1966: 84). To better understand what this economic shift would entail, Cleland's definitions of
focal and diffuse economies need to be reviewed. As stated by Cleland (1976: 61):

As an ideal type, the focal pattern is centered economically on a single species or a few species which are related in the sense that they are exploited by similar tools and techniques. Societies which depend almost exclusively on hunting, herding of domesticated animals, harvesting anadromous fish, or cultivating domesticated plants have focal economies. To provide economic security, the focal adaptation requires, above all else, a high degree of resource reliability. The resource on which a focal adaptation is based must be high quality, occur in abundance, and be consistently available.

As a definition for a diffuse economy, Cleland (1976: 64) gives the following:

Diffuse adaptations, unlike focal ones, appear where resources are varied, scattered, and where no one resource, or few resources, are abundant or reliable enough to promote economic security. The economy of people with diffuse adaptations is based on the careful scheduling of exploitation, so that the natural availability of resources is maximized and so that alternative resources are available. The key to such an adaptation is movement between resources in time and space. As a result, diffuse adaptations may appear only in areas of high ecological diversity.

Of primary interest to this study is Cleland's belief that the Middle Mississippian peoples were agriculturalists with a focal economy based upon maize production (Cleland 1966: 96). According to Cleland (1976: 73):

On the focal diffuse continuum, these focal adaptations are arranged so that Mississippian, with the possibility of double cropping or staggered cropping, is the most focal of these developments. Reliance on secondary subsistence resources is negligible, but specialized exploitation of supplementary resources occurs on a selective basis . . .

In yet another comment, Cleland (1966: 97) states that for Mississippian agriculturalists, "Secondary subsistence activities became less and less important until seasonal hunts devoted almost exclusively to either deer,
elk, or bison, became the only other key to economic security." It is on this contention, a shift in Mississippian hunting activities, that the author must disagree with Cleland. No one can argue that deer and other large game formed the nucleus of the meat diet for the Mississippian populations, but the hypothesis of small game being of less importance to Mississippian peoples than to earlier Woodland or Archaic groups can be questioned.

Cleland (1966) based his hypotheses of focal and diffuse economies primarily on nine archaeological sites in Michigan and Wisconsin which ranged in age from the Middle Archaic through the Late Woodland periods. According to Cleland (1966: 97; 1976: 67), the Late Woodland and Mississippian agricultural peoples possessed a focal economy, relying primarily on domesticated plant foods as their main means of subsistence; deer and other large game were hunted seasonally to supplement their diet. Peoples in eastern North America before the advent of domesticated plant foods were thought to have had a diffuse food economy in which they exploited a large variety of wild plant and animal resources on a seasonal basis. Small animal species were supposed to have been more heavily exploited and thus to have played a larger part in the diet of those peoples having a diffuse economy. Archaic and Early and Middle Woodland peoples are seen by Cleland (1966: 92–94; 1976: 70) as possessing diffuse economies, with the transition between the diffuse and focal economies taking place in the late Middle Woodland period. As ideal types, the existence of focal and diffuse economies is not being questioned here, but some of the particular cultural changes Cleland envisions as occurring with the advent of agriculture are questionable. The validity
of Cleland's model in respect to changes in faunal exploitation through
time is suspect primarily because of the small sample size upon which
the model is based. Nine sites which vary greatly in their age, func-
tion, length of occupation, seasons occupied, and possibly in the
techniques used for recovery of archaeological material, do not suffice
as the basis for hypothesizing major changes in subsistence systems.
In fact, Cleland's data on faunal species exploited are remarkable for
the lack of change which they display. Large and small game species
considered important in the Late Archaic period appear to be of nearly
equal importance in the Late Woodland period. As will be noted later,
changes in plant exploitation do not necessarily have to affect faunal
exploitation.

An example of the type of in depth study that should be conducted to
ascertain the hunting patterns of a culture was produced by Bruce Smith.
In his study, "Middle Mississippi Exploitation of Animal Populations"
(1975), Smith made excellent use of faunal data from a number of Middle
Mississippi sites showing the consistency with which the Mississippian
Indians exploited both large and small animal species and species groups.
If changes in hunting patterns through time are to be accurately shown,
a large sample of sites for each time period involved should be examined
for their inter-site consistencies in faunal exploitation so that sampl-
ing error on a single site cannot bias the interpretations. The results
for the different time periods can then be compared in order to determine
what changes have actually occurred in the hunting patterns.

