A Report on the Analysis of Faunal Remains from Old Chapel Field (18ST0233)

Report Submitted to:

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Submitted by:

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Introduction

This report presents the analysis and interpretation of faunal remains recovered from the Old Chapel Field site (18ST0233) aboard the Naval Air Station Patuxent River's Webster Field Annex in St. Inigoes, Maryland during the excavations conducted in 2000. The site was occupied from ca. 1637-1660 after Jesuit missionaries purchased the land to raise tobacco and other crops as a means of supporting Jesuit missions throughout the colony. While the site itself was not a Jesuit mission it did serve as the mission's headquarters and St. Inigoes Manor, of which Old Chapel Field was a part, served as the Jesuit mission's headquarters throughout the 17th century and remained a Jesuit holding until 1942 (Chesapeake Archaeology 2009, Diagnostic Artifacts in Maryland 2012). This site, one of the earliest-excavated European sites along the Potomac River, provides important insight into the nature of frontier life in the northern Chesapeake region as well as Jesuit missionary activity and the role that group played in the settlement of Maryland. The faunal remains from Old Chapel field are therefore a unique resource for understanding the diet and economy of the Jesuits in early Maryland, a group that is poorly-represented from an archaeological perspective.

Methods

The assemblage was identified using the comparative zooarchaeological collection at the University of Tennessee, Knoxville. Fragments were identified to the lowest taxonomic level possible. Element, portion, and side of the bone was also recorded and all bone was weighed. Fragments that could not be identified to class were counted and weighed as unidentified. Bone modifications such as butchering marks, rodent and carnivore gnawing, burning, and root etching were also noted in order to better understand taphonomy on the site. Additionally, epiphyseal fusion was recorded for specimens in order to better understand age structure of the assemblage.

The assemblage was then quantified using three standard zooarchaeological measures: number of identified specimens present (NISP), minimum number of individuals (MNI), and biomass.

NISP, number of identified specimens present, is simply a count of fragments. This measure, like all methods for quantifying faunal assemblages has both positive and negative aspects (Grayson 1984). Specifically, NISP has a tendency to be affected by numerous factors, including the ability to identify elements in different animals, laboratory techniques, cultural and natural site formation processes, and recovery methods (Reitz and Wing 1999:192). Despite the biases that come along with these data they are included in the analysis because of their ease of replication and standard use and presentation in zooarchaeological analyses.

MNI, minimum number of individuals, was calculated using the method outlined by White (1953) and taking age of the specimens into consideration, which results in a slightly more accurate estimate. Like NISP, however, this method also has biases that are affected by the same factors (Reitz and Wing 1999:195). In addition, the way in which the data is aggregated in the calculation of MNI can affect the result (Grayson 1984:90-92; Horton 1984:269). First, the entire assemblage, including plow zone and feature contexts, was combined in order to present the entirety of the faunal collection and because the occupation span of the site was relatively short, from about 1637 to 1660. In addition to this, all of the feature contexts were combined and analyzed as a group in order to avoid any possible contamination from unknown later components. These two groupings of the overall assemblage and the feature assemblage were used in the calculation of all of the measures of relative taxonomic abundance as well as skeletal portion analyses and age distributions.

The final method used for the quantification of the faunal remains from 18ST233 is the biomass measure obtained by using the allometric regression formulae described by Reitz and

Wing (1999:72; see also Reitz and Cordier 1983; Reitz et al. 1987). This method relies upon the biological principle that bone weight and meat weight are correlated. In addition, this relationship is the same throughout time; therefore this method of meat weight estimation from bone weight has less potential room for error than other methods (Reitz and Wing 1999:227). However, like MNI, the way in which the units of excavation are grouped can affect the biomass, therefore two biomass calculations were completed, one for the entire assemblage and one for the feature assemblage. Additionally, other concerns with the use of biomass have been raised (Jackson 1989), however it is necessary to employ some form of dietary contribution calculation for species in order to conduct intrasite and intersite comparisons of the relative contribution of species to diet. Biomass appears to be the least biased of the methods available and it has the advantage of being comparable to the useable meat calculations employed in previous large-scale faunal analyses in the Chesapeake (Bowen 1980, 1994, 1996b, 1999; Miller 1984, 1988).

In addition to the measures of taxonomic abundance discussed above, a skeletal part frequency analysis was performed on the collection in order to address questions of taphonomy and preference for certain cuts of meat (Binford 1978; Reitz and Wing 1999:202-221; Klippel 2001). An analysis of skeletal part frequency, based on NISP, was performed where elements were assigned to five categories: head, axial, foot, front quarter, and hind quarter. The archaeological assemblage was then compared to a standard specimen of the same species using percentages. Three species (*Bos taurus* (cow), *Sus scrofa* (pig), and *Odocoileus virginianus* (white-tailed deer)) were analyzed using this method.

Elements were assigned to the skeletal categories as follows. The head category counted the entire skull as one element, the mandible as two, hyoid bones and the teeth. The axial category included the pelvis and all ribs and vertebrae, with the exception of caudal vertebrae.

The foot category consisted of all elements including and below the metacarpals and metatarsals. The hind quarter category was represented by the femur, tibia, and patella. Finally, the front quarter category consisted of the scapula, humerus, radius, and ulna.

Determining the age at death for specimens in faunal collections can be used to address a variety of questions including herd management, specific harvest strategies, seasonality and production (Reitz and Wing 1999:178-179). In general, determining the age for most mammals is done through the examination of tooth eruption, tooth wear, and epiphyseal fusion. For the purposes of this report, only epiphyseal fusion of individual elements was examined for the three large mammals present on the site, *Bos taurus*, *Sus scrofa*, and *Odocoileus virginianus*. These elements included proximal and distal ends of long bones as well as vertebra, pelvis, and calcaneus fragments. The fusion of elements is not as specific as tooth eruption and wear, and often occurs within a time range of a few months and can be affected by various factors (Reitz and Wing 1999:75). For this analysis I relied upon the fusion data generated by Silver (1970), Schmid (1972:75), and Purdue (1983) to age individual specimens. Elements were then placed into one of three distinct age classes: early fusing (generally less than 12 months), middle fusing (generally less than 30 months), and late fusing (less than 35-42 months) after Chaplin (1971: Table 10). The age ranges for these groups in months are only estimates, and as a result of the nature of epiphyseal fusion, it should be realized that the ages are relative and the actual age for a specimen may be slightly older or younger than indicated. However, the three groups do allow specimens to be assigned to either a juvenile, subadult, or adult category, which can be useful in understanding harvest strategies and the multiple uses of livestock.

