FAUNAL ANALYSIS: RECONSTRUCTING SUBSISTANCY AND SEASONALITY AT THE TREMAINE SITE (47LC95)

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ABSTRACT

Oneota was a late Prehistoric group that settled in near modern-day La Crosse, WI around A.D.1300, bringing with material remains distinct from the previous Woodland tradition. They abandoned the La Crosse localities by A.D.1625. Archaeological excavations of their complex raised field systems and technologically-advanced plant storage pits has allowed us to learn a great deal about the plant portions of Oneota diet and the role animals played in Oneota subsistence. My research is a detailed analysis of the animal remains found in eight features (33, 55, 69, 78, 92, 97,102, and 108) during the 2012 University of Wisconsin-La Crosse archaeological field school from the Oneota site called Tremaine (47LC95). This study of faunal remains from a single Oneota site will be used to discuss Oneota subsistence and seasonality at Tremaine with to better understand Oneota adaptation to their environment.

INTRODUCTION

Oneota is the name applied to the archaeological complex representing prehistoric Native Americans that occupied the Upper Midwest. They lived in La Crosse, Wisconsin from A.D.1300 until A.D.1625, when they moved west into Minnesota and Iowa at the time of European contact (Boszhardt 1994a:173). The La Crosse Locality is a part of the Driftless Area, which provided an environment with various floral and faunal resources that contributed to Oneota survival and adaptation. The Oneota utilized a variety of subsistence strategies, including: maize cultivation, the harvesting of wetland resources, and the hunting of large and small game animals (O'Gorman 1995: 10). The various kinds of animals the Oneota hunted for food and tools can be observed in the archaeological record. The discarding of animal remains in features can be analyzed for information about Oneota occupation and diet.

The 2012 excavations by the University of Wisconsin-La Crosse Archaeology Field School at the La Crosse Oneota site called Tremaine (47LC95) recovered an assortment of faunal remains in eight features. This study examines and discusses the prehistoric faunal remains recovered. Based on the faunal remains found at Tremaine, I will be able to address the following questions: what animals were exploited for food at Tremaine? What season(s) were Tremaine occupied? This paper is focused on gaining more information about Oneota subsistence and seasonality from the analysis of animal bones to better understand Oneota seasonality and subsistence at the site of Tremaine in order to better understand Oneota environmental adaptation.

BACKGROUND

The Oneota

Oneota is the name applied by archaeologists to the cultural tradition that formed around A.D.1200, as the population declined in the major center of Mississippian tradition, called Cahokia (Theler and Boszhardt 2003:157; Theler and Boszhardt 2006:456). As Cahokia's population dropped (in today's city of East St. Louis, Illinois) Oneota sites were found in Wisconsin, Illinois, Iowa, Minnesota, and Missouri continuing their tradition until around A.D.1650 (Theler and Boszhardt 2003:158). The Oneota integrated a mixture of Late Woodland and Middle Mississippian ideas including corn agriculture and exploitation of wild resources, which has led arguments of Oneota origins to have developed out of the past Effigy Mound tradition or (Late Woodland/Mississippian period) (Theler and Boszhardt 2006:440-441).

The Oneota were a semi-sedentary population who were involved in long distance trade (O'Gorman 1995:12; Stevenson 1985:1). With the absence of mounds and the appearance of smaller villages at Oneota sites has indicated

a less complicated socio-political society than the previous Cahokia Mississippian settlements (Stevenson 1985:1). According to archaeologists, the Oneota were probably a tribe, consisting of an egalitarian social system, which differed greatly from the Middle Mississippian sites that had social stratification (Stevenson 1985:9).

Archaeologists have recognized the Oneota from the amount of sites that have "similar lifestyles and material culture" (O'Gorman 1995:12). There are a combination of qualities that categorize the Oneota. They are known for using shell-temper pottery and having storage pits. Oneota sites also have numerous bison scapulae modified for hoe cultivation (Theler and Boszhardt 2003:157; O'Gorman 1995:11). The Oneota practiced intensive maize agriculture using ridged field systems unlike the previous Woodland population (Gallagher et al. 1985). Although, at the Tremaine site no evidence of agricultural fields has been found but this most likely due to the extensive plowing that occurred from modern-day agriculture. There is abundant evidence of charred corn and beans in the flotation samples taken from the features.

The Oneota subsistence patterns included an array of floral and faunal resources. In Oneota society there was a minimal use of deer in comparison to the previous Woodland populations, which had a greater reliance on deer. Instead, they focused on a combination of intensive corn, beans and squash agriculture with an exploitation of bison and wetland resources. In contrast, to the previous Woodland tradition that were minimally utilizing corn agriculture and were heavily exploiting white-tail deer.

Tremaine

The Tremaine site is located on a high terrace in Onalaska, Wisconsin, situated along side Highway 53 North. The Tremaine site varies from some other Oneota sites since it is located midway on the terrace, between the bluff line and the Black River (O'Gorman 1995:14). While, locations of other Oneota sites are near the Mississippi River or the bluff line, where major food resources would have been located.

Oneota sites have been divided into three phases that are based on ceramic stylistic changes in rim treatment, handle attachment, and punctations, which have been confirmed by radiocarbon dates (Boszhardt 1994b:185-188). The first phase being the Brice Prairie, which transitions into the Pammel Creek and lastly into the Valley View phase (Boszhardt 1994b:173-236). Previous excavations at Tremaine, have found cultural materials that date to the earlier Brice Prairie phase (O'Gorman 1995:13) and 2012 materials derive predominantly from the Pammel Creek phase and transition into the Valley View phase. Although there is evidence of some Paleoindian, Late Archaic (Penman and Hamilton 1990), and Woodland occupation at Tremaine (O'Gorman 1995:11), the majority of cultural material found at Tremaine, there is a heavy Oneota occupation (O'Gorman 1995:3).

Tremaine's existence as an archaeological site (O'Gorman 1995:3) was documented as early as 1906 by local residences but it was not until 1981 when the Great River Road (GRR) archaeological survey occurred when detailed archaeological research of the site began (O'Gorman 1995:3). Phase III excavations began with the State Historical Society Highway Archaeology Program in the 1980's and then in 1990 by the Mississippi Valley Archaeology Center (MVAC) (Boszhardt 1994a:164).

