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PROCEEDINGS OF THE

THIRTIETH SOUTHEASTERN ARCHAEOLOGICAL CONFERENCE

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OCTOBER 5-6, 1973

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FLORIDA STATE MUSEUM
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PREFACE

The Thirtieth Southeastern Archaeological Conference was held in Memphis, Tennessee on October 5-6, 1973. Drexel Peterson served as chairman for the program. Forty-eight papers were presented along with a special symposium on computerizing data from archaeological sites.

Originally, 29 papers were submitted for publication in the preceedings of the conference. Tom Hemmings sent all of the papers to me in January, 1980, and I sent them back to the authors in order to give them an opportunity to revise, update, or withdraw. Most of the authors chose to withdraw, since much of the data was either very out-of-date or had been published elsewhere. Seven authors, whose papers are reproduced here, opted to publish them in Bulletin 17. Several authors did not respond and I assumed that they had also chosen to withdraw. Richard Faust, Chief of the Southeast Center of the National Park Service, aided in contacting the authors of some of the National Park Service symposia. It is sad to note that two of the conference participants, Joseph Caldwell and Hale Smith, have died in the intervening years since the conference.

Some authors exhibited disbelieve that their papers might finally make it into print. Steve Cumbaa passed along a simple "WOW!" and Bruce Smith offered a more spectacular good time in Between, Georgia.

In preparing this Bulletin I have had the expert help of Vernon J. Knight, a graduate student in anthropology at the University of Florida, and Diane Coupe, of the Florida State Museum. I am grateful to both of them for their contributions.

J.T. Milanich
Florida State Museum

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MAN-ANIMAL INTERACTIONS WITH A SUBSTANTIVE EXAMPLE: MAN AND DOG IN THE PREHISTORIC SOUTHEAST

E. Thomas Hemmings
with a note by Clarence H. Webb

There is a prevalent, or at least strongly advocated, view in archaeology today that past human cultures operated within ecosystems and were themselves orgainized as intercommunicating subsystems. This rationale states further that under the proper conditions of inquiry significant features of a past ecosystem--human, biotic, and abiotic--and the interactions of these features through some interval of time can be understood. The stimulus for this paper and, in part, for papers which follow is just such a view on the part of an ecological anthropologist, Kent Flannery (especially his paper "Archaeological Systems Theory and Early Mesoamerica", 1972). In my view Flannery has been particularly aware of both possibilities and limitations in the systems approach to human ecology.

One outcome of this approach is a focus on procurement systems, the interactions between human cultures and selected plant and animal food resources. As Flannery (1972:222) and others have noted, "primitive peoples rarely adapt to whole environmental zones [nor even to] microenvironments within a zone, but [may be basically adapted] to a small series of plant and animal genera whose ranges crosscut several environments." Even if we could do so, and we cannot, it serves little purpose to enumerate all the organisms and physical features of a past environment. No known human group has had so "diffuse" an economy as to exploit the total range of available food organisms (Cleland 1966). If we can fully characterize the interactions of human populations with their staple resources (specified plant and animal populations) we move toward fuller understanding of culture as an adaptive system. This approach has its corollary in the life sciences--the study of single interactions precedes an understanding of ecosystems and the biosphere as a whole (Abraham et al. 1970).

At this point we should examine the concept of "interaction." Interactions mean, quite simply, all the ways organisms affect each other and their abiotic environment, and are in turn affected by environment. The most obtrusive interactions in an ecosystem, which is an energy dissipating structure, are food-getting and feeding, or, as we said for man as the dominant organism, procurement systems. These are not, however, the full range of significant interactions which maintain ecosystems--at least not stated precisely in this way. A variety of interactions among individuals of the same species (e.g. cooperation) and others between species (e.g. symbiosis), are not at all closely related to feeding, but contribute to stability or change in ecosystems. Some striking examples of such interactions among human beings and disease, vector, or host organisms, in particular cultural and environmental settings, can be drawn from medical anthropology and epidemiology (Alland 1969). The point is that not all interactions are strictly exploitative, and some that are not may be equally basic to cultural adaptation and to processes of change in cultural systems.

Man and Dog in the Prehistoric Southeast:

The foregoing remarks can be usefully illustrated by dealing with one substantive example from the prehistoric Southeast--the interaction or series of interactions between men and dogs. We can begin with the observation that dogs are"domesticated" animals, conserved by Southeastern Indians within their settlements, and distinguished by morphological differences from any wild canid populations (Berry 1969).

This man-dog association appears to be truly persistent over thousands of years. The earliest known North American domestic dogs are those from Jaguar Cave in Idaho dated at about 10,400 years B.P. (Lawrence 1967, 1968). A single dog has been dated in northern Minnesota at about 7500 years B.P., another in western Missouri at the same date, and a third in western Illinois at 7100 years B.P. (McMillan 1970; Shay 1971; Hill 1972). These three eastern dogs are all interpreted as intentional burials. Whether these earliest finds will stand future scrutiny (as Canis familiaris) is still a questionable matter in light of the diverse interpretations of Old World dogs in early farming communities (e.g. in Pre-Pottery Jericho, Clutton-Brock 1969). The earliest record in the Southeast appears to be loose dog bones in early Middle Archaic levels, dated about 7200 years B.P., at the Eva Site in western Tennessee (Lewis and Lewis 1961). A number of dog burials wre present in later Archaic levels at Eva. At any rate we can now say with some certainty that domestic dogs were present in the central states 7500 years ago and certainly in the interior of the Southeast by 7200 years ago.

In addition to these isolated finds, Haag's (1948) excellent study of aboriginal dogs shows their not-altogether rare occurrence as burials in Middle Archaic shell middens of Alabama and Kentucky. In fact, he can distinguish sub-populations of dogs in these areas on the basis of size characters. He shows further that dogs occur sporadically as burials in excavated Woodland and Mississippi Tradition settlements, and seem to increase in size from the small Archaic Indian dog. In Florida dog remains are widely dispersed in Late Archaic and early ceramic middens of the St. Johns River and at South Indian Field (Neill et al. 1956; Gross 1971) There are indications of both large and small dogs in South Indian Field deposits which date about 500 B.C.

The great time depth and the little data available for differentiation in Southeastern dogs are of interest in this respect. An average dog generation is two years, and 7200 years represents about 3600 generations. The genetic consequence of selective breeding in modern dogs has produced extraordinary polymorphism and differentiation in behavior (Scott and Fuller 1965). Great Danes may weigh 40 times as much as Chihuahuas--compare the behavior of Dobermans and Bassets--all this in a few centuries of scientific breeding from a few native stocks. Remains of aboriginal dogs in the Southeast and the few incomplete ethnohistoric accounts indicate no such polymorphism or specialization in behavior, although diversity is moderately well documented for late prehistoric and early historic dogs in Mexico (Wing 1970). The nature of interaction between Southeastern Indian cultures and their dogs must lie behind this relative uniformity.

The associations between primitive or non-literate peoples and domestic dogs in all areas and times can be summarized in several categories and examined against the Southeastern record as follows:

1. The dog as "a parasitic hanger-on, a shy, tolerated, uncared-for scavenger" (Kroeber 1923:412). It is doubtful whether this association could apply to any but the earliest sites of domestication in the Old World range of ancestral wolves.