Taphonomy and Recovery

Prior to the analysis and interpretation of the faunal remains from Old Chapel Field the processes effecting the preservation of organic remains at the site must be addressed. Needless to say, these taphonomic processes can significantly bias the data, and affect what research questions can be asked and how to address them best. In general, bone preservation for this assemblage appears to be average for a collection in the Chesapeake region derived primarily from plow zone. The presence of small and delicate fish and mammal bones indicates that burial conditions were at least somewhat favorable for the preservation of bone. It is likely that the soil at the site was slightly acidic, which tends to be common in Chesapeake plow zones, specifically plow zone in southern Maryland tends to have a pH around 5.3 (Miller 1984:203-205). Additionally, a large proportion of this collection displayed evidence of root etching, which can negatively affect the preservation of bone (Lyman 1994:375-377). Based upon the condition of the faunal remains, preservation bias does appear to be a factor affecting this assemblage, likely resulting in the loss of more delicate fragments. However, without data on the actual soil pH at the site its effect on the preservation of bone is only speculative.

Another taphonomic process affecting the assemblage is plowing, particularly since the majority of the assemblage (79%) was recovered from plow zone. The major effect that plowing has on bone preservation is related to fragmentation. In general, assemblages from plow zone tend to be highly fragmented and tend to have an extremely high proportion of unidentifiable bones (Lyman and O'Brien 1987:495-497). This problem is clearly noted in the Old Chapel Field assemblage when examining bone size. Bone weight was used as a proxy for size and the results are significant to bone identification. The average weight for a bone fragment in the overall assemblage was 0.61g, which is exceedingly small when compared to other collections in the region using similar recovery strategies such as Mattapany (18ST390) and Addison

Plantation (18PR175), which had average fragment sizes of 2.79g and 5.97g, respectively (Table 1). The effects of plowing on bone size can be seen when the plow zone assemblage is compared to the feature assemblage. At Old Chapel Field bone fragments from plow zone contexts averaged .51g while fragments recovered from feature contexts average .99g, almost twice as large. These low weights indicate that the assemblage was highly fragmented, probably due to both pre-depositional and post-depositional processes such as butchery practices and plowing. As a result of the small fragment size on the site, a large proportion of the bones (54%) were unidentifiable even to class.

	18ST233 Overall	**18ST233 Plow zone**	**18ST233 Features**
Avg. frag. weight (g)	0.61	0.51	0.99
Avg. ID to at least family frag. weight (g)	3.1	2.3	4.57
Avg. UID frag. weight (g)	0.32	0.34	0.24

Table 1: Table Comparing Bone Fragment Size in Different Contexts at 18ST233.

Heat alteration has the potential to significantly impact the analysis of faunal remains on a site. Burning usually occurs at temperatures up to 500°C and alters bone by removing the organic material; it generally changes the color of the bone to brown or black. Calcining of bone occurs at temperatures over 500°C and can shrink the bone and make it more brittle and prone to fragmentation; it usually changes the color of the bone to white or blue-gray (Lyman 1994:384-392; Reitz and Wing 1999:133). Of the 2,966 bone fragments recovered from entire site 467, or roughly 16%, showed evidence of heat alteration (Figure 1). One hundred and forty-one fragments were burned and 326 fragments were calcined. Of the 628 bone fragments recovered from features 103, or roughly 16%, were heat altered with 27 being burned and 76 being calcined (Figure 2). Clearly, heat alteration does not play a significant role in the analysis of this collection and does not differ greatly between plowzone and features.

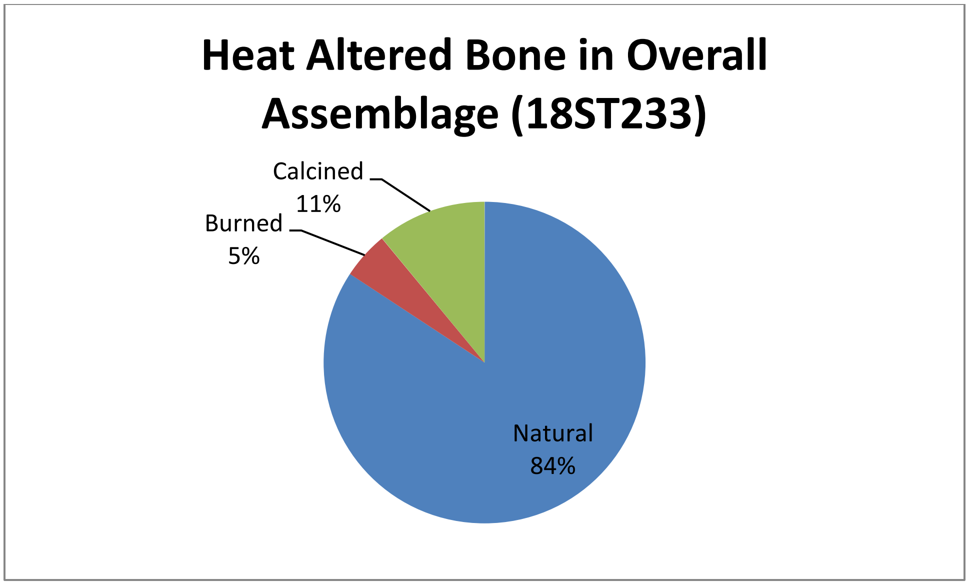

Figure 1: Chart Showing Proportions of Heat Alteration for the Overall Assemblage.