O'Gorman's (1995:5) extensive field work at Tremaine, throughout 1986-1991, had framed the earliest Oneota occupation at A.D.1300 and its latest to be during A.D.1450-1550. The area of the site is 32.8 hectares or 81 acres. Tremaine has been exposed to extensive plowing from agricultural practices, erosion, and had been affected by the construction of highway 53 (O'Gorman 1995:3).

Since 2011, the University of Wisconsin-La Crosse field school continued more excavations of Tremaine as a field school, under Dr. David Anderson. In particular, the summer excavations in 2012 found eight features (33, 55, 69, 78, 92, 97,102 and 108) (Figure 1) containing various deposits of animal bones. The analysis of these bones will be the primary focus of this paper.

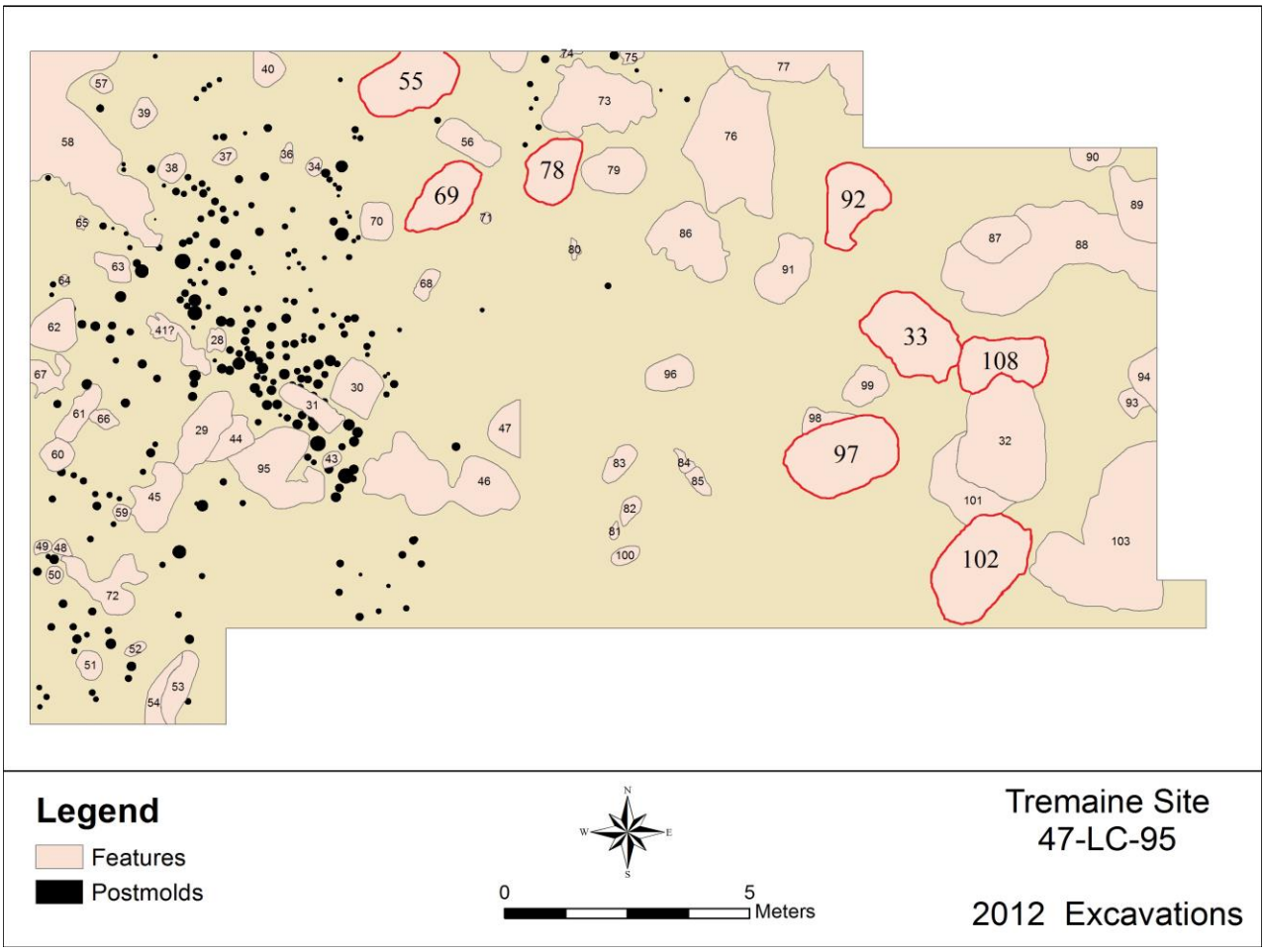

Figure 1. A map of the features (outlined in red) excavated at Tremaine site during the 2012 excavations (Courtesy of Dr. Anderson**).**

Geographical Setting

Tremaine is one of three Oneota sites that make up the Tremaine Complex as show in Figure 2. The other two sites are the OT site and the Filter site. The Tremaine complex is a part of 12 other complexes' that make up the La Crosse Locality. The La Crosse Locality is a "geographic region of the Mississippi Valley" that encompasses the areas between Winona, Minnesota to Stoddard, Wisconsin (O'Gorman 1995:9). This geographical area is in a region, untouched from glacial retreating during the Pleistocene, called the Driftless Area. The Driftless Area created the ridged landscape we see today, and provided diverse habitats that were exploited for food and tools by the Oneota.

Although there is no evidence of glacial retreating, there is evidence of glacial outwash in the major valleys that produced three physiographical zones: sand terraces, floodplains, and uplands that housed (Theler and Boszhardt 2006:441) six different habitats (Gallagher and Stevenson 1982), which were all used for faunal resources. These six various habitats that existed in the past are the: open water, wet bottomlands, dry bottomlands, oak savanna, sandy prairie, and mixed uplands (Stevenson 1985:48-50) as seen in Figure 3. As the seasons changed from summer to winter to spring various resources of animals would have been offered in La Crosse (Stevenson 1985:46).

The rivers and floodplain lakes, channels, and marshes made up the open water habitats of the Upper Mississippi (Stevenson 1985:48-49). The open water would have provided animal resources such as: naiads, turtles, waterfowl, fish, aquatic birds, and smaller mammals that lived along the river (Stevenson 1985:48). Spring would have contained the most resources as the fish were beginning to hatch and the migrant waterfowl were returning and all would have stayed there through the summer until the fall season (Stevenson 1985:49).