2. Dogs as "useful disposers of rubbish" (Cole 1967:21). Undeniably dogs have near-omnivorous feeding capability, scavenged the refuse of settlements where allowed to do so, and promoted sanitation (Reed 1969). Some cultures, our own for example and Eskimo, exercise great care in feeding their dogs. I would assume that the dog in a scavenging niche was significantly interacting with early, if not all, Southeastern Indian cultures.

3. The dog as "watchdog" (Washburn and Lancaster 1968). Even without selective breeding or training, historic Indian dogs functioned as watchdogs. They must certainly have done so in the past, but without conferring survival value on particular cultures. Presumably, the watchdog was ubiquitous in the Southeast after 6000 years ago.

4. Dogs as domesticated food animals (Coe 1962:128). Ethnohistoric accounts and the Colima figurines attest to this practice in Mexico. Scattered dog remains in middens are widespread in the Southeast, but are not proportionally great in any food bone sample. Most Southeastern archaeologists who have interpreted such occurrences, infer little use of dogs as food animals. However, the potential productivity of dogs was fairly great. A single bitch can produce 50 living offspring by the time she is six years old. Even in the case of small Indian dogs a consistent protein food supply was obtainable with little energy expenditure on the part of man. In times of real food stress we can assume that the man-animal interaction expediently shifted from competition with to exploitation of dogs.

5. Dogs used in hunting "for locating, tracking, bringing to bay, and even killing" (Washburn and Lancaster 1978:295). Dogs were important adjuncts to hunting societies on nearly every continent. They were, in fact, employed in hunting by Creeks in historic times (Swanton 1946). The dogs occurring in European Mesolithic sites, generally ascribed a role in hunting (Piggott 1965; Clark 1969), suggest this possibility for the forested Southeast (Caldwell 1958). Here, however, the predominant technique may have been the stalk or ambush by solitary hunters. Until a cross-cultural comparison indicates in detail the cultural ecological settings, the specific procurement systems, associated with use of hunting dogs, we cannot easily define this interaction for the prehistoric Southeast.

6. The dog as a draught animal (Driver 1961). Large dogs have been used to draw sleds by Eskimo and travois in the Plains, including northwestern Louisiana. This is clearly an important interaction, limited by open terrain as well as the availability of large robust dogs.

7. The dog as social companion (Haag 1948; Lewis and Lewis 1961). Dogs interred in prepared graves or associated with human burials in Archaic cemeteries, and occasionally in later burial mounds, are commonly taken to indicate the affection lavished on pets in our own culture. At Indian Knoll in Kentucky and Eva in Tennessee dogs were associated with adult males, females, and children without apparent preference. Some of these animals must have been sacrificed in accordance with religious attitudes or as personal or contributed property. A more careful analysis of these grave associations should lead to refined hypotheses about the interaction of men and dogs in specified cultural settings.

8. Dogs as transmitters of disease in human populations (Scott and Fuller 1965). Almost all important constitutional diseases have counterparts in dogs, hence their usefulness in medical studies. I have not been able to ascertain the role of dogs in transmitting parasitic disease to humans (or vice versa), but suggest that this mechanism may be significant in regulating small semi-isolated human populations. David Chase (1972) has reported the interesting case of a thousand-year-old dog burial in central Alabama in which hyperpulmonary osteoarthropathy (Marie Bamberger's Disease) was diagnosed. The dog had been killed by crushing the skull. According to Chase, the highest incidence of this disease in the United States today is among residents of this central Alabama area.

Conclusions:

This list is not intended to exhaust the possible associations between men and dogs, and I have intentionally omitted some which seem to be of little consequence. It appears that there are interactions directed by man to his own benefit, and others undirected, which may or may not be immediately advantageous. No single category of man-dog association has been satisfactorily examined for the prehistoric Southeast, either for particular cultures or for Southeastern culture in general. We have in hand, however, an approach to these questions and to larger considerations. Man-animal interaction systems may be characterized from archeological evidence in sites and in regions, just as a variety of procurement systems for plant and animal resources.

Note: by Clarence H. Webb

With respect to the question raised of potential danger to man from infections acquired from the domestic dog, I have been interested in infections shared by dogs and children. There is presently a large dog population in the United States, estimated at 35 million. On the basis of recent studies and reports, dogs do not seem to offer a significant health hazard.

Certain infections can be acquired from dogs. Streptococcal and viral respiratory infections are possible, but are not deemed significant. Ringworm of the skin offers no health problem. Dogs, like many animals, have salmonella infections but do not offer the danger to humans that infected poultry, eggs, and meats do--this is a market and kitchen problem. Dogs, like humans, can acquire rabies from the wild animal reservoir (bats and skunks, especially). The dog can acquire and transmit tularemia, and the dog tick can transmit Rocky Mountain Spotted Fever and tick paralysis, but wild animals and wood ticks are much more likely sources.

Dog parasites do not complete their cycle in other species, including man. The only parasitic infection of the dog which offers a problem of significance is the ascaris or roundworm (Toxocara canis). The young child does not acquire this infestation by contact with the animal, only by eating dirt contaminated with dog feces and containing ascaris ova. If ingested, the larvae pass through the child's intestinal wall into the bloodstream, but are sequestered in the liver or lung. Human tissue reacts to produce an illness that is usually mild, rarely fatal; the canine ascaris larva cannot complete its life cycle and rarely is deposited in areas that would be dangerous.

In summary, the domestication of the dog and the close relationship to man seems unlikely to have offered a significant health hazard to prehistoric man.

Addendum by Author:

A variety of articles and several books pertaining to the domestication of canids have come to my attention since this paper was written in 1973. In general these do not provide new data or interpretations for the interaction of men and dogs in the prehistoric Southeast. Since I have touched briefly on Old World dogs, I would like to make note of the evidence and discussion presented by Olsen and Olsen (1977; references therein) regarding Asian dogs and their presumed ancestry.

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ABORIGINAL USE OF MARINE MAMMALS IN THE SOUTHEASTERN UNITED STATES

Stephen L. Cumbaa

The marine mammals which are now or have been present in the historic past along the coastal southeastern United States include the various whales and porpoises (dolphins) of the order Cetacea, the West Indian seal (Monachus tropicalis Gray) and the manatee [Trichechus manatus latirostris (Harlan)]. These animals were hunted through time by a number of Indian groups, primarily along the Gulf and Atlantic coasts of Florida and at scattered sites elsewhere along the coast of the southeastern United States (Figure 1). This report will attempt to summarize the archeological occurrence of these marine mammals in the Southeast, pertinent ethnohistorical and ecological data relevant to their capture and use, and will conclude with a discussion of the importance of the various marine mammals in the subsistence base of the peoples involved. Data presented are current only to early 1973.

