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Technical Report
Volume V of VI

ARCHAEOLOGICAL DATA RECOVERY, ROBINSON TERMINAL SOUTH, SITE 44AX0235 ALEXANDRIA, VIRGINIA

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Archaeological Data Recovery, Robinson Terminal South, Site 44AX0235 Alexandria, Virginia

Volume V of VI

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Technical Report

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Chapter 1
Introduction

Volume V of the Robinson Terminal South (RTS) report series addresses several of the research questions that were posed at the outset of the archeological investigations at Site 44AX235. The research questions were broadly-phrased and reflected research interests and topics that were current at the time the initial site plans for the RTS project were approved. Research questions posed for a project typically consist of questions likely to be answered through either project-specific historical research or through archaeological field investigations. The questions also considered information gained during archaeological investigations undertaken on adjoining city blocks, particularly those located along the Potomac River waterfront in the historic location of Point Lumley.

Preliminary historical research conducted for the RTS project suggested that the project area may have undergone a developmental pattern like that of the nearby Hotel Indigo site (44AX229) and, therefore, that it may yield similar archaeological resources. Bordering the northern side of the RTS project area, the land encompassed by the Hotel Indigo site (44AX229) was owned partially by private land-owners and partially by the Trustees of the Town of Alexandria. The site saw initial development during the mid-eighteenth century that was focused on maritime commerce, followed by a shift in favor of more diverse mixed-scale residential and industrial development and, finally, use as a consolidated industrial property.

The Hotel Indigo site was one of several notable archaeological sites along the Alexandria waterfront, including Keith's Wharf (44AX119) and Roberdeau's Wharf (44AX114), that have yielded data on early land-making efforts along Point Lumley. The Hotel Indigo site (44AX229) was unique for its new insights on the land-making process, including the documented use of wooden sailing vessels for bulkhead construction along Alexandria's waterfront. In contrast to vessels that accidentally or unintentionally sank while at anchor, the wooden sailing vessel exposed at the Hotel Indigo site (44AX0229) appeared to have been "dragged into place" to strengthen a wooden bulkhead structure erected along the shoreline (Baicy et al. 2020:167). It is likely the vessel also functioned as a type of jetty, allowing sediment to naturally accumulate within and along the vessel's exposed frame. These interpretations offered new perspectives on submerged vessels and their possible intentional use as land-making structures.

RTS Research Questions

The research questions prepared for the RTS project focused on identifying historic land-formation practices and on identifying additional archaeological markers relevant to discussing important historical events and patterns of social and economic development in the City of Alexandria. Cited in full below, these research questions were presented in the *Scope of Work for Archaeological Evaluation; Robinson South Terminal* (dated February 20, 2017) prepared by WSSI and provided in Volume VI of this research report series. The research questions were intended to compliment and build on the information gained during the recent archaeological investigations at the Hotel Indigo site (44AX0229). They included specific queries about known residents within the project area, as well as general queries related to topics such as land-making, local industry and commerce, and the potential influence of natural disasters, fires, and the Civil War.

As stated in the Scope of Work, these research questions were:

1. Archeological excavations at the Indigo Hotel revealed evidence of engineered infilling and land creation north of Point Lumley: a bulkhead wharf and a vessel that had been also

been used as the framework for the engineered fill. Were similar methods used to create new land south of Point Lumley?

2. Can we locate and identify Thomas Fleming's shipyard? Shipyard sites are largely absent from the archeological record; therefore, the remains of Fleming's wharf, secondary structures and subsurface features related to his shipbuilding venture becomes even more important to complement the documentary record.

3. Will the site contain the remnant eighteenth and nineteenth century wharves and structures?

4. Is the current building on 2 Duke Street resting partially on the foundation of Col. Hooe's Warehouse?

5. Will the stratigraphic profile reveal evidence of the fires that devastated this block?

6. Did the foundations of the Pioneer Mill survive?

7. Can we identify historic resources associated with the Civil War occupation of the waterfront?

8. Can we attribute any historic remains (features or artifacts) to the various industries on the block- blacksmiths, carpenters, coopers, grocers, etc.? To the domestic component of the block?

The above research questions were used to guide the field investigations. They were applied, as appropriate, to the feature-specific Archaeological Resource Management Plans prepared for the project. Archaeological Resource Management Plans were prepared for a total of 33 archaeological resources; these plans are provided in Volume VI of this report series. A total of 21 features were determined to have the potential to provide new information related to research Question 8 (Table 1-1). Ten archaeological features were judged to have the potential to provide information related to Question 3 and one feature was judged to have the potential to provide information related to Questions 3 and 8. The resource management plan prepared for Features 123 (The Strand) and 134 (Pioneer Mill) contained no research questions, as these features had previously been mitigated.

The following chapters of this section address several of the research questions posited for the RTS project area in more detail. The research management plans prepared for the archaeological resources identified during the data recovery investigations of the RTS project area identified only two relevant questions (see Table 1-1). These questions pertained to the presence of wharves and bulkhead structures (Question 3), Pioneer Mill (Question 6), and the presence of residences and businesses/industries within the project area (Question 8). Questions related to abandoned vessels (Question 1), Fleming's Wharf (Question 2), and Hooe's warehouse (Question 4) also could be addressed, although they were not specifically indicated as part of any of the research management plans prepared for the project. These questions are addressed in the main body of the research series, in Volumes 2-4, which provide in detail the historical context, archaeological methods, and analytical results of each of the archaeological features identified during the RTS project.