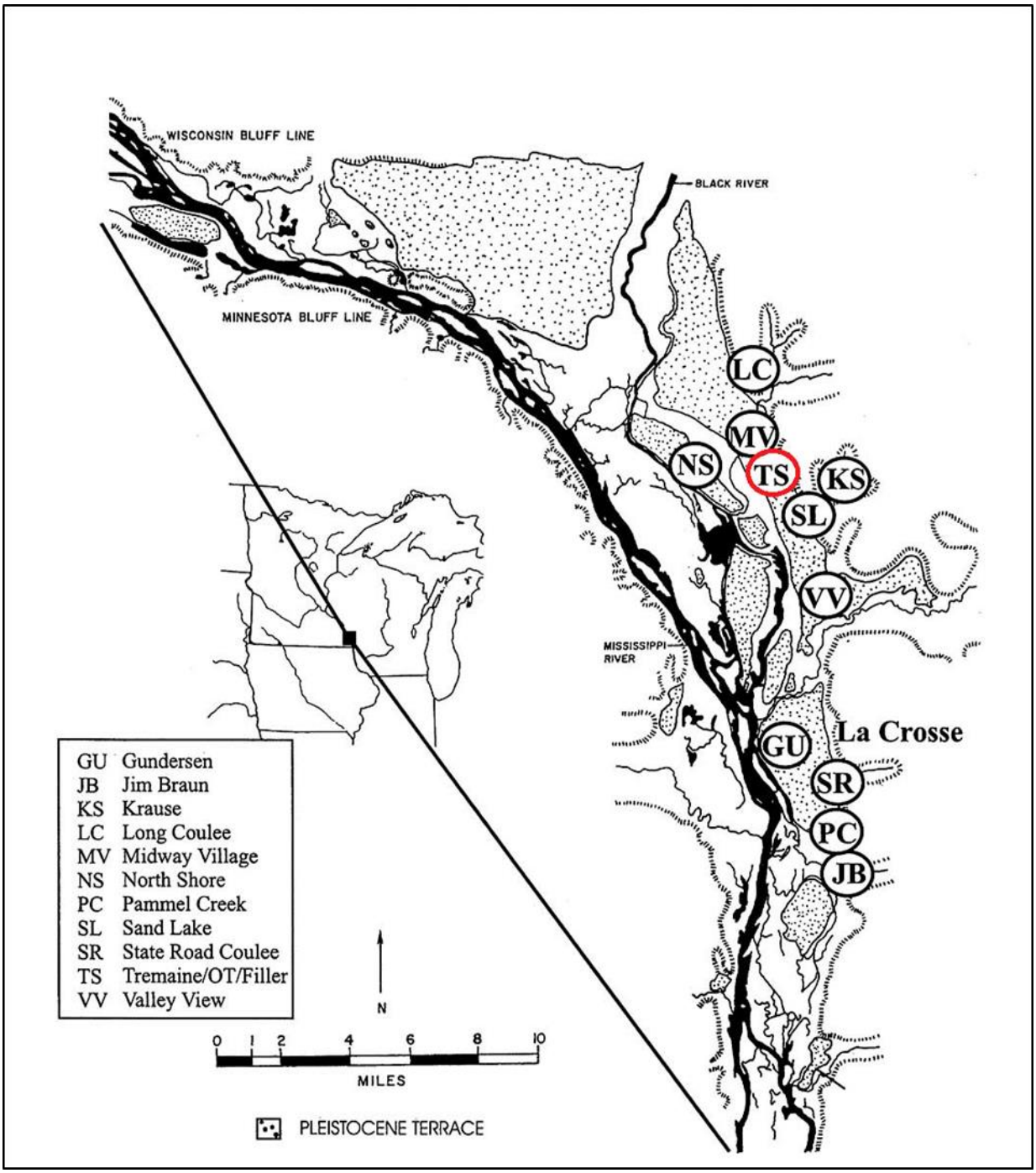

Figure 2. A map of the Oneota Localities in La Crosse. The Tremaine Complex is marked by the red circle (Theler 2002:126; Map of MVAC made by Boszhardt)