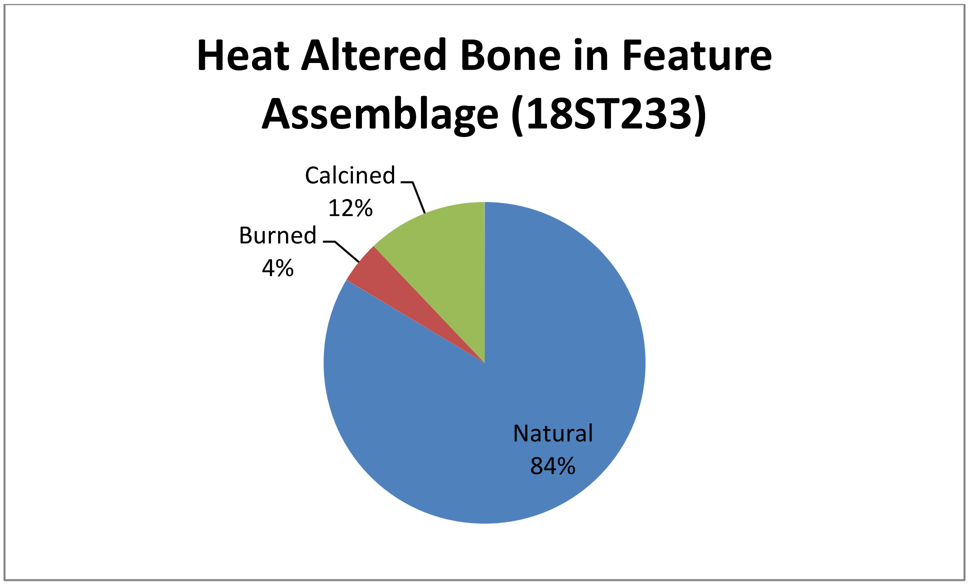

Figure 2: Chart Showing Proportions of Heat Alteration for the Feature Assemblage.

Recovery strategy is exceedingly important in the analysis of any faunal collection, particularly in terms of the diversity of the assemblage and the number of identifiable fragments. All soils on this site were dry-screened through ¼" mesh (Chesapeake Archaeology 2009). While ¼" dry-screening does not capture the smallest bone fragments, such as small fish, bird, and mammal bones, it does serve to recover the majority of the larger species. As such, the recovery methods using during the excavations at Old Chapel Field should allow for a relatively unbiased representation of larger animal species such as *Bos taurus*, *Gallus gallus* (chicken), or *Archosargus probatocephalus* (sheepshead). However, smaller species, which tend to be composed primarily of fish and birds, will likely be underrepresented in this assemblage. Despite this, the Old Chapel Field assemblage does contain some specimens from smaller species such as *Scalopus aquaticus* (Eastern mole), *Morone americanus* (white perch), and *Perca flavescens* (yellow perch). When fragment size, as represented by weight, is compared to a site that was not screened, the differences in recovery stand out. The Hallowes site (44WM6), which was not screened, had an average fragment weight of 2.25g, while the average weight for a fragment at Old Chapel Field was 0.61g (Hatch, McMillan, and Heath 2013). Clearly, ¼” screening is preferable to no screening at all and will generally better represent the diversity of a faunal assemblage.

Overall Results

The faunal assemblage from Old Chapel Field consisted of 2,966 fragments, 2,338 (79%) of which were recovered from plow zone, with the remaining 628 fragments recovered from feature contexts. For the purposes of this section of the report all of the faunal remains will be combined regardless of their context and the results of their analysis will be presented (Table 2). The next section of the report will focus on the feature assemblage in order to determine if and how it differs from the overall site assemblage.

Taxa	NISP	%	MNI	%	Weight (g)	%	Biomass (kg)	%
<u>*Mammalia*</u>								
Bos taurus	18	0.61%	1	6.67%	182.9	10.07%	2.86	13.10%
Sus scrofa	42	1.42%	2	13.33%	174.15	9.59%	2.73	12.50%
Cf. *Sus Scrofa*	3	0.10%			5.5	0.30%	0.12	0.55%
Odocoileus virginianus	32	1.08%	2	13.33%	239.5	13.18%	3.64	16.67%
Cf. *Odocoileus virginianus*	9	0.30%			27.7	1.52%	0.52	2.38%
Marmota monax	1	0.03%	1	6.67%	1.1	0.06%	0.03	0.14%
Scalopus aquaticus	2	0.07%	2	13.33%	0.5	0.03%	0.01	0.05%
Peromyscus	1	0.03%	1	6.67%	0.05	0.00%	0.001	0.00%
Microtus sp.	2	0.07%	2	13.33%	0.1	0.01%	0.003	0.01%
Artiodactyla	125	4.21%			276.9	15.24%	4.15	19.00%
UID *Mammalia*	753	25.39%			437.85	24.10%	6.27	28.71%
<u>*Aves*</u>								
Gallus gallus	5	0.17%	1	6.67%	0.95	0.05%	0.02	0.09%
Cf. *Gallus gallus*	4	0.13%			0.9	0.05%	0.02	0.09%
UID *Aves*	4	0.13%			0.9	0.05%	0.02	0.09%
<u>*Osteichthyes*</u>								
Cf. *Acipenser sp.*	2	0.07%	1	6.67%	0.7	0.04%	0.02	0.09%
Archosargus probatocephalus	45	1.52%	5	33.33%	47.5	2.61%	0.55	2.52%
Cf. *Archosargus probatocephalus*	2	0.07%			3	0.17%	0.04	0.18%
Lepisosteus osseus	6	0.20%	1	6.67%	0.5	0.03%	0.02	0.09%
Morone americanus	2	0.07%	1	6.67%	0.1	0.01%	0.004	0.02%
Cf. *Perca flavescens*	1	0.03%	1	6.67%	0.05	0.00%	0.002	0.01%
UID *Osteichthyes*	308	10.38%			56.4	3.10%	0.77	3.53%
<u>*Reptilia*</u>								
Testudines	6	0.20%	1	6.67%	1.4	0.08%	0.04	0.18%
<u>*Amphibia*</u>								
Anura	3	0.10%	1	6.67%	0.5	0.03%		
<u>UID</u>								
UID	1590	53.61%			357.45	19.68%		
Total	**2966**		**15**		**1816.6**		**21.84**	

Table 2: Table Showing Taxonomic Abundance Measures for the Overall Faunal Assemblage at 18ST233.