Table 1-1 Summary of Research Questions Applied during Archaeological Investigations at Robinson Terminal South

Feature	Feature Type	Time Period	RMP	Research Question
4	Building/ Structure Foundation	19th-20th century	Features 4, 18, and 19	Question 8
5	Building/ Structure Foundation	Early-mid 19th century	Features 5 and 13	Question 8
12	Privy	Late 18th century	Feautre 12	Occupation (Question 8) and the use of original Town Lot 77
13	Privy	Late 18th century-early 19th century	Features 5 and 13	Question 8
18	Building/ Structure Foundation	Late 18th-early 20th century	Features 4, 18, and 19	Question 8
19	Drainage Feature	Late 18th-late 19th century	Features 4, 18, and 19	Question 8
23	Building/ Structure Foundation	Late 18th-early 19th century	Features 23 and 45	Question 8
24	Building/ Structure Foundation	early-mid 19th century	Features 24, 34, and 44	Question 8
32	Privy	Unknown	Features 32, 46 and 48	Question 8
34	Building/ Structure Foundation	early-mid 19th century	Features 24, 34, and 44	Question 8
44	Building/ Structure Foundation	Late 17th - Mid 18th century	Features 24, 34, and 44	Question 8
45	Building/ Structure Foundation	Late 18th century-early 19th century	Features 23 and 45	Question 8
46	Pit	Late 18th century-early 19th century	Features 32, 46 and 48	Question 8
48	Privy	Early 19th century	Features 32, 46 and 48	Question 8
81	Building/ Structure Foundation	Late 19th-early 20th century	Feature 81	Question 8
91	Building/ Structure Foundation	2nd half 18th-Mid 19th century	Feature 91	Question 8
104	Building/ Structure Foundation	Early 19th century	Feature 104	Question 8
120	Building/ Structure Foundation	ca. 1790s-1890s	Feature 120	Question 8
123	Road/Walkway	Late 18th - Mid 19th century	Feature 123	No questions; mitigation required by Alexandria Archaeology
125	Building/ Structure Foundation	Late 18th-early 19th century	Features 125 and 150	Question 8
134	Building/ Structure Foundation	1854-1897	Feature 134	No questions; mitigation required by Alexandria Archaeology
150	Privy	Early 18th century, after 1810	Features 125 and 150	Question 8
151	Building/ Structure Foundation	Early 19th century	Features 151 and 155	Question 3
155	Ship	Mid 18th C	Features 151 and 155	Question 3
157	Privy	Late 18th-early 19th century	Feature 157	Question 8
159	Ship	2nd half 18th century	Feature 159	Question 3
160	Wharf/Bulkhead/Cribbing	Late 18th C	Feature 160	Question 3
161	Wharf/Bulkhead/Cribbing	Late 1760s-1780s	Feature 161	Questions 3 and 8
162	Wharf/Bulkhead/Cribbing	Mid 18th century	Features 162 and 165	Question 3 and the use of space along the waterfront
165	Wharf/Bulkhead/Cribbing	Mid 18th century	Features 162 and 165	Question 3 and the use of space along the waterfront
168	Wharf/Bulkhead/Cribbing	Post 1842	Feature 168	Question 3 and the use of space along the waterfront
200	Ship	Unknown, likely Late 18th C	Features 200, 201 and 202	Question 3
201	Isolated Board/Timber	Unknown, likely Late 18th C	Features 200, 201 and 202	Question 3
202	Wharf/Bulkhead/Cribbing	Unknown	Features 200, 201 and 202	Question 3

Chapter 2
The Research Questions

Introduction

Archaeology strives to tell the story of a place and the people who passed through it. The story of the RTS project area is one that is intricately layered with the threads of many people lives and their efforts to make a living, or to simply just live day-to-day. The research questions posed for the RTS project area were varied and reflected the long history of the project area, as well as the great diversity in the businesses and industries that were established there, ranging from small niche-businesses to large-scale industrial endeavors. Preliminary research suggested that the project area had developed in a way like that of nearby waterfront blocks, which were enlarged through infilling unusable parts of the landscape and then saw a mixture of commercial/industrial and residential development.

It was clear, however, as the archaeological fieldwork progressed and later as the data analysis was undertaken that certain research question could not be answered. For instance, although there was well-documented Civil War-period usage of the Pioneer Mill buildings, no evidence of Civil War-period activity was identified archaeologically. A vast majority of features identified at site 44AX235 dated from the turn of the eighteenth century (ca. 1790-1815) and the few buildings that had remained standing during the Civil War were razed during the twentieth century. The research questions that remained most relevant to the RTS project area were those pertaining to the process of land-making; to local commerce and industry; and to the locations and uses of various buildings and structures within the project area.

The process of creating additional land through the infilling of the natural shoreline has been well documented archaeologically, particularly along Alexandria's waterfront. A majority of the land within the RTS project area was created during the mid-late eighteenth century using techniques that included the use of earth-filled timber-cribbed structures and bulkheading. The remains of three decommissioned maritime vessels were also employed as part of the land-making process. The locations of these structures and the materials used in their construction have provided additional information on the various resources that were available to build out the land, as well as to how rapidly the shoreline changed once the process had begun. Over half of the RTS project area was comprised of reclaimed land that had been created from infilling the natural shoreline and that process appears to have happened in less than a quarter of a century.