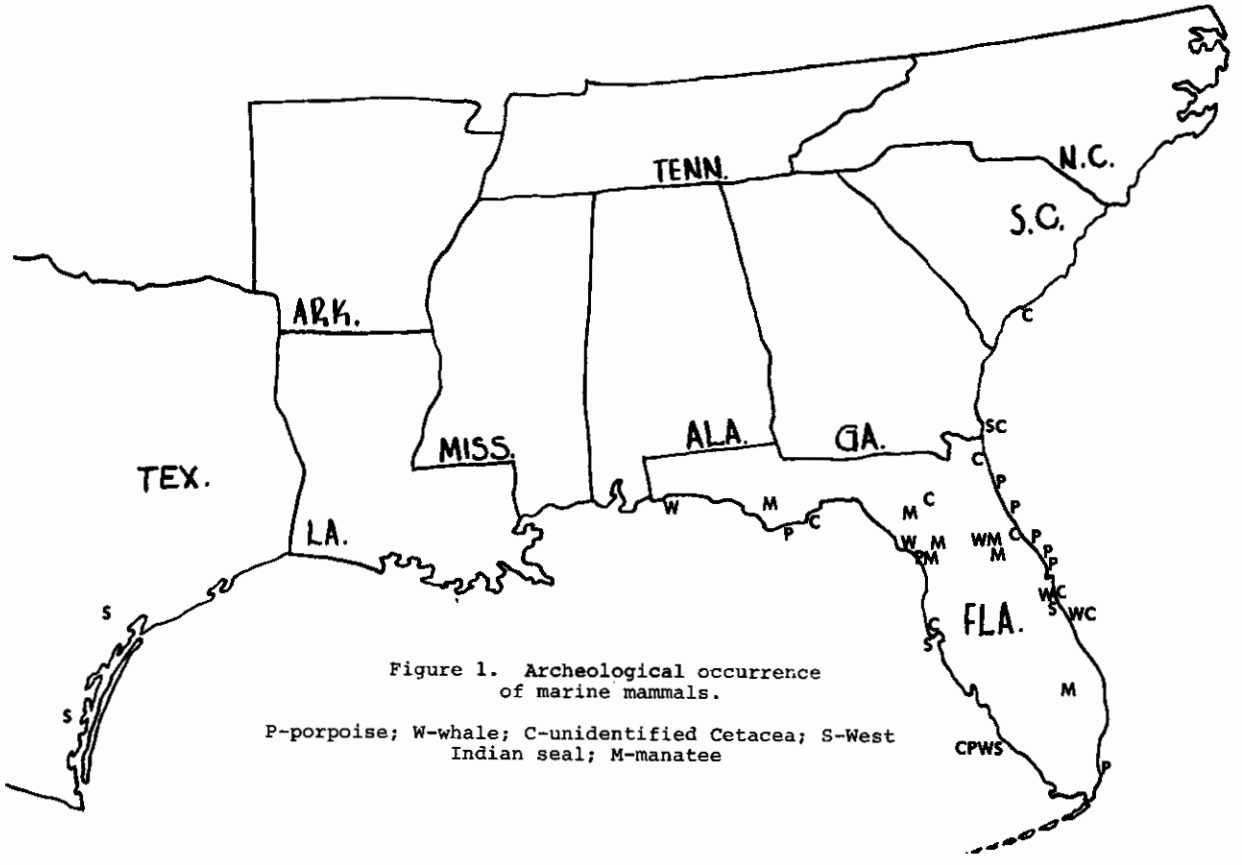

Figure 1. Archeological occurrence of marine mammals.

P-porpoise; W-whale; C-unidentified Cetacea; S-West Indian seal; M-manatee

Porpoise:

Perhaps the earliest published account of cetacean remains in a southeastern archeological site was C. B. Moore's description (1902:269) of 76 teeth of the Atlantic bottlenosed dolphin (Tursiops truncatus), drilled and in situ around the wrist of an early Santa Rosa-Swift Creek, or Yent Complex (Sears 1962:17), burial in the Yent Mound on the Gulf coast in Franklin County, Florida. Other Florida Gulf coast sites containing identified porpoise remains are the famous Crystal River site in Citrus County, which produced vertebrae identified as those of the bottlenosed dolphin (FSM; FSM indicates specimens in the collections of the Zooarchaeology Range, Florida State Museum, Gainesville), and a Glades I period site (8Cr107x2) on Marco Island, Collier County, which also contained vertebrae of this species. Another Glades I site (8Cr107x1) produced the auditory bulla of the short-finned pilot whale (Globiocephala macrorhynca) (Cumbaa ms.a.). This "whale" is actually a member of the porpoise and dolphin family, Delphinidae.

The majority of sites containing porpoise remains are on the Atlantic Coast of Florida. The Surfside site (Willey 1949:83) in Dade County contained remains of the common dolphin (Delphinus delphis). Atlantic sites from which bottlenosed dolphin remains have been identified include the Castle Windy midden (Bullen and Sleight 1959:20) and Green Mound (Bullen and Sleight 1960:31) in Volusia County. The former site appears to date from the St. Johns II period while the latter encompasses both St. Johns I and II. Vertebrae from the Ragin Midden (FSM) in Brevard County and the Mabry Mound (FSM) in St. Johns County are also probably bottlenosed dolphin, although identification is not positive. Summer Haven in St. Johns County yielded bones identified to the family level as Delphinidae (Wing ms.a.).

Whale:

Whale remains are somewhat more scarce. A baleen whale jaw has been reported from the Gulf Breeze III site in Santa Rosa County in an early Swift Creek context (Daniel Penton, personal communication). An unidentified, fragmentary whale vertebra, similar at least in size and gross features to the goose-beaked whale (Ziphius cavirostris, which attains a length of 28 ft) was recovered from the Beetree Slough site in Levy County about a mile inland from the Gulf. The site is apparently of the Weeden Island II period (E. Thomas Hemmings, personal communication). Other sites from which whale remains have been identified are the McLarty site on the Atlantic coast in Brevard County (Wing 1978) and the Jungerman site, also in Brevard County, which contained an auditory bulla identified as being from the pygmy sperm whale (Kogia breviceps) (Wing 1963:53). An unidentified whale jaw fragment was apparently picked up recently in a surface collection of a Marco Island shell midden (Curtiss E. Peterson, personal communication). The only additional archeological record of a whale noted is a single, non-fossil tooth from the huge inland freshwater shell midden at Bluffton on the St. Johns River in Volusia County, Florida.

Other Cetacea:

Fragmentary and other non-distinctive remains identified only as cetacean have come from the Gulf coast at the Refuge Tower site in Wakulla County in a middle-late Swift Creek context (Daniel Penton, personal communication), from the Bayshore Homes site in Pinellas County (Wing ms.a), and from both the proto-historic Cushing site (Wing 1965:25) and several Glades I sites on Marco Island in Collier County (Cumbaa ms.a.). Atlantic coast sites include the Jungerman and McLarty sites in Brevard County (Wing 1963:53, 1978); the Cotten site in Volusia County (FSM), and the proto-historic and early historic period Goodman Mound in Duval County (Wing 1963:56). Additional Atlantic coast sites are the Table Point site, a Deptford house site on Cumberland Island in Camden County, Georgia (Milanich 1971:195), and the Fig Island shell ring, an early ceramic site in Charleston County, South Carolina (E. Thomas Hemmings, personal communication). A single drilled cetacean tooth has been reported from the Melton site (8A-169) in Alachua County, Florida (Cumbaa 1972:71). This inland site apparently has both early Weeden Island and St. Johns I influences.