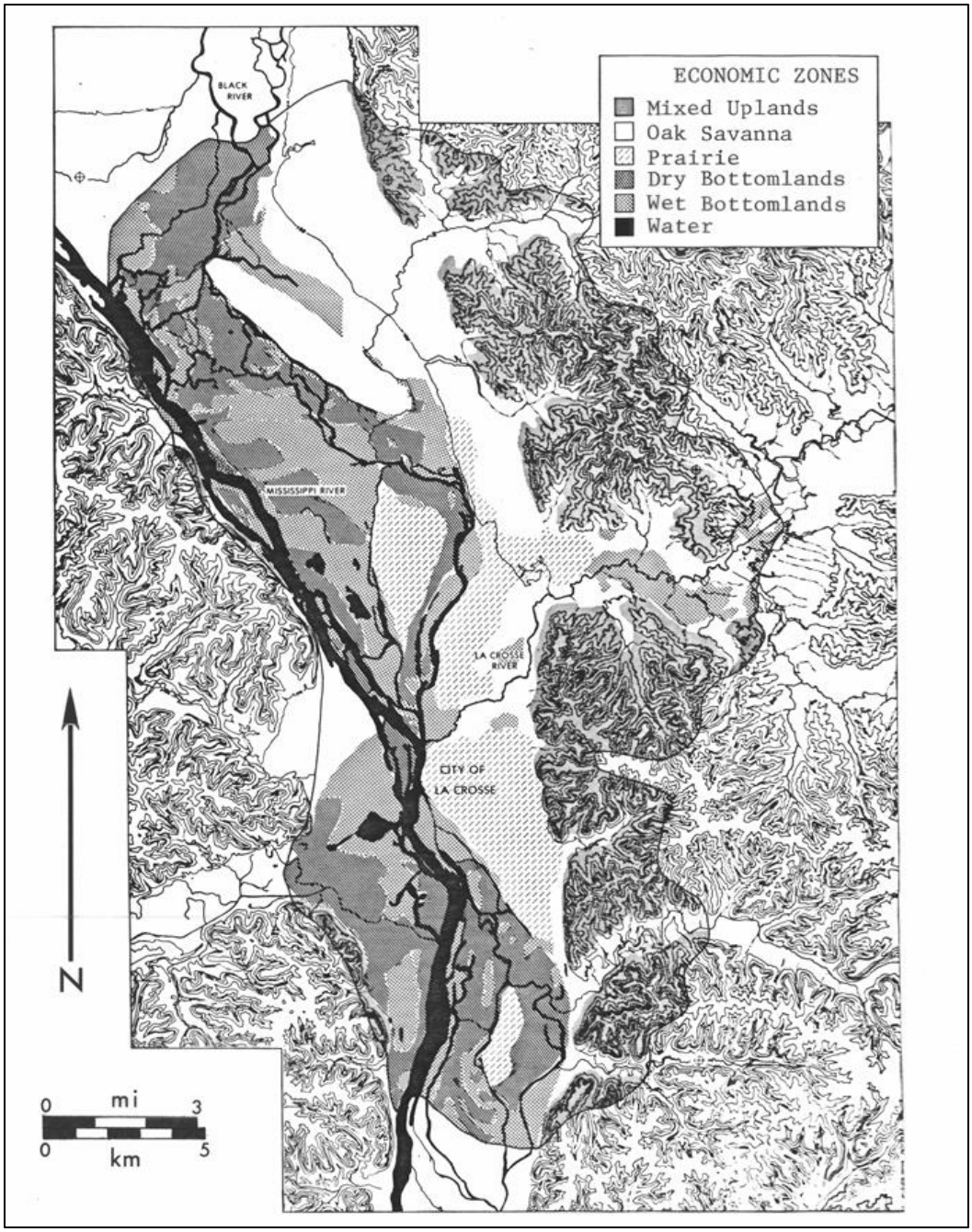

Figure 3. A map featuring the six different economic zones in the La Crosse region.(contour interval = 100') (Stevenson 1985:245).

The floodplains, which consist of the wet bottomlands and dry bottomlands (Stevenson 1985:49-50), were forested areas that contained a number of warm season resources (Theler and Boszhardt 2006:441). The wet bottomlands being the lower wet part of the floodplains are home to the seasonal and local birds, as well as, fish and riparian mammals that live along the river, such as muskrats, raccoons, and beavers. (Stevenson 1985:50). These animal resources were very plentiful in the spring and summer (Stevenson 1985:49-50). The dry bottomlands are the floodplains made up of wet prairies and floodplain woodlands, which had food resources that occurred only in

particular periods of the year (Stevenson 1985:50). The dry bottomlands have birds and mammals that live along the river like the wet bottomlands. They in addition have deer and bear (Stevenson 1985:50).

The oak savanna was accompanied with prairie grass and was located on the upland ridges and terraces (Theler and Boszhardt 2006:441). This habitat not only housed various plants but also had many small animals, white-tailed deer, and elk (Theler and Boszhardt 2006:441). Other animal resources would have included the various birds and tiny mammals that went there for the bluestems and needlegrasses (Stevenson 1985:51). The "animal resources" that lived in this habitat were accessible year around, "although less abundant than in the floodplain" (Stevenson 1985:50).

The mixed uplands composed of the slopes, rivers, and bluff tops, and was made up of shrubs, dry prairies, but mostly of oak-hickory forests; there were also some cedar and juniper (Stevenson 1985:51). The animal resources would have been birds, elk, white tail deer, and bison, as well as, smaller mammals. Some of the animals would have been there year around, while others would have been there only during the warm seasons or cold seasons.

METHODS

The Sample

Faunal remains from Tremaine were collected from the eight features (33, 55, 69, 78, 92, 97,102, and 108) excavated in 2012, using 1/4-inch mesh and hand excavations. The animal bones were sorted by animal class (bird, fish, reptiles, and mammals), and separated into identifiable and unidentifiable remains. The faunal remains were analyzed with the help of Dr. James Theler, as well as, with the reference collection that is stored at the Mississippi Valley Archaeology Center (MVAC) at the University of Wisconsin-La Crosse.

Documentation of the elements included a taxonomic classification as specific as possible, bone element, cut marks, gnawing, burning, and if appropriate, side, weather left or right, was recorded. The findings of worked bison scapulae, bird bone beads, and a bone point will not be included in my subsistence analysis as the animals that were used for tools might not have been exploited as a food resource by the Oneota.

Determining MNI and NISP

In the following analysis, I collected the NISP (the number of identified specimens) (Table 1) and MNI (the minimum number of individuals) (Table 2), from the bones of identifiable taxon. I calculated these types of data sets in order to look at the importance of one animal over another. The NISP was calculated by adding up the number of individual elements and fragmented bone per the identified taxon. Although the NISP calculated the amount of fragmented bones identified, it lacked the ability to account for the possibly these bone fragments could have added up to one bone element.

With the biases of the NISP, I calculated the MNI that was determined based on all bone elements found in the 2012 excavations as a whole, instead of based on the individual bone elements found per a feature. This approach took into account the possibility that the trading and sharing of various portions of a single animal happened between the Oneota peoples at Tremaine. If so, then this might have caused them to discard these various portions into different features. In addition, the MNI was calculated based on the amount of duplicated right and left element counts for a species, as well as, the size of each element was factored in. This allowed for a better determination of MNI because it accounted for the size variations between two left and rights of the same elements, for example if there were three fish hyomandibular's and two were lefts and one was a right. If the size of the right was much bigger or smaller than the other two, we can then say there were a minimum number of three individual fish instead of two.

Determining Meat Weight

The meat weight was determined using the comparative collection at MVAC of animals with known weights. This gave us an estimated live weight, which is the "weight of an animal while alive" (Lyman 1979:536), for each individual element. The usable meat weight was based on the method proposed by Thomas White (1953), which is based on the Euro American butchering practices and their cultural beliefs of what "consumable meat" or usable meat is (Lyman 1979:538). Whites (1953) equation is for "usable meat":

MNI (% live weight representing meat) (average live weight per individual) = MTWT.

The MTWT is the "usable meat" and the "percentage of live weight representing meat" (White 1953:397; Lyman 1979:537) in the equation is determined based on the particular animal (Stevenson and Theler 2011:185).

For turtles and mammals, 50% of the total meat weight was counted from the live weight (White 1953). For birds and fish this was 70% (White 1953). A biasedness toward taking this approach is that archaeologists are unsure clear what the Oneota found to be "consumable meat" (Lyman 1979:537).