It is important to note that since the completion of the archaeological investigations at RTS and the writing of this technical report, nearly seven years have passed. During that time, many of the research questions posed in the Scope of Work have been addressed through outside, independent researchers or through work sponsored by Alexandria Archaeology. For example, information on the bulkhead wharves discovered at the RTS Project Area, is available in a series of online articles published by Alexandria Archaeology and by Texas A&M. The history of Pioneer Mill is also available in a series of online research briefs published by Alexandria Archaeology. Multiple reports also have been authored regarding the transformation of Alexandria's shoreline through the process of "banking out"; this information is also readily available in digital/electronic format through Alexandria Archaeology.

Due to this large body of existing information, the responses to the posed research questions have been kept brief. To offset this brevity, two additional research topics are included in this report. These topics relate to interpreting neighborhoods through tax and census data (Chapter 3), examples of local and international commerce expressed through material culture (Chapter 4), and possible expressions of identity, again expressed through material culture (Chapter 5). These chapters highlight some of the directions in which research on the collection may be taken in the future. A large number of artifacts were recovered during the RTS project; not all of the materials had great provenience data, and much of the information presented in later volumes of this report is speculative and cannot be proven with the data obtained from the archaeological excavations.

Below are brief responses to the research questions posed in the Scope of Work for the RTS Project Area.

Research Questions 1-3

Question 1. Archeological excavations at the Indigo Hotel [44AX0229] revealed evidence of engineered infilling and land creation north of Point Lumley: a bulkhead wharf and a vessel that had been also been used as the framework for the engineered fill. Were similar methods used to create new land south of Point Lumley?

Question 2. Can we locate and identify Thomas Fleming's shipyard? Shipyard sites are largely absent from the archeological record; therefore, the remains of Fleming's wharf, secondary structures and subsurface features related to his shipbuilding venture becomes even more important to complement the documentary record.

Question 3. Will the site contain the remnant eighteenth and nineteenth century wharves and structures?

There are plenty of accounts of the founding of Alexandria and the development of its two shipping ports, one to the north at West Point and the other at Point Lumley. Between the two ports was a broad shallow bay or cove. West (1748) indicated the cove was "The Shoals or Flats," while Washington (1749) simply noted the area contained about five feet of water. These early mapmakers both depicted the river channel standing out from the cove. It passed close by the tips of West Point and Point Lumley, where West (1748) and Washington (1749) both noted that the channel was eight fathoms deep, or about 48 feet. Today, the river channel is 24 feet at its deepest point; this depth was set by Congress in 1899 (Chapell 1973:72) and is maintained by periodic dredging of the channel.

The shape of the land depicted on those early maps changed quickly. By the late nineteenth century, enough of the crescent-shaped bay had been infilled that in 1782, the Trustees of Alexandria authorized the extension of Water (Lee) Street "from north to south" and also the laying off and opening of Union Street "from north to south" (Virginia State Library 1908:63 [A462]). The extension of Union Street through the southern part of the town was completed over a two-year period, from 1782-1784 (Claypool and Johnston 2014:5). The construction of this street split Lots 77 and 85 into two unequal sections. The portions left on the west side of Union Street were typical half-acre lots, consistent with the lot sizes described in the original town plan. The lot portions on the eastern side of Union Street were composed of the residual acreage and were of irregular size.

An article on the History of Alexandria, published in the *The Times, Washington* (10/13/1899 p.2), described the building of Union Street, stating that "in 1780, except the roadways by which Oronoco Street reached Point West and Duke Street sloped to Point Lumley, there was no way to reach the river shore except the rough and precipitous inclines cut through the high bluff which overtopped the river side. The earth cut from the hills was used in filling up the cover in front of the town, 'banking out' the process was called. While this grading was in progress, before porches could be completed, temporary steps and ladders furnished access to the doors." The news article noted that in some areas so much of the bank was cut away that building cellars were exposed.

The soil generated by the two road projects was deposited along Alexandria's waterfront to build out the land. This concept was not new. The making of new land by infilling unusable areas, particularly along the shoreline, was actually permitted by the Trustees of Alexandria. Entered into the proceedings of the Board of Trustees of the Town of Alexandria at their September 1, 1760 meeting was an agreement made during the

1749 sale of town lots that entitled every person purchasing a riverside lot "the benefit of extending the said Lotts into the River as far as they shall think proper" (Ring and Pippenger 2008:139). In this way, Thomas Fleming came to own two 25-ft wide strips of land along the southern boundary of Lot 77. Fleming also was instrumental in building out Lot 85, which he briefly owned before selling it to his brother in-law. The Corporation also enlarged its own land on Point Lumley through the building out process.

The archaeological investigations did provide some additional information on the building out process, however, much of it is speculation and is not directly supported. The study of the sequence of land development within the project area does not appear to have been one of the primary objectives of the archaeological investigations. The vast majority of the excavation areas within the RTS were confined to feature interiors, with virtually no sampling of soil deposits occurring outside of the feature interiors. Without the comparative data, it was extremely difficult to determine which soils may be related to the banking out process and which soils were simply disturbed natural deposits.