Cetacea: Hunting Techniques:

Larson (1969) has done an excellent job of gathering together ethnohistorical data on the capture of whales by the Indians of southeast Florida. It is convincing that several independent accounts from the Tequesta area (e.g., Acosta 1962, Monardes 1589, and others quoted in Larson 1969: 217-222) are so consistent in describing the method of hunting these large marine mammals. Briefly, the hunting took place in winter, presumably when the whales were more abundant. When one or more whales, usually a cow and her calf, were spotted coming along in reasonably shallow water close to shore, a group of Indians would paddle out in dugout canoes to surround or impound the whales, getting close enough so that one man could jump on the back of the chosen beast. He would then pound a wooden stake into each blowhole. The whale would sound immediately, but in shallow water and with a limited supply of oxygen, would soon return to the surface to breathe. The wooden plugs would render breathing impossible and the huge mammal would suffocate in a few moments. The Indians would then attach ropes and tow the dead whale to shore where it would be butchered and the meat and blubber cut into strips to dry. The heavy bones, not being very useful, would be left on the beach.

In 1593 Friar Andres San Miguel described whale bones lying on the beach as a result of a recent Indian whale kill (Garcia 1902:209 quoted in Larson 1969.220). This presents a problem to zooarchaeologists in that no bones are left behind in the middens to identify. Unless the bones were used for tool making or the habitation site happened to be immediately adjacent to the kill site, the presence of whale bones in middens would seem to be unlikely. Other aboriginal techniques for the hunting of cetaceans in the Southeast have not as yet been reported.

Larson notes that of the 18 species of whales and porpoises present at times off the Florida coast (Moore 1953:122-152), only five occur with any frequency and number. These five species are the pygmy sperm whale (Kogia breviceps), the North Atlantic right whale (Balaena glacialis), the sperm whale (Physeter catodon), the Atlantic bottlenosed dolphin (Tursiops truncatus) and the pilot whale (Globiocephala macrorhynca).

After reviewing the habitat, social organization, habits and other pertinent factors relating to these species, Larson concludes that the whale referred to in these early documents was the Atlantic right whale (1969:226). These whales are 40-55 ft in length and attain a weight of some 30 tons. They migrate to Florida waters in winter, traveling as adult and calf or in larger groups where food is plentiful. There have been many sightings from 50-300 yards offshore in southern Florida, and these slow-moving whales can be approached by non-powered craft. When they sound they come back up near the same spot, and perhaps most importantly, float when killed (Larson 1969:226). The Atlantic right whale certainly appears to fit the ethnohistorical descriptions, even to the fact that it has two narial openings. The fact that this particular whale occurs only very rarely on the Gulf Coast of Florida (Layne 1965:134) may help explain why there are no ethnographic accounts of the Calusa hunting whales in this manner.

As noted earlier there seems to be little chance of confirming this type of whale hunting archeologically, as the bones are not in the habitation areas and there is no specialized artifactual inventory to provide secondary confirmation. However, right whale baleen plates could easily have been cut away and used in the manufacture of artifacts, and would preserve under good conditions. Still, the fact remains that we have at least five other cetacean species that were hunted or collected to at least some extent. These are confirmed archeologically in generally datable stratigraphic context.

It is well known that many species of whales and porpoises are at least occasionally found stranded in low water or washed up on a beach (Moore 1953, Layne 1965). These strandings could presumably account for many of the cetacean remains from Southeastern aboriginal sites. However, the most frequently stranded marine mammel, the pilot whale (Layne 1965:148) is represented archeologically by only one individual, from Marco Island on the Gulf Coast. These animals, often stranded in numbers greater than 50, can range in weight from calves of 100 lbs to adult males of 2000 lbs (Layne 1965:148) and would seem to have presented, at least occasionally, a fortuitous resource. However, unless they too were stripped of flesh at the beach and the bones are not preserved, they were not eaten in large numbers.

Strandings of the Atlantic bottlenosed dolphin are relatively infrequent considering that it is the most abundant marine mammal on the Gulf and Atlantic coasts (Layne 1965.158), yet the remains of these animals show up in archeological sites with by far the greatest frequency. They are almost as large as the pilot whales (adults are 9-12 ft long) and weigh over 1000 lbs. Why would these animals not be treated in the same manner, by butchering at the beach? I am not certain this question can be answered satisfactorily. However, it does seem sure, particularly at sites such as Green Mound on the Atlantic coast and Marco Island on the Gulf where several individuals are represented, that the bottlenosed dolphin was hunted or collected as a somewhat regular food resource. The relatively concentrated archeological distribution of this porpoise along the northern half of the east coast of Florida, and perhaps the lower Gulf coast as well, may point toward some manner of specialized hunting.

These porpoises do frequent tidal waterways, lagoons, and estuaries year round in Florida and seasonally farther north, often in social groups. They are powerful swimmers and can clear the water, but could possibly be trapped or temporarily restrained by a tidal weir or a net. These porpoises are probably too fast to be harpooned with any degree of success unless their movements were somehow restricted. We know from the Cushing site on Marco Island that the Calusa had a sophisticated netting technology (Cushing 1897, Wing 1965). By way of analogy, coastal middens throughout Florida and perhaps somewhat in the sea islands of Georgia and South Carolina are often replete with shark vertebrae representing several species. Vertebrae from sharks over 10 ft long are not uncommon, and those of this size must have presented somewhat similar problems of capture and of the butchering of a very large carcass.

West Indian Seal:

The remains of the West Indian seal (Monachus tropicalis) are rare in archeological sites. Rouse (1951.83) noted the presence of seal bones at South Indian Field in Brevard County, Florida. Further excavation and collections at the site by A. T. Anderson and Robert Gross have produced a rich faunal assemblage (Smollek ms.) which includes at least three other individual seals (Cumbaa ms.b.). These seal bones were associated with fiber-tempered ceramics of the Orange period (Robert Gross, personal communication). The only other site to be represented by more than one individual seal is a large shell midden (8Cr107) on Marco Island, Collier County, Florida, excavated within the last few years by the Bureau of Historic Sites and Properties of the State of Florida (Cockrell 1970). The excavations, primarily in a Glades I period context, have yielded at least three individuals (Cumbaa ms.b.).

Clayton E. Ray has reported the find of a West Indian seal maxilla dredged up along with Indian artifacts at Long Bayou in Pinellas County off the Gulf Coast (Ray 1961:113). He notes that the seal maxilla and the artifacts are not necessarily contemporaneous. Curtiss Peterson has identified West Indian seal remains in faunal material from the Table Point site on Cumberland Island, Georgia (Milanich 1971:195). This find, in a Deptford period context, apparently extends the known former range of the species, as a previous fossil record from near Charleston, South Carolina has proved to be erroneous (Clayton E. Ray to Elizabeth Wing, personal communication).