RESULTS

Crawfish (Decapoda)

As shown in Table 1, the crawfish was represented by one individual element that represented one individual. The crawfish represented 0% of the number of identified specimens found and 4% of the minimum number of individuals at Tremaine. The crawfish might have been a northern crawfish (*Orconectes virilis*), which was popular at the Pammel Creek site (Theler 1989:204). They breed their eggs in early June and laid their eggs until mid-march to mid-April, as the young develop between May to June (Theler 1989:204). This shows they would have been exploited during the spring and summer seasons (Figure C12).

Table 1. Summary of crawfish found in the 2012 Tremaine excavation.

				Usable Meat		
Taxon	Features	NISP	MNI	(kg)	% class	Notes
Decapods	78	1	1	-	-	Element: 1 claw
Total Decapods		1	1	-	-	
*MNI= minimum number of individuals *Unid= unidentified species *NISP= number of identified specimens						

Fish

A total of 457 identified fish elements were found at Tremaine, only 107 were identifiable by species, representing 13 individuals as shown in Table 2. Overall, 52% of the individual elements (NISP) were fish and 43% of all the individual species (MNI) were fish out of the animals found at Tremaine. The fish represent the most abundant animal remains found from the 2012 faunal assemblage. There was 11.2 kg edible meat weight from fish that made up 5% of the meat of all the animals found Tremaine.

Table 2. Summary of fish found in the 2012 Tremaine excavations.

				Usable Meat		
Taxon	Features	NISP	MNI	(kg)	% class	Notes
Ameiurus melas (black bullhead)	33, 102	4	3	0.40		MNI (based on size): (3) 0.192 kg *Total live weight*: 0.576 kg Elements: 2 pectoral spine (right), 1 hyomandibular (left), 1 supraethmoid
Ameiurus sp. (bullhead family)	33, 102	23	-	-	-	Elements: 1 articular (left), 1 ceratohyal (right), 1 cleithrum (right), 1 coracoid (right), 1 coracoid (left), 2 dentary (left) 1 dentary (right), 2 hyomandibular (right), 2 opercle (left), 4 pectoral spines (left), 3 supracleithrum (left), 1 supracleithrum (?).
*MNI= minimum number of individuals *Unid= unidentified species *NISP= number of identified specimens						

Table 2. (continued) Summary of fish found in the 2012 Tremaine excavations.

				Usable Meat		
Taxon	Features	NISP	MNI	(kg)	% class	Notes
Ictalurus punctatus (channel catfish)	33, 102	2	1	7.94		MNI (based on size): both elements range from 9.07kg-11.34kg *Total live weight*: 9.07kg-11.34kg Elements: 1 pectoral spine (?) and 1 hyomandibular part
Ictaluridae (catfish family)	33, 29, 102	53	-	-	-	Elements: 5 articular (left), 1 articular (right), 3 ceratohyal (left), 3 ceratohyal (right), 1 cleithrum (?), 4 cleithrum (left), 2 cleithrum (right), 2 coracoid (right), 2 dentary (left), 1 dentary (right), 1 dentary (?), 1 frontal (right), 3 hyomandibular(left), 3 hyomandibular (right), 2 hyomandibular (?), 2 opercle (left), 2 opercle (right), 2 parashenoid, 2 supraoccipital,1 pectoral spine (left), 2 pectoral spine (right), 2 quadrate (left), 1 second pectoral spine, 3 supracleithrum (left), 1 supracleithrum (right),
Amia calva (bowfin)	33, 55, 69, 102	7	1			Elements: 1 dentary (?), 1 opercle (left), 3 verebra, 1 jaw
Esox lucius (northern pike)	33,102	11	4	2.52	23	MNI (based on size): 1.81, 0.36, 0.36, 0.75, 0.68 kg *Total live weight*: 3.6kg Elements: 2 dentary (right), 3 dentary (left), 2 dentary (?), 1 frontal (right), 1 jaw (?), 1 hyomandibular (left), 1 preoperculum (right)
Ictiobus sp. (buffalo fish)	102	1	1	-	-	Element: 1 rib
Catostomidae (sucker family)	33,102	2	1	-	-	Elements: 1 Dentary (?), 1 maxilla (left)
Lepomis macrochirus (bluegill fish)	33	2	2	0.322	3	MNI (based on weight): both elements were 0.21 kg. *Total live weight*: 0.46kg Elements: 2 mandibles (left)
Micropterus sp. (bass family)	102	1	1	-	-	Element: 1 articular (right)
Lepisosteus sp. (gar family)	33	1	1	-	-	Element: 1 operculum (right)
Unid. Fish		350				
Total Fish		457	15	11.2	77	

*MNI= minimum number of individuals *Unid.= Unidentified species

*NISP= number of identified specimens

In the assemblage, the most identifiable fish elements were catfish (Ictaluridae) with 53 individual bones. In the catfish family is the channel catfish, and the bullhead family, such as the black bullhead. The most common elements found in the eight features were the hyomandibular and pectoral spine, which are diagnostic bone. The one

channel catfish found in the assemblage was the largest fish with an estimated live weight of 11.34 kg, having three cut marks on the hyomandibular.

The Oneota would have gathered fish from the Mississippi backwaters (Theler 2000:132, Stevenson 1985:144). The Oneota would have caught fish with spears, nets, or by hand, by trapping them in shallow waters (Theler 1989:203). The support for ice fishing during the winter is very minimal at Oneota sites. No other site, besides the State Road (47LC176) site, has support of shell lures that would have been used to draw in fish (Theler 2003:206).

Catfish family (Ictaluridae) and Bullhead species (*Ameiurus* sp.). In features 92, 33, and 102, the Catfish family represented a greatest number of individual species found at Tremaine with a totaled of 53 identified elements. The largest fish found was the channel catfish, about 62 centimeters in length averaging between 9.07-11.34 kg of average meat weight. There was an estimated 7.94 kg of edible meat weight, representing 71% of the total fish edible meat weight for fish. The hyomanidbular of this channel catfish had three cut marks on the lateral side.

The Oneota would have been able to harvest channel catfish (*Ictalurus punctatus*) in the open-waters, mostly in areas with a current (Boszhardt et al. 2011: 203), but probably in nest cavities instead of open waters. They would have been harvested them during May and July (Theler 1989:191).

The Bullhead species totaled 23 identified elements. The black bullhead (*Ameiurus melas*) totaled four elements that represented three individuals. The MNI was based on the size of the elements. There was a total live meat weight of 0.576 kg, containing about 0.40 kg of edible meat that makes up 4% of overall fish edible meat weight. The Oneota would have exploited them between August and September (Theler 1989:191).