Smith, for his study, examined the faunal remains from seven Middle
Mississippi sites—Chucalissa, Banks, Lilbourn, Turner, Snodgrass, Powers
Faunal analyses for these sites revealed that 13 animal species/species groups were primarily exploited by the Middle Mississippi peoples. These 13 groups, ranked according to their projected meat yield values, are white-tailed deer, raccoon, fish, migratory waterfowl, wild turkey, beaver, opossum, rabbit, snapping turtle, aboriginal dog, squirrel, black bear, and elk (Smith 1975: 10). Smith sees the exploitation of the aforementioned species as being both seasonal and selective. Middle Mississippi peoples no doubt attempted to gain a maximum meat yield for a minimum of effort. To show how this was accomplished, Smith set up a hypothetical scheduling model of the seasonal exploitation of animal groups by Middle Mississippi peoples. Spring and summer were seen as the seasons when fishing was most advantageous. Fish are most easily taken during the spring spawning season when certain species are concentrated in many of the smaller streams or during the late summer when ponds and backwater sloughs are at their low water levels. Spring and fall would have been the optimum times for hunting migratory waterfowl, since the birds migrate in large numbers along the Mississippi flyway during these seasons. Late fall and winter were, in turn, seen as the prime hunting times for terrestrial animal species since it is during these periods that hunting is least likely to interfere with plant collection (Smith 1975: 121-124).

An important point that Smith notes is the selective hunting that Middle Mississippi peoples practiced with regard to terrestrial game animals. He believes that deer, raccoon, and turkey remains appear in far greater numbers than they would if hunted nonselectively (Smith 1975: 137). However, Smith feels that the selective hunting pattern employed
by the Middle Mississippi peoples is an old one and not something newly developed when agriculture was adopted. Smith (1974: 281, 287) states that the Apple Creek and Scoville faunal reports reflect a heavy emphasis on most of the same 13 species/species groups that were exploited by the Middle Mississippi peoples. Rather than display a confusing list of figures, several excerpts shall be presented from the Scoville and Apple Creek faunal reports to show their resemblance to the Middle Mississippian assemblages. Scoville was a terminal Middle Woodland village in west-central Illinois, dated to about A.D. 450. In the Scoville report, the authors state:

Thus, it appears that there was selection or specialization in the hunting of deer and turkey, whereas squirrels, raccoons, woodchucks, and cottontails were relatively ignored, at least in relationship to their potentials (Munson, et al. 1971: 426).

Deer and turkeys, along with fish, formed the basic meat staples and were concentrated upon much more than other animals, at least relative to their biomass (Munson, et al. 1971: 430).

At the Apple Creek site, in southwestern Illinois, no major changes were noted in the faunal exploitation between the Middle and Late Woodland components. To quote Parmalee, et al. (1972: 57):

As a group, mammals (at least 25 species) were the most significant to these Woodland peoples as a source of meat and by-products . . . . The white-tailed deer was singly the most valued animal; based on the faunal sample studied, approximately one-half of all meat . . . obtained from the various species came from the deer . . . . With regard to the variety of smaller fur-bearers, raccoons, dogs, beaver, muskrats and cottontails provided most of the supplemental meat obtained from mammals other than the deer . . . . The majority of birds were aquatic or semi-aquatic forms, and the numerous species of ducks and geese (combined) contributed over half of the pounds of meat obtained from birds . . . . The turkey was perhaps the singly most important bird taken by these people . . . . Fish, as a group, probably contributed most of the supplemental meat for the daily food intake.
A similar faunal exploitation system for Tick Creek Cave, Missouri, was discussed by Parmalee. Tick Creek Cave was occupied almost continually from the Middle Archaic through the Late Woodland period. According to Parmalee (1965: 3):

A greater quantity of faunal remains occurred in the upper (Woodland) levels of the deposit than in the Archaic zones, but a comparison of percentages . . . for each species between the two cultural groups shows close similarities in almost all cases. Based on these data, there appears to have been no change in the faunal complex within the area hunted by the inhabitants of Tick Creek Cave and there were no significant differences between Archaic and Woodland peoples in their selection/killing of any given species.