The only other archeological sites which have recorded seal remains are in Texas. One, represented by a single canine tooth, was at Rancho Diermero in Nueces County, a Spanish ranch headquarters in the early 1800s and the location of a somewhat earlier Indian campsite. The other site is the mission Nuestra Senora del Espiritu Santo de Zuniga at Goliad. This site was represented by five unmodified teeth (Raun 1964:191).

Seal Hunting Techniques:

There are no published descriptions of an aboriginal seal hunt in the Southeast. However, seals were discovered quite early by Europeans in the Caribbean area. In fact, as early as 1494, during the second voyage of Columbus, some of his crew members killed eight seals at Alta Vela, just off the south coast of Hispaniola (Scheffer 1958:114, King 1964:73; Rice 1972:8). In 1513 the crew of Juan Ponce de Leon killed 14 seals in addition to 170 turtles and 5000 pelicans and other birds during a brief stop in the Tortugas (Herrerra 1935:324). The pace appears to have picked up after that with intensive efforts to hunt the seal for oil from at least the 17th to nearly the end of the 19th century (Allen 1880:708-710). The seals were on the verge of extinction by the late 19th century and were never adequately studied by biologists. What we do know about the West Indian seal has been pieced together from occasional sightings over the years. The West Indian seal is now considered to be an extinct species (Scheffer 1958:5).

The aboriginal method of hunting the West Indian seal was probably much like that of the Europeans, which was to quietly approach a hauling ground or nesting site (usually a protected sandy beach near rock outcroppings), then when within range, attack a small group of seals with clubs. Many historic accounts describe similar measures (Gosse 1851:311-312; Ward 1887:261-262). The seals apparently only roused when individually attacked or when an intruder came too close for the individual seal's tolerance. This is a quite different situation from that of another species of the same genus, the Hawaiian monk seal (Monachus schauinslandi) which appears to be very timid and is declining in numbers due to disruption of breeding areas by the presence of man and dogs (Kenyon 1972:687-696).

The seals apparently haul out more frequently during the winter breeding and pupping season (Rice 1972:19). This would have been the optimum time to hunt the seals, but even then they were probably available at very few locations as far north in their range as Florida and Texas. It is suggested that a small section of the Atlantic coast near South Indian Field and perhaps one of the Gulf Islands near Marco were, at their respective points in time, two such favorable breeding and pupping locations. The agility and speed of the seals in the water would almost certainly preclude their capture away from such an area.

Manatee:

The remains of manatee appear with one exception to be restricted to inland and coastal riverine sites. The exception is the Belle Glade site near Lake Okeechobee in Palm Beach County, Florida (Willey 1949:61). A shell midden in Citrus County Florida, downriver from the famous Crystal River site, has also produced manatee rib fragments (FSM) as have the Bluffton and Tick Island middens on the St. Johns River in Volusia County (FSM).

The remaining "sites" I have labeled on the map (Figure 1) only as the Chipola River, Gulf County, Florida; the Santa Fe River, Gilchrist County, and the Withlacoochee River, Citrus County, Florida, although they perhaps each in turn contain several sites (Ben Waller, personal communication). Each of the three rivers has several bottom locations in which are concentrated Paleo-Indian and later projectile points and cutting, scraping and hammering tools in addition to large quantities of cut and worked manatee and other animal bones (Waller 1970:131-134).

Manatee: Hunting Techniques:

Waller suggests that the bones and artifacts from these river bottom sites are the residue accumulated from years of using the rivers at these points as kill sites. The accumulations are almost invariably just below a shallow ford or stream crossing between high banks. He suggests that the animals were attacked and killed while negotiating these shallows, and that heavy bones and useless parts of the carcass were discarded in the river in the act of butchering the animal after the kill. Many animal species are represented, but the most prevalent bones are those of the manatee. Ribs, skull fragments, jaws and teeth are found in abundance, but bones representing the fleshy parts of the animal appear to be missing (Waller 1970:133). The fact that artifacts of several periods are present in these sites is seen as continued use through time of a productive hunting technique (Waller 1970.134). It should be noted that the ability of even relatively swift-running streams in Florida to move cultural and other bottom debris any significant distance is extremely limited and would tend to support Waller's hypothesis. It also seems clear that the material is not washing in from the banks.

In other areas of the manatee's range there are historical descriptions of hunting techniques. In Jamaica one manatee was rendered helpless after becoming entangled in a seine (Gosse 1851:341). Oviedo noted the practice of shooting the beasts with an arrow to which was attached a tarred line and a float which could be spotted and pulled in when the animal tired (Stoudemire 1959:113 quoted in Wing ms.a). A Similar method was described by Landa in Yucatan where the Indians would harpoon a manatee in tidal creeks or shallow water and follow its progress in their canoes by watching their buoys and the animal's dying struggles, which roiled the bottom sediments and discolored the water with blood (Tozzer 1941:191 as quoted in Wing ms.b).

Perhaps the most opportune time to hunt manatee would be in the winter. They cannot tolerate cold water (Moore 1951b:18, Layne 1965:166) and will gather around the flow of constant-temperature freshwater springs when surface runoff drops the river temperature below about 72°. Severe cold can in fact kill them (Moore 1951a:35; Layne 1965:166). At other times they avoid clear water (Larson 1969:214) and are seldom seen in groups (Harrison and King 1965:167). The naturalist William Bartram, in his travels in Florida in the 1770s, noted the bones of a manatee killed by the Indians for food the previous winter at what is now known as Manatee Springs off the Suwannee River (Harper 1958:146). There is no particular reproductive season to key on, as the females seem to have one calf per year without regard to any species-wide breeding or calving season (Harrison and King 1965:167).

Summary:

In summary we should relate the importance of these marine mammals to the subsistence base of the peoples involved. We know from Landa (Tozzer 1941:191) that the manatee was a very profitable catch; in his words, "...for these are all flesh and fat" and Gosse (1851:345) raves about the delicicus taste of manatee steaks. Larson notes that a small adult weighed 450 lbs (1969:214) and animals twice that size are not at all unusual. Certainly manatee would have been a worthwhile catch, but with the possible exception of the Paleo-Indian riverine sites, manatee use in the southeast appears negligible and probably formed no more than a local abundance at infrequent times. There were never enough manatee in any one area to constitute a harvestable, renewable resource.

The same can be said of the West Indian seal. Seals were scarce enough in areas inhabited by aboriginal peoples that Fontaneda, in his travels over south Florida as a captive of various Indian groups, noted that (at least in the Keys) only individuals of high status ate seal (True 1944:26). No doubt seals were an appreciated and sought-after resource when they were in an area. An adult was 6 to 7 ft in length, weighed 200 lbs, and had nice fur and teeth for possible trade (as perhaps in the two Texas records). The oil was certainly valuable; Gosse reports that a specimen 4 ft, 2 in long yielded 4 gallons of oil (1851: 309-310). Nevertheless, the scarcity of West Indian seals in the Southeast made their capture infrequent in prehistoric times and only of temporary local importance. An example is the Marco site (8Cr107) where there were only three individual seals in some 2150 vertebrate individuals identified (Cumbaa ms.a.)