Bowfin (*Amia calva*). The bowfin had been found in features 102, 69, 55, and 33. There was a total of seven identified elements that represented one individual. The Oneota would have harvested them in the Mississippi backwaters between April and May (Theler 1989:187; Stevenson 1985:353).

Bluegill (*Lepomis macrohirus*). The bluegill was found in feature 33, totaling two identified elements representing two individuals based on weight. The estimated live weight was 0.46kg, with an edible meat weight of 0.322 kg or, 3% of the total edible fish meat. They inhabit lakes, ponds, streams, rivers, and the backwaters. Between May and August they spawn in shallow waters (Stevenson 1985:359). The Blue Gill hit their highest population in June (Stevenson 1985:359).

Northern Pike (*Esox lucius*). Found in features 33 and 102, the Northern Pike totaled 11 identified elements representing four individuals, which was based on size. There was a total live weight of 3.6 kg, which was 2.52 kg of edible meat weight that made up 23% of the overall edible meat weight for fish. The Oneota would have found them in the "weedy backwaters and low-energy pools in rivers" (Theler 1989:187).

Sucker Family (Catostomidae) and Buffalo (*Ictiobus* sp.). Found in features 102 and 33, the sucker family totaled two elements representing one individual in the Tremaine assemblage. A genus in the sucker family is the buffalo fish *(Ictiobus* sp.) that totaled one identified element, representing one individual in the Tremaine assemblage. These fish would have been harvested in the "shallow waters of flooded marshes" throughout April and June (Theler 1989:202).

Gar family (*Lepisosteus* sp.). The gar fish was found in feature 33, totaling one element that represented one individual in the Tremaine assemblage. Depending on the species of gar fish, the shortnose gar (L.*platostomus*) inhabited the open waters where the current is calmer and the longnose gar (L.*ossseus*) is more found in the backwaters (Theler 1989:187).

Bass (*Micropterus* sp.). There are two known bass species common to the Upper Mississippi River are the smallmouth bass (M. *dolomieui*) and the Largemouth bass (M. *salmoides*). None of which could be positively identified to species in the Tremaine assemblage. The bass species was found in feature 102, totaling one single element, representing one individual. The Oneota would have harvested the smallmouth bass between May and June, in lakes and streams, especially in strong current areas of the Mississippi (Stevenson 1985:579). The largemouth bass would have been harvested in the same areas, as well as, in the backwaters and sloughs along rivers (Stevenson 1985:579). They typically spawn between April and July. Both small and largemouth bass swim and spawn in shallow water (Stevenson 1985:579) where they could have been speared or netted.

Mammal Species Found at Tremaine

Mammals were the most identified element found in the faunal assemblage. Out of 483 bones, 456 were identifiable as mammal (Table 3). Mammal remains made up a large portion of individual elements found in the Tremaine assemblage, making up 46% but the MNI of mammals found was 28%. The Mammals made up 82% of the editable meat weight, or 104.9 kg.

The assemblage was has been recovered at other Oneota sites. There were two bison scapula's found in features 69 and 102 but were not included in as an item of substance as no unmodified bison remains were recovered at the

site The domestic dog, elk, and white-tailed deer were the most commonly found individual species from the faunal remains.

Table 3. Summary of mammals found in the 2012 Tremaine excavations.

				Usable Meat		
Taxon	Features	NISP	MNI	(kg)	% class	Notes
Cervus canadensis (elk)	33, 97, 102, 108	5	1	79.35	76	*Ave. live weight est.*: 158.7 kg Elements: 1 astragalus (left), 2 astragulus (right), 1 calcaneus that was broken into 2 pieces
Odocoileus virginianus (white-tailed deer)	33, 108	4	1	16.10	15	*Ave. live weight est.:* 32.2 kg Elements: 2 3rd phalanx (right), 1 3rd phalanx (left), and 1 3rd phalanx (?)
Castor canadensis (bever)	33, 108	3	1	5.50	5	*Ave. live weight est.*: 11.0 kg Elements: 1 insisor, 1 innominate (left), 1 mandible (right)
Canis familiaris (domestic dog)	97, 102, 108	16	2	3.60	3	*Ave. live weight est.*: 3.6 kg Elements: 1 mandible (right), 2 maxilla (right), 1 maxilla (left), 1 frontal (left), 1 canine tooth, 3 teeth, 5 cranial frag.
Ondatra zibethicus (muskrat)	102	1	1	.30	0	*Ave. live weight est.*: 0.6 kg Element: 1 humerus (right)
Microtus sp. (vole)	33, 102	4	1	-	-	Elements: 1 mandible (left), 1 mandible (right), 1 innominate (right), 1 skull.
Unid. mammal		456	-	-	-	
Total mammal		483	7	104.9	100	

*MNI= minimum number of individuals *Unid= unidentified species
*NISP= number of identified specimens

Elk (*Cervus canadensis*). Elk bones were recovered in three features: 33, 97, 102, and 108, totaling five identified elements that represented one individual. Average live weight from an elk is 158.7 kg, which totaled to 79.35 kg for the 2012 Tremaine faunal assemblage contributing 76% of the meat for mammals. The only elk elements found were from the feet, which were the astragalus and calcaneus. There were no identified long bones found in the assemblage. This implies that elk were butchered at a kill site (Theler 1989:170), and the Oneota were being back the hooves and the hide to Tremaine. The Oneota would have been able to find elk by the edge and openings of the forests, prairies or prairie-forests regions, bushland, but most preferably around lakes or marshes (Stevenson 1985:381).

White-tailed deer (*Odocileus virginianus*). The 3rd phalanxes of the White-tailed deer were all that were found at Tremaine. Deer bones are commonly found as tools in the archaeological record, but none were found in this assemblage of faunal remains from Tremaine. This shows that most of the deer was left at the kill site (Theler 1989:170) and only the hooves and hides were brought back to Tremaine.

There were a total of four identified elements that represented one individual found in features 33 and 108. The deer have an estimated live weight of 32.2 kg, which totaled 16.10 kg of live weight, which was 15% of the overall mammal meat. Deer can be found year round. As they preferably roam the edges of forests, the Oneota could have also exploited deer in the mixed upland, oak savanna, floodplain, and brushy terrace (Stevenson 1985:353).