The principal game animals of Tick Creek Cave appear to have been white-tailed deer, raccoons, striped skunks, cottontail rabbits, turkeys, and elk. White-tailed deer, as might be expected, were the primary meat resource, and their bones made up a majority of the faunal remains.

Russell Cave in Alabama was occupied intermittently over a period of several thousand years by Archaic and Woodland cultural groups. The following are a number of pertinent comments that J. W. Griffin (1974: 106-107) had to make about the faunal remains recovered at the site.

We have, therefore, a rather complete utilization of the available mammalian fauna in all layers of Russell Cave. Expectably deer is the dominant food animal . . . . The only substantial increases in the number of species represented in Russell Cave occur after Early Woodland and are represented in the categories of fish, bivalve mollusks, and to a certain extent freshwater turtles . . . . As I evaluate the evidence from Russell Cave, there is little or no significant difference in subsistence during the long range of occupation of the site. The pattern seems to involve a wide use of the available animals, with deer and turkey dominating; . . . and a light but rather consistent use of aquatic resources, with those from the Tennessee River itself increasing through time.

Data from faunal reports on material from other archaeological sites also tend to support Smith's belief that the Middle Mississippi system
of faunal exploitation is one of some antiquity in eastern North America and was relatively stable through time. In the Little Bear Creek Reservoir report, Oakley and Futato (1975) compiled a listing of faunal species found at 13 archaeological sites within a 200 mile radius of the Bear Creek watershed in Alabama. The 13 sites evaluated in this listing range from the Archaic through the Mississippian periods in age and are located in three states: Alabama, Tennessee, and Missouri. From Alabama the site faunal reports utilized include those for the Stanfield-Worley Bluff Shelter, Little Bear Creek site, Gainsville Reservoir, and Jones Bluff Reservoir. Those examined from Tennessee included the Chucalissa, Westmoreland-Barber, Bible, Lay, Mason, and Brickyard sites, and the Tucker Rock Shelter. Also included in the listing were the Crosno and Callahan-Thompson site faunal reports from Missouri. Only the presence or absence of animal species is noted in their table. Thus, while it is impossible to numerically quantify the animal remains at each site without consulting the original reports, it is possible to speculate which species, based upon their presence or absence at a majority of the 13 sites, were most important in the overall hunting pattern. When Oakley and Futato's table was examined, it was found that the remains of a majority of the species/species groups exploited most heavily by the Middle Mississippian peoples also appeared at a majority of the 13 sites included in the table. Those animal remains found at a majority of the sites include white-tailed deer, raccoons, rabbits, squirrels, beaver, turkeys, and fish; waterfowl, elk, and bear remains were recovered less frequently than might have been anticipated. When the original site reports were examined, the white-tailed deer was found to have provided
the vast majority of the potential meat obtained by the inhabitants at each of the 13 sites, while the other less frequently taken species provided only minor additional meat supplements.

The faunal reports on the Archaic Riverton culture in Illinois (Parmalee 1969: 139-144), the Mississippian material at the Etowah site in Georgia (van der Schalie and Parmalee 1960: 37-54), and the author's own work on the Normandy Reservoir Mississippian faunal remains in Tennessee all show additional evidence that the animal species these aboriginal peoples relied upon were basically the same as those utilized by the Middle Mississippian Indians. Again, smaller animals were probably taken with regularity but in less quantity than the white-tailed deer, which was the main meat animal in all these periods and geographical areas.

Cahokia is thought to have been the largest Mississippian center ever to exist and presumably was inhabited by a large population that practiced intensive maize agriculture. Yet the Cahokia inhabitants were heavily utilizing the local fauna. In his analysis of the faunal remains from 5 Cahokia locales, Parmalee (1976) analyzed 152,581 bone pieces, of which 44,400 fragments could be identified and were found to represent at least 146 vertebrate species. The 146 vertebrate species included 29 species of fish, 4 amphibians, 2 snakes, 7 turtles, 72 birds, and 29 species of mammals. At the Cahokia site, the faunal exploitation pattern was found to be similar to that of Smith's Middle Mississippian sites, emphasizing a utilization of basically the same 13 species/species groups, with white-tailed deer again being the primary meat resource. With such a large number of bone fragments from so many species, it is hard to
reconcile these figures with the decreased emphasis agricultural peoples were supposed to place on hunting (Cleland 1966: 97).