The cetaceans, particularly the whales in south Florida, remain as the really important group of marine mammals. It is unusual, but understandable in this case, that their importance is not always directly reflected in the archeological record. An exception is the presence of bones representing what may be a specialization on the Florida east coast north of Cape Canaveral on the Atlantic bottlenosed dolphin. The trading of teeth or other artifactual or non-subsistence utilization of these mammals is a minor factor here, and almost certainly accounts for the Bluffton and Melton site records, as well as the Yent Mound porpoise tooth bracelet.

It is not until we look at the ethnohistorical data that we get an idea of the importance of whale hunting in South Florida. Fontaneda, writing again of the Keys, notes that the common foods are fish and whale (True 1944:26). A January 1568 letter from Villareal to Father Rojel states that neighboring villages gather to show respect to the cacique, and to eat whale and fish (Zubillaga 1946:236 quoted in Larson 1969:234). Similar, although not localized ethnographic descriptions of whale hunting and the use of the whale as a food source in south Florida prompted Goggin and Sturtevant (1964:184-185) to consider whale hunting as a Calusa subsistence technique.

The independent accounts of whale hunting, remarkable in the lack of necessity for complex equipment, leave no doubt as to the importance of these large marine mammals. There are important social ramifications in the cooperative group effort necessary for the spotting, capture, butchering, distribution and redistribution of the tremendous amounts of meat and blubber present in even one large individual. A 30 ton whale (the size of the North Atlantic right whale) may have up to 45% of its body weight as usuable blubber (Harrison and King 1965:66). The meat and blubber, rich in animal protein and fats and storable when dried, would generate a significant energy surplus to see the group through possible lean times and would enable them to trade with other peoples for desirable inland resources.

The use of marine mammals in the Southeast appears to have been restricted almost entirely to Florida. Scattered use occurred over a great area of the state at various time periods. We have records to the historic present of the use of manatee from possibly the Paleo-Indian period, of the West Indian seal from about 1500 B.C., and of various cetaceans from at least 500 B.C. It is likely that winter was the season of exploitation of marine mammals, and that at least in south Florida where whales may have made up a great percentage of the diet, systematic hunting at certain locales made winter residence on the coastal strand a necessity.

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MIDDLE MISSISSIPPI EXPLOITATION OF THE WHITE-TAILED DEER[1]

Bruce D. Smith

The white-tailed deer (Odocoileus virginianus) was an important source of animal protein for human populations in the eastern United States throughout much of the prehistoric period, and the abundance with which its skeletal elements are recovered from Middle Mississippi sites attests to its significant utilization by these agricultural groups.

As is the case with any other animal species utilized by prehistoric human populations, five of the most important questions to be asked concerning the utilization of the white-tailed deer by Middle Mississippi populations are:

1) the contribution of the species to the diet of the human populations in question, expressed in terms of percent of the total estimated meat yields,

2) the extent to which exploitation was selective: was the species exploited more intensively than other species/species groups in relation to their relative abundance (biomass levels),

3) seasonality of exploitation: what would be the most advantageous time of year to exploit the species, judging from its seasonal behavior, and is there any ethnohistorical information and/or direct archaeological evidence available concerning the seasonal nature of exploitation,

4) similarly, is there any ethnohistorical information and/or direct archaeological evidence available concerning possible techniques of hunting/capturing, and

5) what was the predation profile: what was the age composition and sex ratio of the deer harvest, and what was the impact of human predation on the prey population and non-human predator populations?

Before considering these questions, however, it is necessary to consider the seasonal habits of the white-tailed deer within the central section of the Mississippi Valley.

The seasonal habits of deer vary in a given region very little from year to year. The rutting period, the fawning period, the seasonal groupings, and the periods during which antlers are grown and shed are reasonably consistent from year to year, as are seasonal food preferences and seasonal movements.

The peak of the fawning period in the southeast Missouri area is approximately the first of June, with most births occurring in late May and after the first two weeks of June (Dunkenson 1958).

Antler growth in males begins around the middle of May, full growth is attained by August first, but antlers are not fully hardened until the beginning of September. Antlers are dropped by January or early February.

The rutting season lasts from late September through November, with the peak occurring during the first two weeks of November.

The white-tailed deer quite probably has the smallest home range of any member of the deer family in North America. The average minimum home range of deer in an area of central Missouri was found to be 695 acres, or a little more than 1 mi^2 (Progulske and Baskett 1958). This figure of 1 mi^2 seems to hold true for much of the eastern United States (Severinghaus and Cheatum 1956:154). This home range is in no sense a defended territory, but rather the area utilized by a single individual. Obviously a great amount of overlap of individual home ranges exists. There is some seasonal variation in the size of home ranges, with increases especially noted during the fall rutting season.

The theoretical maximum growth rate of a species, which occurs only when a species reproduces under ideal conditions and in the absence of mortality, is termed the biotic potential of a species. The white-tailed deer has a fairly high biotic potential, which has been estimated at over 60% per year. If this maximum growth rate continues for any period of time, it would produce a larger deer population than the plant-food base of an area could support. This critical level above which the available food resources cannot support the growing population can be loosely termed the carrying capacity of the specific area.

As a result of the existence of a number of different interpretations of the meaning of "carrying capacity", however, wildlife ecologists have developed a number of concepts concerning the relative density of animal populations, and have strictly defined a number of different density levels, 3 of which apply to deer populations. These three density levels are subsistence density, optimum density, and security density.

White-tailed deer usually inhabit brushy or wooded edge areas during most of the year. Hunting pressure elicts highly effective avoidance behavior which includes prolonged hiding and a shift to nighttime feeding. For these and other reasons the white-tailed deer is considered a "resistant species" by wildlife ecologists. This means that given suitable habitat conditions, it is almost impossible to remove high percentages of white-tailed deer populations by shooting.

When a white-tailed deer population is reduced to a certain density level of modern hunting, it is theoretically impossible to further harvest the population. This density level at which the population is invulnerable to further predation is termed the security density level.

Given the excellent cover conditions that must have existed in the Mississippi Valley during the Mississippi period, there is little doubt that this security density concept can be applied to predation of white-tailed deer populations by Middle Mississippi hunters. No matter how great the predation pressure by Middle Mississippi hunters, they could not harvest enough deer each year to endanger the ultimate survival of the deer population.

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[1]This paper, presented at the 1973 SEAC meeting in Memphis, Tennessee, was submitted for publication in the SEAC Bulletin in October of 1973. After seven years, this paper is finally appearing in print. During this long period many articles have appeared which deal with the general topic of prehistoric exploitation of the white-tailed deer. This paper has not been updated to incorporate these recent studies. It appears in its original form, and reflects the author's position in 1973.

The upper limit that a deer population can reach in a given environment is termed the subsistence density level. A population at such a high level "obtains enough food for bare survival, but not enough to maintain good health, optimum growth, optimum body size, or peak birth rates" (Dasmann 1964:183). Subsistence density has been aptly described as a disaster level. Deer populations at such high levels are more vulnerable to such factors as disease and predation, and when a deer population at a subsistence density level is faced with a sudden reduction of the carrying capacity of an area, widespread starvation and a subsequent rapid decline in population will result. Paradoxically enough, an insufficient deer harvest by Middle Mississippi hunters can be seen to have been a greater threat to the continued existence of their primary animal food source than extreme predation pressure on their part.