Beaver (*Castor canadensis*). Beaver was seen in features 108 and 33, totaling three elements representing one individual. The beaver represented one of the less important mammals exploited at Tremaine. Beavers have a live weight of 11.0 kg, which was 5.50 kg of usable meat or totaling 5% of the mammal meat from the 2012 Tremaine assemblage. The Oneota could have exploited beaver during many different times in a year (Stevenson 1985:579).

They would have been able to find beavers around the lakes and streams that run through forested areas (Stevenson 1985:579).

Domestic Dog (*Canis familiaris*). The domestic dog represented the most individual elements with 16, representing two individuals. Found in features 97,102, and108. The live meat weight of a dog is 3.6 kg, totaling 7.20 kg of meat found in the Tremaine assemblage that represented only 3.60 kg or 3% of the overall mammal meat. The majority of the dog elements were cranial fragments. A frontal of a dog had a cranial fracture to the frontal, showing the dog suffered from a blunt force trauma to the head.

Muskrat (*Ondatra zibethicus*). One muskrat bone was found in feature 102 by a full innominate. The average live meat weight for a muskrat is 0.6 kg, which was seen in the faunal assemblage. The Oneota could have exploited muskrat all year round, as they live by lakes, marshes, ponds, and streams, most commonly by calm waters (Stevenson 1985:579).

Vole (*Microtus* sp.). The vole was found in features 102 and 33, totaling four elements representing one individual. The Oneota could have exploited voles all year round, but depending on the species, the vole can live in grassy, marshes, or forests habitats (Stevenson 18985:579).

Birds

A total of 42 identified bird elements, five of those elements were identifiable (Table 4). They were found in features 33 and102, the elements represented two individual bird species and held 3.49 kg or 3% of the usable meat weight Overall, the birds represented 8% of all the species found. The number of individual bone elements was 4% percentage, which shows birds to be less exploited as a food substance by the Oneota.

Table 4. Summary of birds found in the 2012 Tremaine excavations.

				Usable Meat		
Taxon	Features	NISP	MNI	(kg)	% class	Notes
Branta canadensis (Canada goose)	102	4	1	3.42	1.00	*Ave. live weight est*.: 4.89 kg Elements: 1 3rd phalanx, 1 2nd phalanx, 1 1st phalanx, 1 carpometacarpus
Agelaius phoeniceus (Red-wing Black bird)	33	1	1	.007	.00	*Average live weight es*t.: 0.01 kg Element: 1 humerus
Unid. birds		37	-	-	-	
Total Birds		42	2	3.49	1.00	

*MNI= minimum number of individuals *Unid.= unidentified species
*NISP= number of identified specimens

"Giant" Canada goose (*Branta canadensis*). The Canada goose was found in feature 102, totaling four individual elements, representing one individual. There was 3.70 kg of edible meat. Since the Canada goose is a waterfowl bird the Oneota would have captured them between March and April, as they nested in the Upper Mississippi Valley (Theler 1989:182). The wing joint (carpomatacrpus) of the Canada goose has a canine tooth compression pit imprinted in bone.

Red-winged Blackbird (*Agelaius phoeniceus*). The red-winged blackbird was represented by one humerus in feature 33, representing one individual. The Red-winged Blackbird would have been captured around the Upper Mississippi River valley between June and July (Theler 1989:184).

Reptiles

Out of the total 69 reptile elements, 57 of those were identifiable (Table 5). Found in features 33, 69, and 92, there was a majority of snapping turtle (*Chelydra serpentine*) found over soft-shell turtle (*Apalona* sp.). Overall,

reptiles were 8% of the individual elements found in the assemblage and 8% of the individual species found. The reptiles represent 6.8 kg, or 1% of the total meat weight of faunal found at Tremaine.

Table 5. Summary of reptiles found in the 2012 Tremaine excavations.

				Usable Meat		
Taxon	Features	NISP	MNI	(kg)	% class	Notes
Chelydra serpentina (snapping turtle)	33	41	1	6.8	-	*Total live weight*: about 13.61 kg Elements: 3 phalanx, 1 coracoid, 1 humerus (right), 1 humerus (left), 1 tibia (right), 1 tibia (left), 1 fibula, 1 scapula (right), 1 jaw (right), 1 jaw (left), 3 plastron, 26 frag.
Apalona sp. (soft-shell turtle)	33,69, 92	16	1	1.6	-	*Ave. live weight*: 3.3 kg Elements: 8 ribs, 8 frag.
Unid. Reptiles		12	-	-	-	
Total Reptiles		69	2	8.4	-	

*MNI= minimum number of individuals *Unid= unidentified species
*NISP= number of identified specimens

Snapping turtle (*Chelydra serpentine*). The snapping turtle was the most common reptile elements found, in feature 33, totaling 41 separate elements that represented one individual. The scapula had three cut marks and was the biggest turtle found at the site, weighing an estimated 30 pounds (or 13.61 kg). The Oneota would have found snapping turtles all year around in various water habitats, such as, muddy lakes, slow-moving rivers, and floodplain marshes between mid-April to October (Stevenson 1985:362). When it turns to June they lay their eggs until July. When winter comes they hibernate in holes found around the bank or in the tunnels created by muskrats. Although, they were mostly likely harvested near the La Crosse floodplain (Stevenson 1985:362).

Soft-shell turtle family (*Apalona* sp.). There were 16 individual elements of soft-shell turtle found, in features 92, 69, and 33 that represented one individual. The soft-shell turtle family is make up of two species found in different regions, the smooth soft-shell (*A. muticus*) that can be located in large, sandy rivers, whereas, the larger spiny soft-shell (*A.spiniferus*) is found in lakes, but mostly muddy or sandy bottoms (Stevenson 1985:363). Though both species are active between May and fall (Stevenson 1985:363). It is hard to tell from bone fragments what species of soft-shell turtle is being exploited but we can tell there were 16 total elements of soft-shell turtle found that represented 2 individuals. They were found in features 92, 69, and 33.

DISCUSSION

The 2012 Tremaine faunal assemblage contained 1052 individual bone elements that were identifiable by class. The assemblage was consistent with other La Crosse area Oneota sites, such as the exploitation and harvesting of turtles, fish, and crawfish from the Mississippi; birds that migrated along the Mississippi valley; deer and elk that roamed in the various adjacent habitats. This shows that the Oneota were fully using all of the habitats offered in the Driftless Area.