It is realized that the faunal reports cited in the previous discussion do not meet the author's criteria for an intensive study of changes in faunal exploitation; a large number of contemporaneous sites for each cultural period would be needed for such a study. However, an initial review of the available evidence suggests that the hypothesis of there being little change in the faunal exploitation system from the Archaic through the Mississippian cultural periods is correct. The 13 species/species groups that were exploited by the Middle Mississippian peoples seem to have been exploited in a similar manner by aboriginal groups of earlier cultural periods. Site-to-site differences in the frequencies with which certain animal species/species groups were exploited were probably due to the varying geographic locations of the sites and the local availability of certain animals. Those species which can maintain large populations and have high meat yields per individual were those most heavily utilized by the Indians, while animals that are naturally less frequent in numbers or contribute lower meat yields per individual were taken less often. In relation to food procurement activities, peoples throughout time have usually attempted to maximize their yield for a minimum of physical effort. Smaller animals seem never to have been utilized to their full potential, but the occurrence of their remains in faunal samples has been relatively consistent.

If the snares, traps, and deadfalls used by historic Indian groups to capture small game were also used in the prehistoric period, the acquisition of small game would, in fact, take less time and effort than
the stalking of large game. Although the amount of meat yielded is less for small animals, it could be had for very little physical effort.

Much of the following statement by Cleland (1966: 108) on the hunting patterns of Archaic peoples at the Raddatz site in Wisconsin is also probably applicable to the hunting patterns of later Eastern Woodland groups.

The subsistence economy of the Raddatz site is undeniably based upon the exploitation of deer and elk. All other food species occur much less frequently, although the consistency with which these species appear is indicative of a diffuse subsistence pattern. In short, small mammals, birds and turtles, were not the major food source and, although these Archaic hunters preferred to kill deer or elk, they did not ignore other food sources. Neither can it be said that these small species were not important since they probably acted as vital dietary supplements when larger game was not available.

Cultural groups which followed the Archaic peoples in time also preferred to kill deer and other large game when these animals were available, but at the same time they did not ignore or stop utilizing smaller animals or species acquired only on a seasonal basis such as waterfowl and possibly certain fish. Are the hunting economies of the Late Woodland and Mississippian peoples then diffuse as described for the Archaic peoples at the Raddatz site? The answer to this question is probably yes. While the plant production economies of the Late Woodland and Mississippian peoples may have been focalized on one or a very few plant species such as maize, beans, and squash, the hunting economies of these peoples were still of a diffuse nature. Hunting and fishing were conducted on a seasonal basis, exploiting those animals with large meat yields most heavily but yet utilizing other animal species when encountered or when preferred game species were unavailable.
Because of the apparent continuity in hunting patterns and game selection through time, the place of agriculture in the subsistence activities of Eastern North American Indians needs to be reviewed. Asch, Ford, and Asch (1972) show that Archaic Indian groups, because of their smaller populations, may actually have exploited fewer plant resources than their descendants in the Woodland periods. With increasing population pressures during Woodland periods, the procurement territories of the Woodland peoples probably became smaller, forcing them to rely on a wider selection of food resources to support themselves (Asch, Ford, and Asch 1972: 29). The recently developed recovery technique of flotation (Struever 1965) has made it obvious that before the introduction of maize, bean, and squash agriculture, the Indian inhabitants of eastern North America were practicing intensive harvest collecting, and by at least the Early Woodland period, were attempting the domestication of local plant crops such as sunflowers and chenopodium (Yarnell 1976: 266, 268). For both intensive harvest collecting and incipient plant domestication, the Indians would have had to schedule their food exploitation routine, balancing the time spent collecting plant crops with the time spent hunting animals. Therefore, when maize, beans, and squash were introduced, the Indians were already accustomed to exploiting plant foods and scheduling these activities with hunting.