An optimum density level is located between the security density and subsistence density levels. It corresponds to the meaning ascribed to "carrying capacity" in range management studies. At this density, maximum health, growth, and productivity will be realized. Mortality due to shortages of food, water, and shelter do not occur.

Having briefly discussed selected aspects of the seasonal behavior and population dynamics of the white-tailed deer, we can now turn to the five questions raised earlier. While the data presented herein come from a series of seven Middle Mississippi sites (Chucalissa, Banks, Lilbourn, Snodgrass, Turner, Powers Fort, and Gooseneck), most of the conclusions I will offer will hold true for Middle Mississippi sites in general, with a few notable exceptions such as Cahokia. The white-tailed deer contributed from 50% to 91% of the estimated total meat yield at this sample of seven sites (Table 1). While part of the intra-site variation in the importance of the white-tailed deer is a function of biased samples at some sites (poor preservation of skeletal elements of smaller species resulting in overestimating the importance of larger species), it is also apparent from the faunal samples that there is a real variation in the importance of the deer from zone to zone, with fish and migratory waterfowl being exploited, not surprisingly, much more intensively at meander belt sites than at sites in other zones.

Table 1. Percent of total projected meat yield at seven Middle Mississippi sites represented by the white-tailed deer.

Site	Percent of total meat yield
Chucalissa	Village 83.4% Mound 67.1%
Banks Village	80.5%
Lilbourn Structure 9	49.6%
Lilbourn Structure 12	63.0%
Lilbourn Structure 25	61.6%
Turner	82.8%
Snodgrass	89.6%
Powers Fort	76.3%
Gooseneck	91.0%

The second question to be considered is the extent to which exploitation of the white-tailed deer was selective in nature. Since this topic is covered in some detail in another article (Smith 1974b), I will simply state here that the white-tailed deer along with several other species were selectively exploited. That is, if a large group of terrestrial species, including squirrels, rabbits, black bear, raccoon, turkey, opossum, etc., are considered, and the fall-winter biomass levels and potential annual productivity of each species is estimated, the white-tailed deer was exploited more intensively than any other species, based on their relative abundance.

The third and fourth questions I would like to consider refer to the extent to which exploitation of white-tailed deer populations by Middle Mississippi groups was seasonally oriented, and possible techniques of exploitation that may have been employed. Since these questions have been covered elsewhere (Smith 1974a, 1974b, 1975), only the main points of the argument will be presented herein.

Although it is difficult to show conclusively the relative extent to which deer hunting was a seasonal, as opposed to a year-round subsistence activity for Middle Mississippi hunters, a strong argument can be presented to support the hypothesis that deer were most intensively exploited during the late fall and early winter at these seven sites, with some hunting going on throughout the winter months.

The seasonal occurrence of a high availability of a prime food source (acorns) within upland hardwood and bottomland hardwood areas produces a higher density of deer for several months (September-October-November), and with this higher density of deer within known zones, the probability of a hunter-prey encounter is substantially increased. The increase in the probability of a hunter encountering deer is both a matter of simple higher prey density and the fact that hunters could depend upon this seasonal concentration, and would quite probably take advantage of it. In terms of the feeding habits and seasonal movements of the prey, the fall and early winter would be the most advantageous period to hunt. It is also during this late fall and early winter period that deer attain their maximum yearly weight. A further factor which should be considered in the first bottoms areas around the Banks and Lilbourn sites is the late winter and spring floods, which would function to maintain high deer densities on the hardwood first bottom ridges throughout the early spring, and would facilitate deer hunting during the early spring flood period.

Perhaps the greatest problem presented to a hunter armed only with a bow and arrow is getting near enough for a shot at the prey without being detected. But from the time a buck's antlers drop their velvet (the first week in September) until the end of the rutting season in late November, a behavioral change occurs which greatly increases the hunter's chances. During this period the "personality" of the male deer changes radically from being ready to flee to being both overly curious and belligerent, as he avidly seeks out individuals of both sexes.

This personality change seems to have been exploited in early historical times. Swanton cites nine ethnographic references to individual stalking of white-tailed deer by Indians in the southeast United States (Swanton 1946). Of these nine references, eight made specific, detailed references to the use of deer skins and/or heads both for concealment and to attract the deer. This sometimes involved violent rustling of bushes and trees with stuffed deer heads held in the hunter's hand. Such a method closely parallels the way in which deer attack trees and bushes immediately prior to and during the rutting season. This hunting strategy is one of slow stalking, concealment, and attraction of the deer prior to shooting.

Judging from seasonal movements, feeding habits, maximum seasonal weights, rut induced behavioral changes, and the seasonal flood stages of the Mississippi River, the period from September through November was the most advantageous time of year to hunt deer in more upland areas, while the winter-spring flood stage of the Mississippi River would have extended this optimal period through the early spring in the first bottom areas. It was also a widespread practice during the early historical period to take advantage of these openings for exploitation.

Archaeological evidence for the seasonality of deer hunting can be obtained by analysis of both the growth and shedding of deer antlers, and the eruption and wear patterns of mandibular dentition. While the presence or absence of deer antlers on skulls gives a rough indication of season of death, it is possible to determine the season of death of white-tailed deer within finer limits by analysis of deer mandibles from archaeological sites. The eruption of permanent dentition, and the replacement dentition, and the replacement of deciduous pre-molars in Odocoileus virginianus during the first 20 months of life proceeds at a relatively reliable rate. This allows mandibles of individuals of less than 20 months of age to be accurately aged within a 2 or 3 month range (Severinghaus 1949).

By taking June 1st (the peak of the fawn-dropping period) as the birth date of each deer, an estimate of the date of death can be computed for each. Each deer mandible recovered from the sites that was complete enough to be aged and represented an individual less than 20 months of age, was aged within a 2 to 3 month range. Histograms of the computed range of death for these juvenile deer are shown in Figure 1 (black areas represent individuals less than 12 months of age).

The histograms of seasonality for each site (except for the small sample from the Lilbourn site) are quite similar, with the peaks corresponding closely to the availability of acorns in the hardwood areas, and to the rutting period. It is not possible, however, to determine from the archaeological evidence if deer hunting peaked during the "acornrutting" period, and then continued at a lesser intensity through the winter months, or if it was a constant level through the late fall and winter.