It does appear that each of the three properties within the RTS project area (Lot 77; Lot 85; and the land owned by the town trustees on Point Lumley) experienced the effects of the building out process differently. Lot 77, for example, was laid out on an upland portion of Point Lumley and was not projected to contain fill soils related to banking out. Archaeological investigation of Feature 5, located in Parcel 77-1 in the northeastern corner of Lot 77, however, revealed a 1.3 ft (39.6 cm) thick deposit of soil that resembled natural substrata, yet yielded historic artifacts that clearly indicated the soil layers were not intact. The recovered artifacts were small in size, suggesting the artifacts had been within an environment where breakage was common, such as a surface layer of a yard or pathway, or within a garden area where tillage was common. Since Feature 5 had been built sometime between 1798 and 1815, and the foundation appeared to be intrusive into the deposits, this meant that the deposits may have been laid down as part of the banking out process on either Lot 77, or on the adjacent town-owned (Corporation) land. Artifacts recovered from the deposit were typical of household deposits; diagnostic artifacts indicated the deposit had been laid down sometime after 1775 (mean date 1793).

An interesting side-note related to Lot 77 was that, in 1786, Thomas Fleming's heirs gave merchants Robert Hooe and Richard Harrison permission to take soil from Lot 77 to infill their wharf. The wharf was situated east of Lot 77, on land that Hooe and Harrison leased from the town trustees. Few leases survive from the mid-eighteenth century and the early leases for the Corporation-owned property cannot be confirmed. So, it was sometime during the 1780s that Hooe and Harrison leased the land and built a large stone warehouse and store southwest of the intersection of the Strand and Duke Street. The two-story structure measured 44 x 72-feet and was associated with Hooe's Wharf. If Hooe and Harrison had borrowed soil from Fleming's property, then the layer of redeposited subsoil may have been related to the permissive borrowing of soil and may also have come from a "stockpile' of soil placed in that area for future use.

During the eighteenth century, in Alexandria, wharf construction was a means of land reclamation. Today, wharves are a generic term for areas where maritime vessels can safely dock. Wharves can be open structures such as piers or docks, or earth-filled structures such as quays or earth-backed bulkheads. A quay is generally understood to be part of the shore and is typically a place where vessels can dock perpendicular to the shore. In contrast, a pier or dock extends out into the water and is perpendicular to the shore. Other shoreline structures, such as jetties and breakwaters are typically not intended for docking vessels. These terms seem to have been more loosely applied during the eighteenth and early nineteenth century, where "wharf" can have meaning as both a dock and a quay.

In some instances, waterfront structures were modified from their original intent without changing their overall use. For example, in 1754, the town trustees instructed John Carlyle to build a warehouse on "sills to be rais'd four feet from the ground" (Ring and Pippinger 2008:135). The warehouse was to be located at the foot of Duke Street, on the northern side of the newly cut-through road. Less than a year later, the trustees requested "that the Warehouse at point Lumley be fill'd in with Sand & Rubbish from the Point but in such a manner as not to prejudice the foundation of said house" (Ring and Pippinger 2008:136). The warehouse was completed by February 1761 (Ring and Pippinger 2008:140). Still built on piers, the earth-filled foundation may have been used as a bulkhead for land-making activity on the Corporation-owned land north of Duke Street.

Shipyard

From the beginning, the Corporation had envisioned Point Lumley as a shipyard. Thomas Fleming, who held the earliest lease on the Corporation property on Point Lumley appears to have attempted to make this vision a reality. While there are accounts that suggest there was a shipyard at Point Lumley and that Fleming was successful in building a vessel at the point, there has been little verifiable proof. The remains of a ship (Feature 200) and ricking just north of the inland end of the shipway can reasonable be associated with Fleming's early efforts to both build out the shoreline and establish a shipyard. The ship appears to have been intentionally sunk as grillage and does not appear to have been a failed attempt at shipbuilding. It may, however, have been scavenged for its rigging, masts and other parts necessary to start-up the shipyard.

The angled bulkheads of Feature 160, located along the northern edge of Fleming's original wharf on Point Lumley, appear to have been Fleming's attempt to build a shipway (Figure 2-1). Shipway's allow for the dry-docking and later launching of vessels directly from the shore. The shipway was of timber construction and had been built in the same manner as a bulkhead (Figure 2-2). Cross-timbers and additional longitudinal timbers exposed in the interior of the wedge-shaped structure appeared to be in their original positions. Tie-back timbers on the exterior of the wedge also appeared to be in their original position, confirming that the structure's shape was intended to be wedge-shaped and had not been deformed due to erosion, decay, or soil pressure. Its location within a portion of Point Lumley leased by Fleming and its situation on the north side of Fleming's wharf all point to the structure being associated with Fleming.

Feature 91 was located within a portion of the Corporation lands originally leased by Fleming and may also have been associated with his early attempts to establish a shipyard. The function of this structure remains unknown. It had an unusual crib sunk into the marshy sand on its ground floor and a brick-surfaced platform on its second floor that suggested the building may have been a transfer point for loading and unloading goods (Figures 2-3 and 2-4). The building foundation was insubstantial. It had been laid directly on the ground surface and followed the slope of the land. Oddly, the natural upland soil was visible beneath the building foundation on its northern and western sides.