The analysis of the faunal remains from all contexts on the site revealed that the top five most abundant species, based upon NISP, were *Archosargus probatocephalus*, *Sus scrofa*, *Odocoileus virginianus*, *Bos taurus*, and *Lepisosteus osseus* (longnose gar). The MNI calculation revealed a total of at least 15 individuals represented in the assemblage. The most abundant species, based upon MNI were *Archosargus probatocephalus*, *Sus scrofa*, *Odocoileus virginianus*, *Scalopus aquaticus*, and *Microtus sp.* (vole). The biomass calculation showed *Odocoileus virginianus*, *Bos taurus*, *Sus scrofa*, *Archosargus probatocephalus*, and *Gallus gallus* to be the top species contributing to diet on the site. Clearly, these three different measures of taxonomic abundance show some variation in terms of the most important dietary contributors in the assemblage. However, it should be noted that, in general *Odocoileus virginianus*, *Sus scrofa*, *Bos taurus*, and *Archosargus probatocephalus* appear to be the primary sources of meat based upon all of the taxonomic abundance measures. As discussed above, all three of these measures have advantages and disadvantages stemming from aggregation, post-depositional processes, and variation in calculation. Therefore, while all of these data are presented, the following discussions will rely mainly on biomass when addressing dietary contribution as it is one of the least biased measures of the three.

At least 15 distinct species were identified in the faunal assemblage from Old Chapel Field. However, as many as five of these species are commensal meaning that inhabitants of the site would likely have not eaten them and that their presence in the assemblage probably results from natural processes. From the overall analysis of the faunal assemblage it appears that residents of the site relied primarily upon venison, beef, and pork for their meat diet, with fish, particularly sheepshead, as an important supplement. Indeed, venison, beef, and pork account almost 87% of the total biomass if unidentified and commensal species are removed. It should be noted that domestic species account for 51% of the total biomass, while wild species account for the remaining 49%. Most of the wild biomass stems from the venison represented in the collection, but at least five fish species and turtle also contribute to non-domestic biomass. The composition of the wild assemblage indicates that the occupants of the site took advantage of the available local resources, particularly fish in the nearby Potomac River. The heavy reliance on wild game may also indicate that domestic species had difficulty adapting to the Chesapeake frontier, causing the site occupants to more heavily supplement their diets with wild game.

A skeletal part frequency analysis for the entire assemblage was performed for identified fragments from *Bos taurus*, *Sus scrofa*, and *Odocoileus virginianus*. As explained above, this analysis quantified fragments from different portions of the skeleton and compared their occurrence on the site with what should be expected from a typical specimen. The skeletal part frequency analysis for *Bos taurus* showed that only head and axial portions of this species occurred on the site, in the form of teeth, vertebra, and rib fragments (Table 3). This pattern is very odd and is likely a function of taphonomic processes at the site rather than a reflection of cultural processes. While *Bos taurus* ribs and vertebrae are relatively less dense than other portions of the skeleton they are readily identifiable even in a fragmented state due to their drastically different size when compared to the other species on the site. Therefore, it is likely that other portions of this species were present on the site, but have become too fragmented to identify with any certainty and were placed in the *Artiodactyla* category. Additionally, there were only 18 fragments used in this analysis, which is, by no means, a statistically robust sample size.

Bos taurus	**Head**	**Foot**	**Axial**	**Front Quarter**	**Hind Quarter**
Observed Count	7	0	11	0	0
Observed %	39%	0%	61%	0%	0%
Expected %	21%	37%	36%	4%	3%

Table 3: Table Showing Skeletal Part Frequency for *Bos taurus* in the Overall Assemblage.

The analysis for *Sus scrofa* revealed significantly higher than expected proportions of head and front quarter portions with significantly lower than expected foot portions (Table 4). The higher than expected proportion of head fragments is not entirely unexpected due to the fact that *Sus scrofa* teeth are not only numerous in an individual, but also easily identifiable and resistant to degradation due to their structure. The lack of foot parts in this assemblage is also unexpected for the same preservation reasons. In general, *Sus scrofa* foot portions are dense and resistant to decay. While some of these patterns may result from human behavior, others may be a function of sample size, which consisted of 45 fragments and may not be quite large enough to accurately represent what was happening at the site. Finally, the analysis of skeletal parts from *Odocoileus virginianus* also has a relatively small sample of 41 fragments (Table 5). Nevertheless, the skeletal portion analysis revealed that all portions were represented with a significantly high proportion of hind quarter parts. Hind quarter portions were almost ten times more than what should be expected, and, while the sample is small, this may indicate a cultural preference due to the strength of the variation.

Sus scrofa	**Head**	**Foot**	**Axial**	**Front Quarter**	**Hind Quarter**
Observed Count	24	6	6	7	2
Observed %	53%	13%	13%	16%	4%
Expected %	21%	50%	24%	3%	2%

Table 4: Table Showing Skeletal Part Frequency for *Sus scrofa* in the Overall Assemblage.

Odocoileus virginianus	**Head**	**Foot**	**Axial**	**Front Quarter**	**Hind Quarter**
Observed Count	11	11	5	3	11
Observed %	27%	27%	12%	7%	27%
Expected %	19%	44%	31%	3%	3%

Table 5: Table Showing Skeletal Part Frequency for *Odocoileus virginianus* in the Overall Assemblage.

An age distribution analysis for the entire assemblage was also performed for identified fragments from *Bos taurus*, *Sus scrofa*, and *Odocoileus virginianus*. As noted above, this analysis relied on epiphyseal fusion data generated for these three species and placed elements in one of three categories, early, middle, and late fusing. While this method is not as precise as aging based upon tooth wear patterns, it does allow elements to be defined as juvenile, sub-adult, or adult, which can be very useful in helping to determine age at death and, by extension, differing uses for animals. Age distribution analysis for *Bos taurus* revealed that the assemblage for this species was composed primarily of adult animals, but that a significant proportion was from a younger age class, whether sub-adult or juvenile (Table 6 and Table 7). However, because of the problems with element distributions noted for *Bos taurus* above and a small sample size of five, this analysis is likely not reflective of the cattle her as a whole on the site. Indeed, the only elements that were able to be aged for cattle were vertebrae, which are the latest-fusing elements in that species, resulting in skewed results.