Maize was probably the main plant staple in the diet of the Mississippian Indians and partially accounted for their ability to support large populations; it did not, however, cause them to cease utilizing wild plant and animal resources. Few exhaustive studies have been done on Mississippian plant food remains and consequently a lack of knowledge
exists concerning their utilization of plant foods other than maize, beans, and squash. Shea (personal communication) has analyzed a portion of the floral remains from 40CF111, a multicomponent site with Middle Woodland and Mississippian occupations. Remains of hickory nuts, black walnuts, acorns, grape seeds, and chenopodium seeds were found in features from both the Middle Woodland and Mississippian components. Maize was found only in the Mississippian feature. It is impossible to even estimate the proportion each of these plant foods would have constituted in the total Mississippian diet, but it would probably be safe to say from the floral evidence that wild plant foods were still a desired Mississippian food resource, even if no longer the main fare. Ethnographic accounts for historic Indian groups in the Southeast record extensive use of wild plant foods as well as domestic plant crops (Swanton 1946: 265-297).

There have been few models proposed that take into account the status of hunting in a society that is changing from a hunting and gathering economy to one based on maize agriculture. One of these few models is a hypothetical one proposed by Flannery in his paper "Archeological Systems Theory and Early Mesoamerica" (1968). Although there is no real means of testing its validity, this hypothetical model is in basic agreement with this author's contention that the adoption of agriculture did not have to affect the hunting patterns of a culture to any large degree. Flannery sees preagricultural groups of the southern Mexican Highlands surviving in that area by scheduling the procurement of certain plant and animal species when they were most abundant. Although others existed, the six
major food sources exploited by various procurement systems were maguey, cactus fruit, tree legumes, white-tailed deer, cottontail rabbits, and wild grasses.

Maguey was available throughout the year and was used especially during the winter when few other plants were available. Of the other plant foods, cactus fruit was harvested in the spring, seeds from tree legumes in the summer, and wild grasses in the fall. White-tailed deer were available throughout the year but were exploited most heavily in the winter when hunting did not interfere with plant gathering. Trapping cottontail rabbits interfered little with other subsistence activities, and therefore, was practiced the year around. When the collection of wild grasses, such as maize, became more profitable because of increased yields, a rescheduling of the food resources resulted. Cactus fruit and tree legumes became less important in the diet because their collection would have conflicted with the planting and harvesting schedule for maize. The exploitation pattern of cottontails and white-tailed deer would have probably remained the same since rabbits could still be trapped at any time and the hunting of deer in the winter did not interfere with the production of maize. And finally, maguey remained a food for "hard times" when little else was available. In this model, one plant food is substituted for another without interfering drastically with the acquisition of or selection of formerly exploited game species. While it is realized that one hypothesis does not prove another hypothesis, Flannery's model does help to illustrate that it may have been possible to have a major change in plant exploitation without affecting the hunting patterns of a culture.
From a review of ethnographic accounts, especially those relating to the Southeast, it might be possible to gain a better understanding of the amount of time and effort agricultural groups allotted to both their farming and meat procurement activities. The following ethnographic examples help to substantiate the author's hypothesis that aboriginal subsistence systems were scheduled in such a way that hunting and fishing activities did not greatly interfere with the agricultural planting and harvesting cycle. While ethnographic accounts are often useful in supporting or refuting a hypothesis, it must be remembered that the subsistence activities of historic Indians were affected by white influence and trade. The fur trade was especially significant in changing hunting patterns, since it brought about an emphasis on certain game animals with marketable pelts. Although there are shortcomings, a review of ethnographic accounts is useful in providing bases for possible comparisons between the subsistence systems of historic and prehistoric groups.

Swanton's "Indians of the Southeastern United States" (1946) is an especially valuable source for ethnographic accounts of Indian subsistence systems. It is all the more useful for this study because the Southeastern Indians probably practiced the most intensive maize agriculture in the eastern United States. If historic Southeastern Indians were still scheduling intensive hunting and fishing activities at certain times of the year, it might be assumed that the prehistoric Mississippian groups in the area practiced a similar subsistence system. The following passage from Swanton (1946: 256-257) describes the general economic cycle of most Southeastern Indian groups.
the people were generally in or near their villages in summer. They had to return to them in spring to plant, and a certain amount of cultivation was also necessary during the growing season, though the Indians did not worry themselves on the point. Between planting and harvest they did, however, often get time for a shorter hunt. After harvest they would remain in town until well toward winter to enjoy the produce of their fields and thus place it beyond the reach of human or animal depredation. As the harvest was seldom sufficient to last — nor was it expected to last — until another crop came in, the Indians were obliged to seek natural food supplies elsewhere.