Although it was considered a single feature during excavation and analysis, Feature 91 may have been two separate features that coincidentally overlapped. The cribbing was three-sided, with an opening to the east, toward the river. Evidence of marsh grass found in the interior of the cribbed area, indicated the cribbing had been built on the pocosin, while several thin lens' of sediment indicated the crib had been periodically inundated. The area surrounding the cribbing was raised and was compacted earth, which suggested it had been available as a "walkway" around the cribbed area. A gum barrel on a platform of compacted earth stood on the southeast corner of the cribbed area. Fleming had proposed the construction of a building or "shed" below the bank on Point Lumley and it is possible that Feature 91 is one of those buildings.

Thomas Fleming, in seeking to develop a shipyard, was one of the earliest people to begin building structures on Point Lumley. Some of his earliest structures were bulkheads and a wharf that incorporated the remains of vessels as grillage or cribbing. Vessels were an expedient form of cribbing as they were already assembled and could be "floated" to the proper location and then sunk. A ship (Feature 155/Ship 2) that became the foundation for the riverside end of Fleming's wharf had been weighted down beneath a layer of cobbles (Figures 2-5 and 2-6). The final layer of cobbles overflowed the vessel onto the natural bluff soils that had been dumped around its

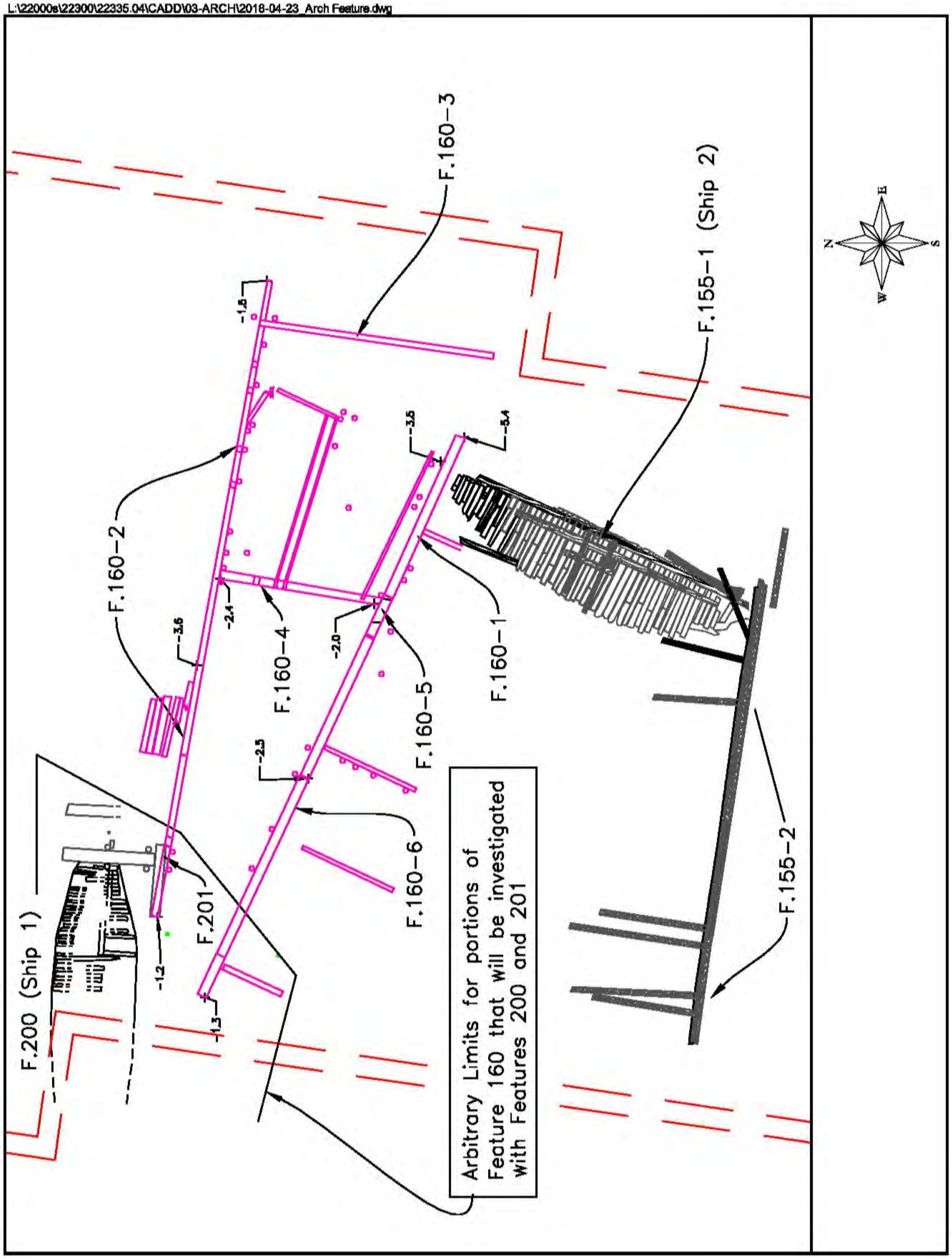


Figure 2-1 **Map showing portion of Feature 160 subject to mitigation (WSSI Resource Management Plan, Feature 160, May 2018)**

Figure 2-2 Photograph showing overview of Feature 160, view south (WSSI staff, 6/15/2018)