Bos taurus, n=5	**Early**	**Middle**	**Late**
% Fused	0%	0%	40%
% Unfused	0%	0%	60%

Table 6: Table Showing Age Distribution for *Bos taurus* in the Overall Assemblage.

Element	**Fused**	**Unfused**	**Age at Fusion**
Vertebral Centrum	2	3	84-108

Table 7: Table Showing Elements Used in Age Distribution Analysis for *Bos taurus* in the Overall Assemblage.

The age distribution analysis for *Sus scrofa* showed that no juveniles were represented in the assemblage and that the majority were likely sub-adults (Table 8 and Table 9). Out of a total of nine elements that could be aged, only one could be placed in the late-fusing, or adult, category. While the fused early stage elements and the unfused late stage elements could be related to adults or juveniles, respectively, based upon the composition of the remainder of the assemblage it is likely that they are related to sub-adult specimens. However, like the age distribution analysis for *Bos taurus*, the sample size for *Sus scrofa* was small and the results should be viewed as suggestive rather than conclusive. The age distribution analysis for *Odocoileus virginianus* revealed that no juveniles were present and that a large proportion of the assemblage was likely adult animals (Table 10 and Table 11). Again, however, the sample size was small, consisting of only seven fragments that could be aged.

Sus scrofa, n=9	**Early**	**Middle**	**Late**
% Fused	44%	0%	11%
% Unfused	0%	0%	44%

Table 8: Table Showing Age Distribution for *Sus scrofa* in the Overall Assemblage.

Element	**Fused**	**Unfused**	**Age at Fusion**
Proximal Femur		2	32
Distal Humerus	3		12-18
Proximal Humerus		1	42
Vertebral Centrum	1	1	48-84
Proximal Metacarpal	1		Fused before birth

Table 9: Table Showing Elements Used in Age Distribution Analysis of *Sus scrofa* in the Overall Assemblage.

Odocoileus virginianus, n=7	**Early**	**Middle**	**Late**
% Fused	29%	14%	43%
% Unfused	0%	0%	14%

Table 10: Table Showing Age Distribution for *Odocoileus virginianus* in the Overall Assemblage.

Element	**Fused**	**Unfused**	**Age at Fusion**
Proximal Femur	1		32-42
Distal Femur		1	26-42
Distal Humerus	2		12-20
Distal Metacarpal	1		Fused before birth
Acetabulum	1		8-11
Distal Tibia	1		20-23

Table 11: Table Showing Elements Used in Age Distribution Analysis of *Odocoileus virginianus* in the Overall Assemblage.

Feature Results

The faunal assemblage from feature contexts at Old Chapel Field consisted of 628 fragments. For the purposes of this section of the report only the faunal remains recovered from feature contexts will be examined and the results of their analysis will be presented. By examining only feature contexts it is possible to obtain a higher degree of temporal resolution with reference to the faunal assemblage. However, due to the short occupation span of the site, only about 20 years, this may not be possible or entirely necessary. Nevertheless, previous studies of faunal assemblages from the Potomac River region have relied on feature assemblages, and as such, this will allow this analysis to be more comparable to those in terms of archaeological contexts (Miller 1984).

Taxa	**NISP**	**%**	**MNI**	**%**	**Weight (g)**	**%**	**Biomass (kg)**	**%**
<u>*Mammalia*</u>								
Bos taurus	10	1.59%	1	9.09%	149.9	23.95%	2.39	24.85%
Sus scrofa	18	2.87%	1	9.09%	131.95	21.08%	2.13	22.15%
Cf. *Sus Scrofa*	1	0.16%			0.1	0.02%	0.003	0.03%
Odocoileus virginianus	11	1.75%	2	18.18%	111.7	17.85%	1.83	19.03%
Cf. *Odocoileus virginianus*	2	0.32%			6.7	1.07%	0.15	1.56%
Artiodactyla	39	6.21%			77.6	12.40%	1.32	13.72%
UID *Mammalia*	142	22.61%			61.4	9.81%	1.07	11.12%
<u>*Aves*</u>								
Gallus gallus	1	0.16%	1	9.09%	0.1	0.02%	0.003	0.03%
Cf. *Gallus gallus*	3	0.48%			0.6	0.10%	0.01	0.10%
<u>*Osteichthyes*</u>								
Cf. *Acipenser sp.*	1	0.16%	1	9.09%	0.5	0.08%	0.02	0.21%
Archosargus probatocephalus	17	2.71%	2	18.18%	22.5	3.59%	0.28	2.91%
Lepisosteus osseus	5	0.80%	1	9.09%	0.45	0.07%	0.02	0.21%
Cf. *Perca flavescens*	1	0.16%	1	9.09%	0.05	0.01%	0.002	0.02%
UID *Osteichthyes*	165	26.27%			23.7	3.79%	0.38	3.95%
<u>*Reptilia*</u>								
Testudines	1	0.16%	1	9.09%	0.3	0.05%	0.01	0.10%
<u>UID</u>								
UID	211	33.60%			38.35	6.13%		
Total	**628**		**11**		**625.9**		**9.618**	

Table 12: Table Showing Taxonomic Abundance Measure for the Feature Assemblage at 18ST233.

The analysis of the faunal remains from feature contexts on the site revealed that the top five most abundant species, based upon NISP, were *Sus scrofa, Archosargus probatocephalus, Odocoileus virginianus, Bos taurus,* and *Lepisosteus osseus* (longnose gar). The MNI calculation revealed a total of at least 11 individuals represented in the assemblage. The most abundant species, based upon MNI were *Archosargus probatocephalus* and *Odocoileus virginianus* with the remaining species represented by only one individual. The biomass calculation showed *Bos taurus, Sus scrofa, Odocoileus virginianus,* and *Archosargus probatocephalus* to be the top species contributing to diet on the site. These three different measures of taxonomic abundance show some variation in terms of the most important dietary contributors in the assemblage. However, it should be noted that, in general *Odocoileus virginianus, Sus scrofa*, *Bos taurus,* and *Archosargus probatocephalus* appear to be the primary sources of meat based upon all of the taxonomic abundance measures. This pattern is almost identical to that seen in the overall assemblage, indicating that, in terms of taxonomic abundance, there is little difference between the two assemblage types. Like the overall analysis, the following discussions will rely mainly on biomass when addressing dietary contribution as it is one of the least biased measures of the three.