Based on the faunal assemblage the Oneota were heavily exploiting fish in comparison to any other species. Mammals had the most unidentifiable elements for NISP (Table 3) but they were the most weathered and very fragmented items in the assemblage that could have made up one element. Whereas, the NISP for unidentifiable fish (Table 2) bones contained the most whole elements, which shows fish to have been the bulk of animals harvested at Tremaine. This can also be seen in the MNI where 53% of fish and 27% of mammals make up the overall minimum number of individual species.

In the assemblage there were only particular portions of deer and elk brought back to Tremaine. Only the 3rd phalanx of the deer and the astragulus of the elk, which are both part of the animals feet or hooves were found. This

is an indication that the Oneota were deboning large mammals such as elk and deer and leaving the rest of the animal at the kill site. There is a speculation that the Oneota moved west in late fall and winter, hunting deer, elk, and bison and only bring back particular parts with them (Theler and Boszhardt 2006:444; 2000:302-303). This idea comes from the lack of any other various portion from these mammals have been found (Theler and Boszhardt 2006:444; 2000:302-303) at Oneota sites, which is evident from the 2012 assemblage at Tremaine.

Although, Seasonality large mammals, such as deer, elk, and bison can be captured year around there is no evidence of bone grease production at Tremaine. Bone grease production occurs when the long bones of large mammals are broken down for the fatty marrow inside and has been a sign of Woodland and Archaic sites that took place during the cold season (Baker 2009:8). With this evidence, Tremaine might not have been heavily occupied during the winter seasons but that is hard to say based on my sample size.

Large amount of fish found in the assemblage shows harvesting between April and August when the Oneota would have exploited wetland resources (Theler and Boszhardt 2006:438). In the spring, there would have been migrating birds that would have been heavily utilized until autumn (Stevenson 1985:46) such as the Canada goose and red-winged black bird. This concludes a heavier occupation of site during the summer season. Overall, we can see that the Oneota were at Tremaine during the spring and summer but because I have such a small sample size I cannot make an exact seasonality of the Tremaine site. Although, I can get a good picture of the animals they were exploiting at Tremaine.

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REFERENCE/ LITERATURE

Boszhardt, Robert

1994a Oneota Archaeology at La Crosse, Wisconsin: Introduction. *The Wisconsin Archaeologist* 75:(3-4) 165-172.

1994b Oneota Group Continuity at La Crosse: The Brice Prairie, Pammel Creek, and Valley View Phases. *The Wisconsin Archeologist* :(3-4) 172-236.

Boszhardt, Robert., Wendy Holtz-Leith, Katherine Stevenson, and James Theler

2011 Data Recovery Results for a portion of 47Lc394, the Sanford Archaeological District, for the Reconstruction of USH 14/16, Jackson to Farnam Streets, in the City of La Crosse, La Crosse County, Wisconsin. Mississippi Valley Archaeology Center at the University of Wisconsin-La Crosse Reports of Investigations No. 705 Volume 1, February 2011.

Baker, Jonathan

2009 Prehistoric Bone Grease Production In Wisconsin's Driftless Area: A Review of the Evidence and Its Implications. Master's thesis, Department of Anthropology, University of Tennessee.

Gallagher, James P., Robert F, Boszhardt, Robert F. Sasso, and Kathrine Stevenson

1985 Oneota Ridged Field Agriculture in Southwestern Wisconsin. *American Antiquity*. (50)3:605-612

Gallagher, James P., and Katherin Stevenson

1982 Oneota Subsistence and Settlement in Southwestern Wisconsin. In Oneota Studies, edited by Guy Gibbon, pp.15-27. Publication in Anthropology 1, University of Minnesota.

Lee, Lyman R
1979 Avaliable Meat From Faunal Remains: A Consideration of Techniques. American Antiquity. (40)3:536-546

O'Gorman, Jodie
1995 *The Tremaine Site Complex: Oneota occupation in the La Crosse Locality, Wisconsin*. *Volume 3: The Tremaine Site (47Lc-95).* Archaeology Research Series No. 1. Museum Archaeology Program, State Historical Society of Wisconsin, Madison, Wisconsin.

Penman, John and Kelly Hamilton
1990 *Prehistoric Sites in La Crosse County, Wisconsin*. Wisconsin Department of Transportion Archaeological Report 17. Madison.

Stevenson, Katherine
1985 *Oneota Subsistence-Related Behavior in the Driftless Area: A Study of the Valley View Site Near La Crosse, Wisconsin*. Ph.D dissertation, Department of Anthropology, University of Wisconsin, Madison. University of Microfilms, Ann Arbor.

Stevenson, Katherine, and James L. Theler
2011 Faunal Remains. Data Recovery Results for a Portion of 47Lc394, the Sanford Archaeological District, for the Reconstruction of USH 14/61, Jackson to Farnam Streets, in the City of La Crosse, La Crosse Country. Wisconsin. Mississippi Valley Archaeology Center at the University of Wisconsin-La Crosse Reports of Investigations 750(1):183-231.

Theler, James
2000 *Animal Remains from Native American Archaeological Sites in Western Wisconsin*. Transactions of the Wisconsin Academy of Sciences, Arts and Letters 88: 121-142.
1994 Oneota Faunal Remains from Seven Sites in the La Crosse, Wisconsin, Area. *The Wisconsin Archaeologist* 75:(3-4) 334-392.
1989 The Pammel Creek Site Faunal Remains. *The Wisconsin Archeologist 70*:(1-2) 157-241.
1987 W*oodland Tradition Economic Strategies: Animal Resource Utilization in Southwestern Wisconsin and Northeastern Iowa*. Report 17. Office of the State Archaeologist, University of Iowa, Iowa City.

Theler, James, and Robert Boszhardt
2003 *Twelve Millennia: Archaeology of the Upper Mississippi River Valley*. University of Iowa Press, Iowa City. Theler, James L., and Kathenne Stevenson 2002 Animal Bones. Gottschall News 18:6-7. Gottschall Rock Art Project, Logan Museum of Anthroplogy, Beloit College, Beloit, Wisconsin.
2000 The End of the Effigy Mound Culture: The Late Woodland to Oneota Transition in Southwestern Wisconsin. Mid-continental Journal of Archaeology 25:289-312.

White, Thomas E.
1953 A method of calculating the dietary percentages of various food animals utilized by aboriginal peoples. *American Antiquity* 18(4):396.