Swanton also mentions extended winter hunts and spring fishing activities by inland groups that took place before the planting time.

In a further discussion of the economic cycles of Southeastern Indians, Swanton (1946: 257-258) often quotes journal notes that John Smith recorded in Virginia between the years 1606-1625. Smith says of the Powhatan Indians:

In March and April they live much upon their fishing weares, and feed on fish, Turkies and squirrels. In May and June they plant their fieldes, and live most of Acornes, walnuts, and fish. But to mend their diet, some disperse themselves in small companies, and live upon fish, beasts, crabs, oysters, land Torteyses, strawberries, mulberries, and such like. In June, Julie, and August, they feed upon the roots of Tocknough, berries, fish, and greene corn.

The following remarks from Smith cover the winter hunting season for the Powhatan Indians (Swanton 1946: 258):

By their continuall ranging, and travel, they know all the advantages and places most frequented with Deare, Beasts, Fish, Foule, Rootes, and Berries. At their huntings they leave their habitations, and reduce themselves into compa­nies ... and goe to the most desert places with their families, where they spend their time in hunting and fowl­ing up towards the mountaines, by the heads of their rivers, where there is plentie of game. For betwixt the rivers, the grounds are so narrowe, that little cometh there which they devour not.

Extended winter hunts were common to most Southeastern agricultural groups. Hunts conducted at this time of year did not interfere with
agricultural activities and added badly needed food to the diet at a
time of general shortage. A number of references are made by Swanton
(1946: 256, 258-261) to the effect that the maize supply was not expec-
ted to last from one harvest to the next. During the periods between
harvests, wild plant and animal foods made the difference between starva-
tion and survival. In years when the maize crop failed, agricultural
groups would leave their villages earlier than was customary to hunt and
gather wild plant and animal food resources until the time for spring
planting (Swanton 1946: 265). In regard to extended winter hunts,
Swanton (1946: 263) notes that the earliest record of seasonal movements
of central Southeastern tribes was made by Bossu, an early explorer in
the area. Bossu's remarks mainly concern the Alabama Indians, but
Swanton (1946: 263) feels the following observation by Bossu would
undoubtedly be true for all of the tribes of the Creek Confederation:

The savages usually set out on the hunt at the end of October. The
Allibamons go to a distance of 60, 80, or even 100 leagues
[165-275 miles] from their village, and they carry along with
them in their pirogues their entire family; they return only
in March which is the season for sowing their fields. They
bring back many skins and much smoked meat.

In another quote, Swanton (1946: 264) states:

The Choctaw had few canoes and ordinarily went overland to their
winter camps, but they devoted more attention to agriculture
than any other Southeastern tribe and sold some of the produce
to the less thrifty Chickasaw. Their hunting territories were
proportionately restricted and they did not wander far from
their towns. Small game, particularly squirrels, played a
large part in their economy, but these were hunted mostly in
summer.

This reliance on small game by peoples who were considered to be the best
agriculturalists in the Southeast is contrary to Cleland's idea that
agricultural peoples focused their hunting on large animal species with
high meat yields.
The Natchez method of reckoning the months of the year is probably one of the most revealing indications of the importance Indians placed on certain seasonal food items. As quoted by Swanton (1946:260-261), DuPratz enumerates the Natchez months of the year:

This nation begins it year in the month of March, ... and divides it into 13 moons ... At every new moon they celebrate a feast which takes its name from the principal fruits gathered in the preceding moon, or from the animals that are usually hunted then ...