At least 9 distinct species were identified in the feature faunal assemblage from Old Chapel Field. In general, it would seem that the feature assemblage is less diverse, and technically, it is. However, the species missing from the feature assemblage are primarily what would be considered commensal species or those that ended up in the assemblage through natural processes, such as burrowing and dying. Therefore, the change in diversity has little bearing on the interpretation of diet at the site. From the analysis of this assemblage it appears that residents of the site relied primarily upon beef, pork, and venison for their meat diet, with fish, particularly sheepshead, as an important supplement. Indeed, beef, pork, and venison account for almost 90% of the total biomass if unidentified and commensal species are removed. It should be noted that domestic species account for 63% of the total biomass, while wild species account for the remaining 37%. Most of the wild biomass stems from the venison represented in the collection, but at least four fish species and turtle also contribute to non-domestic biomass. While the reliance on wildlife is slightly less in this assemblage than in the overall collection, 37% is still a very high proportion of wild meat and likely related to the frontier adaptations occurring along the Potomac River in the mid-17th century.

A skeletal part frequency analysis for the feature assemblage was performed for identified fragments from *Bos taurus*, *Sus scrofa*, and *Odocoileus virginianus*. As explained above, this analysis quantified fragments from different portions of the skeleton and compared their occurrence on the site with what should be expected from a typical specimen. The skeletal part frequency analysis for *Bos taurus* showed that only axial portions of this species occurred in the features, in the form of vertebrae and rib fragments (Table 13). This pattern likely stems from the extremely small sample size of 10 and, like the skeletal portion analysis for the overall assemblage, should not be seen as representative of cultural processes.

Bos taurus	**Head**	**Foot**	**Axial**	**Front Quarter**	**Hind Quarter**
Observed Count	0	0	10	0	0
Observed %	0%	0%	100%	0%	0%
Expected %	21%	37%	36%	4%	3%

Table 13: Table Showing Skeletal Part Frequency for *Bos taurus* in the Feature Assemblage.

The analysis for *Sus scrofa* revealed significantly higher than expected proportions of head and front quarter portions with no foot portions (Table 14). The higher than expected proportion of head fragments is not entirely unexpected, as discussed in the previous section. The lack of foot parts in this assemblage is also unexpected for the same preservation reasons. Again, however, a small sample of only 19 fragments is likely the main reason for the patterns seen in the skeletal portion analysis. Finally, the analysis of skeletal parts from *Odocoileus virginianus* also has a small sample of 12 fragments (Table 15). Nevertheless, the skeletal portion analysis revealed that all portions were represented with a significantly high proportion of hind quarter parts, generally mirroring the results of the overall assemblage.

Sus scrofa	**Head**	**Foot**	**Axial**	**Front Quarter**	**Hind Quarter**
Observed Count	9	0	4	5	1
Observed %	47%	0%	21%	26%	5%
Expected %	21%	50%	24%	3%	2%

Table 14: Table Showing Skeletal Part Frequency for *Sus scrofa* in the Feature Assemblage.

Odocoileus virginianus	**Head**	**Foot**	**Axial**	**Front Quarter**	**Hind Quarter**
Observed Count	2	2	4	1	3
Observed %	17%	17%	33%	8%	25%
Expected %	19%	44%	31%	3%	3%

Table 15: Table Showing Skeletal Part Frequency for *Odocoileus virginianus* in the Feature Assemblage.

An age distribution analysis for the feature assemblage was also performed for identified fragments from *Bos taurus*, *Sus scrofa*, and *Odocoileus virginianus*. While the results of this analysis generally mirrored those of the overall analysis for all three species, the sample sizes were significantly smaller with four *Bos taurus* fragments, six *Sus scrofa* fragments, and only two *Odocoileus virginianus* fragments. Tables summarizing this data have been provided, but its interpretation remains the as the overall age distribution analysis, with the added caveat that the sample sizes are much smaller and, likely, less reliable (Table 16-Table 21).

Bos taurus, n=4	**Early**	**Middle**	**Late**
% Fused	0%	0%	50%
% Unfused	0%	0%	50%

Table 16: Table Showing Age Distribution for *Bos taurus* in the Feature Assemblage.

Element	**Fused**	**Unfused**	**Age at Fusion**
Vertebral Centrum	2	2	84-108

Table 17: Table Showing Elements Used in Age Distribution Analysis of *Bos taurus* in the Feature Assemblage.

Sus scrofa, n=6	**Early**	**Middle**	**Late**
% Fused	17%	0%	17%
% Unfused	0%	0%	67%

Table 18: Table Showing Age Distribution for *Sus scrofa* in the Feature Assemblage.

Element	**Fused**	**Unfused**	**Age at Fusion**
Proximal Femur		2	32
Distal Humerus	1		12-18

Proximal Humerus		1	42
Vertebral Centrum	1	1	48-84

Table 19: Table Showing Elements Used in Age Distribution Analysis of *Sus scrofa* in the Feature Assemblage.

Odocoileus virginianus, n=2	**Early**	**Middle**	**Late**
% Fused	50%	50%	0%
% Unfused	0%	0%	0%

Table 20: Table Showing Age Distribution for *Odocoileus virginianus* in the Feature Assemblage.

Element	**Fused**	**Unfused**	**Age at Fusion**
Acetabulum	1		8-11
Distal Tibia	1		20-23

Table 21: Table Showing Elements Used in Age Distribution Analysis of Odocoileus virginianus in the Feature Assemblage.