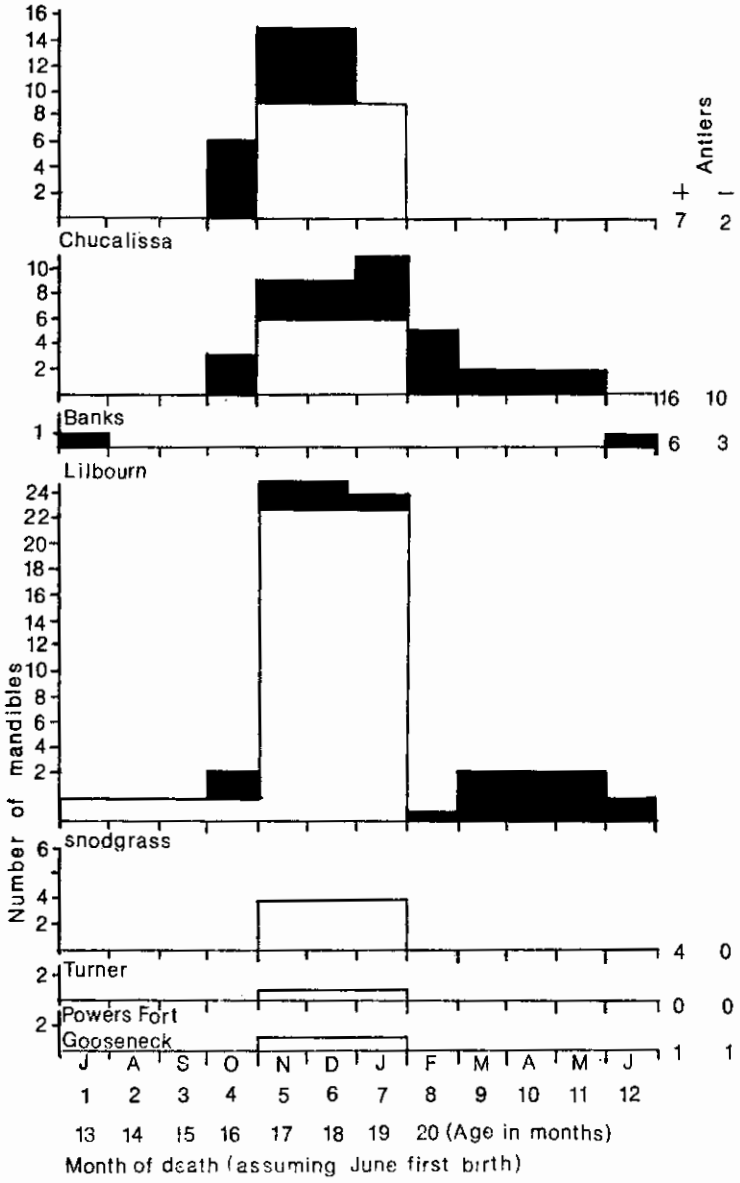

Figure 1. Archaeological evidence from seven Middle Mississippi sites indicating seasonality of the exploitation of white-tailed deer populations.

The low mortality levels through the rest of the year suggest that although deer hunting was not solely a late fall-winter activity, this was indeed the period of most intensive exploitation.

The fifth question to be considered is what the predation profile was like. What was the sex ratio and age composition of the deer harvest at these sites, and what was the effect of human predation on the prey population and on non-human predator populations.

Two skeletal indicators of sex were employed to estimate the sex ratio of the deer kill at these 7 sites, these being the presence or absence of antlers on skull fragments, and morphological characteristics of the pelvis (Taber 1956). Table 2 shows the sex ratio of the deer harvests suggested by each of these two methods. There exists an obvious discrepancy between the results obtained from the 2 sets of data. Judging from the pelvis morphology the sex ratio of the deer kill was fairly evenly balanced. The presence or absence of antlers on skull fragments suggests a definite selection of male vs. female individuals by Middle Mississippi hunters. This seeming selection for male animals is most likely not a result of hunter preference, but rather a bias introduced by two factors: 1) female skulls are less likely to be preserved in recognizable condition, and 2) because of the attached antlers, which were used in a variety of ways, male skulls and skull fragments would be more likely to be brought back to the villages. The pelvic data, therefore, is believed to more accurately represent the sex ratio of the deer kill, and strongly suggests a sexually balanced kill. Hopefully closer attention will be paid to this problem in the future. Since sexing deer pelvic fragments depends on almost complete elements, and is no simple task even then, samples will be small, even when large amounts of bone are recovered from sites (pelvic elements were quite often shattered during the butchering process).

Table 2. Sex ratio of the deer kill from seven Middle Mississippian sites, based on two osteological sexing criteria.

Site	Sexing Criteria	Estimated Sex	
		Male	Female
Chucalissa	Antlers	3	0
	Pelvis	14	17
Banks	Antlers	41	14
	Pelvis	10	12
Lilbourn	Antlers	1	0
	Pelvis	7	5
Snodgrass	Antlers	5	1
	Pelvis	2	4
Turner	Antlers	4	0
	Pelvis	3	2
Powers Fort	Antlers	0	0
	Pelvis	1	3
Gooseneck	Antlers	2	0
	Pelvis	1	0
TOTAL	Antlers	56	15
	Pelvis	38	43

The age composition of the deer kill at these seven sites is shown in Figure 2. Deer mandibles recovered from the sites were aged according to the eruption pattern of permanent dentition and relative amount of tooth wear (Severinghaus 1949). These age composition curves can be seen to be generally similar in form, except for the Banks site curve. There is a low representation of the zero age class (0 - 10% of the harvest) while the first, second, and third age classes represent the bulk of the sample. The older age classes are represented in lower percentages, with all but the two smallest samples including relatively old individuals (7½ years plus). This general pattern compares favorably with that obtained by Elder (1965) from three prehistoric sites in Missouri. One of the most interesting characteristics of the Middle Mississippi harvests is the low percentage of fawns (zero age class) represented in the kill. This is the most unusual in that young of the year are a very large, vulnerable section of the deer population. In attempting to determine the most probable explanation for the characteristic low percentage of young of the year in the prehistoric deer kills, Elder considered the possible influence of non-human predators such as Canis lupus and/or Canis rufus but rejected their possible impact on the deer population in favor of the hypothesis that prehistoric cultures were practicing "A voluntary and effective conservation measure - sparing the fawns to grow into better hides and more meat" (Elder 1965:369). A closer look at the selective nature of predation by wolves on deer populations, however, strongly suggests that it was the impact of wolves, rather than any conscious conservation measure by human predators, that was producing the low percentage of young of the year in the Middle Mississippi deer kills.

The age distribution curve of wolf predation of white-tailed deer obtained by Pimlott at Algonquin Park, Ontario is shown on Figure 2. (Pimlott et al. 1969). A comparison of these two age distribution curves provides a partial answer to the last question raised earlier: the relationship that existed between these two predator populations. The very high negative correlation between the two curves strongly suggests that there was very little direct competition between the two predator populations. Predation by wolves and Middle Mississippi hunters concentrated on almost mutually exclusive portions of the deer population.

Man's role as a predator in the ecosystem can most accurately be viewed as being complementary to the wolf. This complementary predation would be an important inhibitory factor that would function to maintain the deer population below subsistence density. Obviously it would have been advantageous for Middle Mississippi groups if the deer population was stabilized at close to optimum density. This would allow a maximum harvest from the deer population on a consistent basis, and would maintain the deer population at a healthy level. If, on the other hand, the deer population was allowed to increase toward subsistence density, the general health of the deer herd would be reduced, and the possibility of a rapid decline in the deer population would be greatly increased. By keeping the prey population from reaching a subsistence density level, the predator populations not only provide for their own survival, but ensure a future source of food, and protect both the prey population from crashing due to starvation and the plant food supply from being overbrowsed (see Smith 1974a for a complete discussion).