The first moon is that of the Deer ... The second moon, which corresponds to our month of April, is that of the Strawberries. The women and children collect them in great quantities ... The warriors then make their presents of wood ducks, which they have provided by a hunt made expressly for the purpose. The third moon is that of the Little Corn. This month is often awaited with impatience, their harvest of the great corn never sufficing to nourish them from one harvest to another. The fourth is that of the Watermelons, and answers to the month of June. This month and the preceding are those in which the sardines run up against the current of the river. The fifth moon is that of the Peaches. It answers to our month of July. In this time grapes are also brought in if the birds have left any of them to ripen. The sixth moon is that of the Mulberries. It is the month of August. At this feast birds are also brought to the great Sun. The seventh moon is that of Maize or the Great Corn ... The eighth moon is that of the Turkeys and corresponds to our month of October. It is then that this bird comes out of the thick woods to enter the open woods in order to eat nettle seeds, of which it is very fond. The ninth moon is that of the Bison. Then they go to hunt this animal ... The tenth moon is that of the Bears. In these hunting seasons the feasts are not large, because the warriors, being away from home, take away many of the people with them. The eleventh moon, which corresponds to our month of January, is that of the Cold Meal. At time many bustards, geese, ducks, and other similar kinds of game are to be had. The twelfth month is that of the Chestnuts. This fruit has indeed been collected some time before, but nevertheless this month bears that name. Finally, the thirteenth month is that of the Nuts ... It is then that the nuts are broken in order to make bread by mingling them with corn meal.

Probably the primary differences in the seasonal round of the Natchez and Indian groups located farther to the east lay in the seasonal bison
hunts. Indians farther to the east of the Mississippi River went on hunts for deer instead of bison.

Other ethnographic accounts could be cited, but from those already reviewed a general pattern of food resource exploitation can be seen for most Indian agricultural groups in eastern North America. Spring was the season for fishing and planting crops, while the summer months were a time for tending the fields, limited hunting, and fishing. During the fall domestic crops were harvested and mast crops were gathered; hunts for terrestrial animals were started late in the season. Large scale, extended hunts for terrestrial animals were generally conducted during the winter when this activity interfered least with the collection of plant crops. Judging from most ethnographic accounts, at no one season of the year were hunting or fishing activities deleted from subsistence activities of agricultural peoples. The seasonal schedule of food exploitation for the prehistoric Mississippian peoples probably differed little from that of the historic Indian groups. Intensive maize agriculture, in conjunction with the gathering of some seasonal plant foods and a continuation of the old hunting patterns, would have had a greater chance of creating the food surpluses necessary to have allowed the Mississippian peoples to develop larger populations and a more complex culture.

The effect of agriculture on hunting patterns would depend in part on the division of labor peculiar to the group adopting domestic plants. If men had helped gather plant foods in the past, they would probably be more inclined to help with newly adopted farming tasks. At most there would have been a slight rescheduling of the times certain hunting
activities were conducted. But at no time did the economy of eastern North American Indians become so focused on any one plant resource that they did not heavily exploit the fauna around them. Meat was obviously a desired commodity no matter how much vegetable food was produced.

After an examination of numerous faunal reports, the author hypothesizes that large game animals, the most important being the white-tailed deer, were the major meat resources for the Indian cultures of eastern North America from the Archaic cultural period through the Mississippian period. For the same cultural periods mollusks and smaller vertebrates were secondary meat resources for supplying additional protein to the Indian diet. Small vertebrates provided a minor, but relatively consistent, percentage of the diet through time and their collection did not cease or substantially decline with the introduction of maize agriculture. The similarities of the faunal exploitative systems from the Archaic period through the Mississippian period are definitely more striking than the differences.
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VITA

Neil Douglas Robison was born in Peru, Indiana, on October 19, 1950. He attended elementary and junior high school in that city and was graduated from Peru High School in June 1969. The following September he entered Indiana State University at Terre Haute, Indiana. In June 1973, he was graduated cum laude with a Bachelor of Arts degree in Anthropology. In the fall of 1973 he entered the Master of Arts program in anthropology at The University of Tennessee at Knoxville. Spring quarter of 1974 he accepted an archaeology teaching assistantship with the Department of Anthropology, which he retained until June 1977. He was graduated with a Master of Arts degree in anthropology in 1977 and enrolled in the doctoral program in anthropology at The University of Tennessee at Knoxville in the same year. The author is a member of the Tennessee Anthropological Association and the Society for American Archaeology. He is married to the former Judy Eddings of West Lafayette, Indiana.