Discussion

While the overall faunal assemblage and the feature assemblage do show some differences in terms of taxonomic abundance, the variation is slight and likely only a reflection of aggregation techniques and taphonomy rather than cultural behavior. Indeed, the occupation span of the site is so short that the separate analysis of features only serves to ensure that there is no contamination from possible later occupations. However, the results change very little between the two assemblages, likely indicating that there is no contamination. In a general sense, both assemblages are highly typical of mid-17th-century faunal assemblages due to their relatively high reliance on pork and beef, coupled with a strong presence of wild species, 37% to 49%, depending upon which assemblage is examined (Miller 1984:283-300; 1988:181-186; Bowen 1996b:95-97).

On average, sites dating from the 1620-1660 period in the Chesapeake regions contain 44% beef, 24% pork, and 17% venison, with up to 40% of the meat on the site coming from wild species (Miller 1984:294; Bowen 1996b:96). The Old Chapel Field assemblage generally fits this pattern, but shows an increased amount of pork and, particularly, venison, based upon biomass measurements. Venison accounts for between 25% and 32% of the edible biomass at Old Chapel Field, indicating that deer played a significant role in feeding the people who lived at the site.

The other major wild contributors to diet at the site were fish, which accounted for between 10% and 12% of the total edible biomass. The amount of fish present on the site is typical for an occupation from this early period, and the major species present, sheepshead, was a favorite of the early Chesapeake colonists (Miller 1984:294; 1988:184).

The presence of the variety of fish species at this site, including sheepshead, longnose gar, white perch, and sturgeon can be attributed to the site's location near the mouth of the St. Mary's River. The high salinity of the water in this area acts as the perfect environment for these species, which were reportedly easy to harvest and plentiful during the 17^{th} century (Miller 1984:184). During the course of his dissertation, Henry Miller found that proximity to water played a large role in the amount and types of fish present on sites during the 17^{th} century (Miller 1984:333-340). The fish species and high reliance on fish in general at Old Chapel Field correspond with Miller's findings for sites in the Potomac River region, which showed a strong preference for large marine species, such as sheepshead.

The high proportion of venison at this site is likely more complex in terms of its explanation. First, the environment certainly played a large role in the availability of deer as a resource for exploitation. In 1637, when the Old Chapel Field site was first settled, English settlement in Maryland did not extend far beyond the immediate vicinity of St. Mary's City. As a result, the population of deer in the region, particularly away from the settlement at St. Mary's, was likely either very lightly or completely unaffected by the pressures of English settlement.

The frontier environment encountered by the first settlers at the site may have also made it difficult to rely heavily on cattle or swine, which would have been free to roam the countryside and likely fell prey to predators and harsh environmental conditions or became mired in swamps and died with higher frequency than livestock in a more controlled setting (Anderson 2004). In situations like this, venison, in addition to other wild species, would have acted as an important resource to make up for these losses in the domestic herds around the site. Two sites from the Potomac region that have similarly high percentages of venison help to support this conclusion. The useable meat from the Phase I assemblage at St. John's (1638-1660) contained 31% venison, while the assemblage from Pope's Fort (1645-1655) contained 22% venison (Miller 1984:398-399). Miller concluded that both sites contained such high percentages of venison because of uncertainty about the unfamiliar frontier environment (Miller 1984:333-371).

Another factor that needs to be considered in addressing the high proportion of venison in the assemblage is the possibility of trade with Native Americans at the site. Archaeologists and historians working in the Chesapeake have long recognized the importance of intercultural trade during the 17th century, particularly with regard to food, in some cases venison (Miller 1984:349-351; Mouer: 1993:115; Bowen 1996a:30; Anderson 2004:222; Lapham 2005; LaCombe 2012:70-71; Hatch [2014]). The likelihood that at least a portion of the venison present on the site arrived by way of trade with Native Americans is high. However, determining this with any certainty is difficult with only the faunal remains. Examining skeletal portions present on the site in addition to the mortality profile has proven useful for this purpose on other sites (Lapham 2005:77-104; Hatch [2014]).

In this case, all part categories for deer are present and only the hind quarter portion is significantly different from the expected proportions. The mortality profile indicates that no juveniles were present on site and that it is likely that only adult specimens are represented. The presence of all part categories for deer on the site indicates that they arrived at the site complete and were processed there. The high proportion of hind quarter parts may either indicate a preference for that particular section, or the transportation of quarters to the site independent of the rest of the carcass. Additionally, the high proportion of hind quarters may also be a result of taphonomic processes favoring dense elements, some of which occur in the hind quarter portion. The absence of juveniles at the site clearly indicates a preference for larger, more mature, animals, but this may also be due to taphonomic processes. Overall, small sample size, taphonomy, and lack of a distinct pattern of carcass transport and preference make it difficult to determine with any certainty if the venison on the site derived from Anglo-Indian trade or hunting by the colonists. However, previous research, and common sense, dictates that some of this meat almost certainly derived from cross-cultural interactions.

The pattern of edible domestic biomass at the site shows that beef is significantly lower than expected, particularly when compared to pork. In general, the amount of biomass derived from cattle and swine are roughly the same, whereas previous studies of Chesapeake subsistence for the 1620-1660 period have shown cattle to account for almost twice the amount of biomass compared to swine (Miller 1984:294; Bowen 1996b:97). Like the heavy reliance on venison, the low proportion of beef may be indicative of the environment in which the first settlers at Old Chapel Field found themselves. While cows are relatively hardy and were often left to roam the woods during the 17th century, they have a tendency to be more negatively impacted by harsh environmental conditions and predators than pigs because of their slower rate of reproduction (Miller 1984:344-345; Anderson 2004:97-104). The relative isolation of Old Chapel field early in its settlement may have made it difficult for cattle to survive in large numbers. Additionally, cattle from this site may have been sold or moved to other parts of Maryland, either on the hoof or in barrels, since the site acted as a farm supporting Jesuit missions elsewhere in the colony (Diagnostic Artifacts in Maryland 2012). It is also possible that local Indians contributed to thinning the cattle herd around Old Chapel Field through the hunting of cows, which was a common occurrence in the 17th century in both the Chesapeake and New England (Anderson 2004:188-190).