Figure 2-3 Photograph showing an overview of Feature 155, view south (WSSI staff, 4/13/2018)

Figure 2-4 Photograph showing soil profile of cobble fill in the interior of Feature 155, view north (WSSI staff, 3/29/2018)

Figure 2-5 Photograph showing overview of Feature 91 fully excavated, view east (WSSI staff, 9/29/2017)

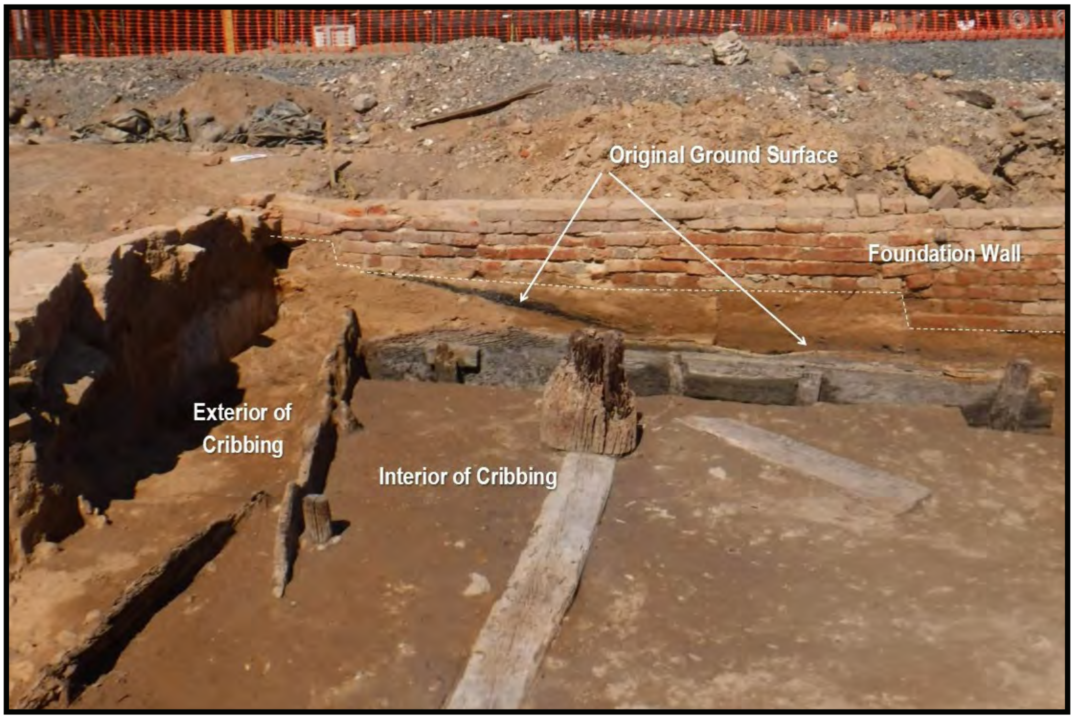


Figure 2-6 **Annotated photograph showing northern wall of Feature 91 fully exposed, view north (original photograph, WSSI staff, 10/2/2017)**

frame as part of the land-making process. Fleming added a shipway to the northern side of the wharf. He sank another vessel and adding some ricking to begin building out the land north of the shipway. Later, after he acquired the adjoining property along Wolfe Street, Fleming built another wharf with an attached warehouse. This wharf, excavated as Feature 161, was built in the early 1770s and appears to have been intended to serve as a loading and unloading area for a warehouse (Feature 125) located at the western end of the wharf.

Once the land-making process in the Project Area had begun it rapidly gained momentum. More and more earth-filled structures were added to the waterfront, eventually filling in around those early wharves and structures begun by Fleming. James Kirk used the remains of a vessel (Feature 159/Ship 3) to extend Fleming's Wolfe Street wharf. Caverley added a wharf between Kirk's extended wharf and Fleming's first wharf. Hooe and Harrison later built a wharf along Duke Street that used the north wall of Fleming's shipway. Abandoned by the early eighteenth century, the shipway was infilled and the process of remaking Point Lumley continued.

Research Question 4

Is the current building on 2 Duke Street resting partially on the foundation of Col. Hooe's Warehouse?

The answer to this question is yes. The foundation of Hooe and Harrison's warehouse was identified as archaeological Feature 44. The foundation had been heavily impacted by previous construction and only the southwestern portion of it remained intact. The surviving portion measured approximately 70 ft (21.34 m) north-south by 13 ft (3.96 m) east-west and was oriented with its long axis parallel to the Strand (perpendicular to Duke Street) (Figure 2-7). If intact, the remaining portion of the foundation would have extended beneath the existing building at #2 Duke Street. This feature is discussed within Volume III, Parcel PL.2 of this report series.

Hooe and Harrison's stone warehouse at the intersection of Duke Street and the Strand was one of the more prominent buildings within the RTS Project Area. The two-story warehouse and store was built in the early 1780s. It fronted Duke Street and was bound on the east by the Strand, on the south by a 15-foot alley, and on

Figure 2-7 Photograph showing overview of Feature 44, view north (WSSI staff, 4/11/2017)

the west by another alley that separated it from other property leased by the Corporation. The structure measured 44 x 74 feet and was originally used for storage and housing for those conducting business on the wharf.