Skeletal part frequencies and mortality profiles for the cattle at the site provide little in the way of evidence as to why beef seems to be underrepresented in this assemblage. For both analyses the sample sizes are extremely small, consisting of only tooth, rib, and vertebra fragments. Age data suggests that all of the specimens in this assemblage are sub-adults or adults, but vertebrae were the only elements used in the analysis, meaning that the conclusions are too biased to be of use. Based upon the composition of the cow assemblage, it is likely that taphonomic processes and small sample size have heavily affected these bones, which may help to explain why the biomass contribution of beef is so much lower than expected.

The contribution of pork to the edible biomass on site, however, conforms to expectations for that species in the 1620-1660 period in the Chesapeake, around 25% (Miller 1984:294; Bowen 1996b:97). Swine played an important role in the diet of early Chesapeake settlers due to the animals' self-sufficiency and rapid rate of reproduction. In general, during this early period, swine were either left in the woods to roam and fend for themselves or kept on necks of land, which caused them to become semi-feral. Additionally, pork was easier to preserve than beef through salting, allowing it to be a source of meat that could feed colonists year-round (Bowen 1996b:103-106). Another advantage of its easy preservation was that pork could be barreled and traded within the community or colony or it could be shipped to other parts of the Atlantic World, thereby providing a plantation with an extra source of income (Carr, Menard, and Walsh 1991:217-239).

While skeletal portion analysis would be a good method to help understand whether pork was barreled on the site, the sample is quite small and appears to suffer from taphonomic bias. If pigs were being slaughtered and preserved on site then traded, one might expect to see a very high proportion of butchery waste (head and foot portions) and lower proportions of meaty elements. If this pattern coincided with a pattern for cow that showed all skeletal portions in an expected range of occurrence then it might be argued that the pattern seen in swine remains on the site resulted from barreling and trading pork. However, at Old Chapel Field, the primary pattern seen in swine skeletal portions shows head portions to be much higher and foot portions to be much lower than expected. This likely stems from the fact that pig teeth make up the majority of not only the head assemblage, but of the entire pig assemblage. Pig teeth are generally well-represented on archaeological sites because of their density and resistance to decay as well as their ease of identification. Therefore, based upon these factors, it appears that the skeletal portion analysis for swine, like cattle, is biased by post-depositional processes and a relatively small sample size. As such, any interpretations drawn from this analysis should not be seen as definitive.

Age data for pigs show that the majority of the animals within the Old Chapel Field assemblage were slaughtered prior to 4 years old, and likely long before that. Again, these sample sizes are very small, but do serve to demonstrate that primarily sub-adult animals were being slaughtered at the site, which is slightly older than the traditional slaughtering ages for pigs of approximately 4 months to one year old. These semi-feral swine would probably have grown less quickly than swine raised in farmyard pens and fed a fattening diet. As such, it probably took slightly longer for Chesapeake swine to reach an appropriate weight for harvest, helping to explain the slightly older ages for the specimens in this assemblage. Nevertheless, due to the fact that only one element could be assigned to the greater than 48 month age group, there is evidence that the inhabitants of Old Chapel Field attempted to avoid harvesting old animals.

Conclusions

Overall, the faunal assemblage from Old Chapel Field conforms to patterns recognized at previously-analyzed sites dating from 1620-1660. Reliance on domestic mammals, primarily cows and pigs, combined with a heavy supplement of wild game, deer and fish, has been noted at sites from this time period and are clearly seen at Old Chapel Field (Miller 1984, 1988; Bowen 1996b). Slight variation in this assemblage, in terms of a higher proportion of deer biomass and lower proportion of cow biomass, likely reflect environmental conditions that colonists encountered at this site upon its settlement. The unsettled Chesapeake frontier, which Old Chapel Field was part of during its early years, was an uncertain place that required adaptation and innovation on the part of colonists. A heavier reliance on deer was probably a reaction to a cattle herd decreased by environmental challenges and predation, in addition to trade with local Native Americans.

The environment also affected diet at the site by providing a bounty of easily-acquired fish. The location of Old Chapel Field near the mouth of the St. Mary's River provided its inhabitants with easy access to large marine fish species such as sheepshead. Consequently, the people living at the site took full advantage of these large marine resources that required relatively little energy expenditure, as did other colonists living in similar environments (Miller 1988:184). Being bottom-dwellers, for the most part, the fish at Old Chapel Field were likely caught using hook and line, which would have allowed the people at the site to perform other tasks while the lines sat baited. The ability to not have to constantly monitor the baited lines would have been especially important at this site since it acted as a major support center for Jesuit missions in Maryland. Jesuits in Maryland relied upon the monetary, and perhaps dietary, support from this plantation through the growing of tobacco and other crops, as well as the raising of livestock. The type of fishing techniques required to harvest sheepshead and other marine species would not have significantly detracted from farm labor, and thus allowed for more profit potential.

While it is likely that some venison was being brought to the site through Anglo-Indian trade and some pork, and perhaps even beef, was leaving the site through trading networks, small sample sizes have ruled out the validity of the analyses to test these assumptions. Indeed, the Old Chapel Field assemblage has several problems that make any interpretations of its faunal assemblage less than definitive. First, as noted above, is small sample size. Small samples were constants for all skeletal part analyses and age distribution analyses. As such, these important data can only be seen as impressionistic. Perhaps more important than small samples is the fact that taphonomic processes have proven detrimental to the assemblage. Root etching had a heavy impact on this collection and was noticed in most contexts. Additionally, plowing has no doubt aided in the destruction and fragmentation of elements to the point where they become unidentifiable. Finally, soil acidity, which is likely high at this site like other sites in the St. Mary's City area, certainly played a role in destroying bone over the past nearly four centuries.

Despite the problems with this assemblage, it is still one of the earliest European faunal assemblages in the Potomac Valley and one of the few archaeological windows into diet and plantation economy from that time and place. The fact that it is associated with the Jesuit settlement in Maryland makes it even more unique and deserving of scrutiny in order to better understand the role that this particular group played in the settlement of the Maryland Colony. Even though this faunal assemblage has not answered every question about diet and life at Old Chapel Field, it has raised some important issues that can be further examined through the analysis of other forms of material culture on the site and their combination with the faunal data.

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