The function of the warehouse changed in 1831, when the Real Estate Committee of the Common Council decided to improve the stone warehouse and the surrounding Corporation property (Alexandria Gazette, 12/23/1831, p.3). They appropriated $500 for the warehouse to be repaired and converted into a tobacco warehouse. A shed, measuring 72 x 30 feet and outfitted with screws for pressing tobacco, was to be built on the west side of the warehouse. These improvements appear to have been made, for in 1832, merchant and developer Josiah Davis posted a notice offering a counting room for rent in the stone warehouse located on Hooe's Wharf (Alexandria Gazette, 11/28/1832 p.3).

The stone warehouse most likely was demolished during the early 1850s, when construction of Pioneer Mills began on an adjoining part of the Corporation land. The mills were completed in 1854. A cooper shop added to the mill complex in 1856 was located where the Hooe and Harrison's warehouse previously had stood. When the Union Army occupied the Alexandria in 1861, at the onset of the Civil War, the Pioneer Mills facility, cooper's shop and area adjoining the shop were transformed into a commissary and mess hall to accommodate troops. The cooper shop stood until June 3, 1897, when it was destroyed in a fire that also consumed most of the buildings in the Project Area (Alexandria Gazette, 6/7/1897). The current building was rebuilt on the foundation of the cooper's shop.

Archaeological investigations of Feature 44 revealed the foundation had been repointed with cement at some time in the past. The remains of wooden floor planking supported by floor joists also were identified. The gutters and floor joists rested within a thick deposit of fill material that had been laid down after construction of the foundation walls had been completed. A drainage system composed of wood-lined gutters or drains was set within the fill material. The drains extended along the interior of the structures' walls, presumably emptying into a catchment outside of the foundation. It was suspected that the flooring was replacement flooring and was not original to the building. Based on the TPQs of artifacts recovered from the identified excavation levels in Feature 44, the uppermost soil layer ("Fill 1") represented fill materials deposited sometime after 1830. The lower soil layers dated more consistently to the last half of the eighteenth century and, as such most likely were original fill material placed within the foundation after its completion in the 1780s.

Research Question 5

Will the stratigraphic profile reveal evidence of the fires that devastated this block?

There was no conclusive evidence of the September 25, 1810 fire within the RTS Project Area. This was due in large measure to a lack of comparative data. The majority of feature excavations concentrated on sampling deposits in the interior of foundations or other features, with very few excavation units placed outside of those features in "yard" areas. Possible evidence of a destructive fire was noted during the excavation of four features (Features 24, 34 and 104) located on the Corporation property. The burn deposit was originally thought to have related to the destruction of Feature 24 by fire, but the identification of nearly identical burn deposits in buildings that clearly did not burn in the 1810 fire has prompted a reconsideration of that conclusion.

The burn deposit in the interior of Feature 24 was exposed at the base of the building's foundation (Figure 2-8). Diagnostic artifacts recovered from the deposit were almost exclusively ceramic. Based on the ware types, the mean occupation was calculated as 1794, suggesting that the layer may relate to the fire of 1810. No excavation was conducted outside of the foundation, so it is not known if the deposit extended outside of the building. There was evidence that the building's cellar had been filled after the fire and its foundation reused, so the conclusion seemed reasonable.

Identification of visually identical burn layers in the soil profiles of excavation units investigating Features 34 and 104, however, has raised the possibility that the deposit identified in Feature 24 was not a result of the destruction of that building, but potentially an unrelated fire event where the remains of that building had been spread out across the landscape as fill material. Like Feature 24, the artifact collection from the burn layer in Feature 34 (designated as Cultural 1; not visible in photos) and in the eastern half of Feature 104 (also designated as Cultural 1; Figure 2-9) consisted mainly of ceramic and glass fragments, with an absence of personal or activity items. Diagnostic ceramic and glass were generally dated to the last quarter of the eighteenth century. In the western half of Feature 104, the deposit also dated from the 1790s, but was more consistent with a kitchen deposit, suggesting it had originated from an open-air kitchen or outdoor kitchen space.

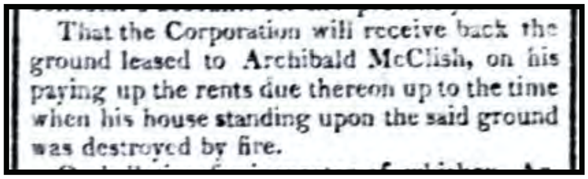
This unique deposit was generally only 0.3 ft (9 cm) thick. It was described in various ways, but it was easily recognizable in soil profiles as a thin lens of dark gray (10YR 3/1) to very dark grayish brown (10YR 4/2) loam with small brick fragments that appeared to be soot covered. The deposit was confined to the Corporation lands located west of the Strand.

While it may not be related to the fire of September 25, 1810, it is possible that the burn deposit was related to the destruction of Archibald McCliesh's cooper shop, which was destroyed by fire in 1810. It was located on Corporation land within the Project Area, but its exact location could not be determined. The building was a one-story building. It was valued at $1,600 in 1807, and was occupied by McCliesh, along with an unnamed apprentice and an unnamed African American person (Alexandria Land tax Assessment 1807, Ward 1). McCliesh was not taxed for the building in 1810 and, in December 1811, the Common Council meeting notes indicated the Corporation was ready to "receive back the ground leased to Archibald McCliesh, on his paying up the rents of due thereon up to the time when his house standing upon said ground was destroyed by fire" (Alexandria Gazette, 12/9/1811, p 3; Figure 2-10). This was not the fire of September 25, 1810, however, but a separate fire event.

The September 25, 1810 fire was started by a candle left unattended in a cooper shop, but

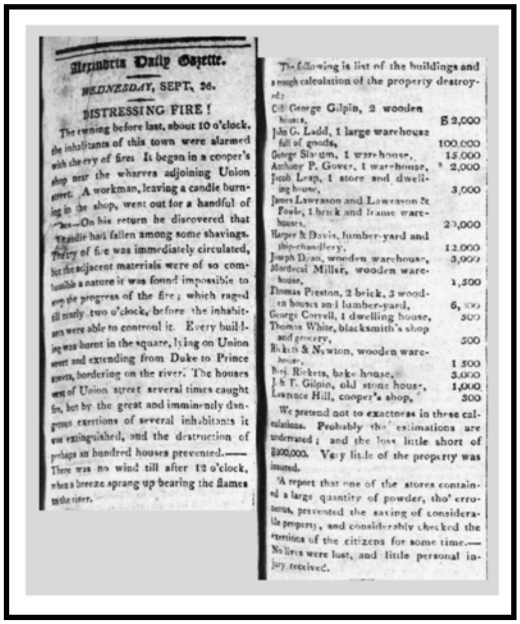
Figure 2-8 Photograph showing destruction layer in soil profile of Unit 60, view north (WSSI staff, 7/7/2017)

Figure 2-9 Photograph showing the "Cultural 1" deposit in the base of Block 4, view south (WSSI staff, 1/23/2018)



That the Corporation will receive back the ground leased to Archibald McClish, on his paying up the rents due thereon up to the time when his house standing upon the said ground was destroyed by fire.

Figure 2-10 Notice from the Corporation that it would receive back land leased to Archibald McCleish (Alexandria Gazette, 12/9/1811, p.3)



Alexandria Daily Gazette.

WEDNESDAY, SEPT. 26.

DISTRESSING FIRE!

The evening before last, about 10 o'clock, the inhabitants of this town were alarmed with the cry of fire. It began in a cooper's shop near the wharves adjoining Union street. A workman, leaving a candle burning in the shop, went out for a handful of [illegible]—On his return he discovered that the candle had fallen among some shavings. The cry of fire was immediately circulated, but the adjacent materials were of so combustible a nature it was found impossible to stop the progress of the fire; which raged till nearly two o'clock, before the inhabitants were able to controul it. Every building was burnt in the square, lying on Union street and extending from Duke to Prince streets, bordering on the river. The houses west of Union street several times caught fire, but by the great and imminently dangerous exertions of several inhabitants it was extinguished, and the destruction of perhaps an hundred houses prevented.—There was no wind till after 12 o'clock, when a breeze sprang up bearing the flames to the river.

The following is list of the buildings and a rough calculation of the property destroyed:

Col. George Gilpin, 2 wooden houses,	$ 2,000
John G. Ladd, 1 large warehouse full of goods,	100,000
George Slacum, 1 warehouse,	15,000
Anthony P. Gover, 1 warehouse,	2,000
Jacob Leap, 1 store and dwelling house,	3,000
James Lawrason and Lawrason & Fowle, 1 brick and frame warehouses,	20,000
Harper & Davis, lumber-yard and ship-chandlery,	12,000
Joseph Dean, wooden warehouse,	3,000
Mordecai Miller, wooden warehouse,	1,500
Thomas Preston, 2 brick, 3 wooden houses and lumber-yard,	6,000
George Coryell, 1 dwelling house,	500
Thomas White, blacksmith's shop and grocery,	500
Ricketts & Newton, wooden warehouse,	1 500
Benj. Ricketts, bake house,	3,000
J. & T. Gilpin, old stone house,	1,000
Lawrence Hill, cooper's shop,	300

We pretend not to exactness in these calculations. Probably the estimations are underrated; and the loss little short of $200,000. Very little of the property was insured.

A report that one of the stores contained a large quantity of powder, tho' erroneous, prevented the saving of considerable property, and considerably checked the exertions of the citizens for some time.—No lives were lost, and little personal injury received.

Figure 2-11 Notice of the "Distressing Fire!" in Alexandria (Alexandria Daily Gazette, 9/26/1810, p.3)

this cooper shop was located on the north side of Duke Street and not in the Project Area. The fire spread rapidly and consumed all of the buildings standing in the block north of the RTS Project Area, bordered by Duke, Union and Prince Streets (Alexandria Daily Gazette, Commercial & Political 9/26/1810, p3; Figure 2-11). The listing of the property lost during the fire contained the names of individuals who lost property in the fire. Archibald McCliesh was not listed. Captain George Slacum, who did reside in the RTS Project Area, was listed. He lost the warehouse that he rented on Gilpin's wharf, but his house at the corner of Duke and Union Streets within the Project Area, was not damaged.

Research Question 6

Did the foundations of the Pioneer Mill survive?

The lower portion of the foundation of Pioneer Mills did survive. Portions of the stone foundation wall, the interior stone and brick walls and sections of brick flooring in the interior rooms of the mill were exposed (Figure 2-12). Stone platforms that supported the mills stones were present, as were the possible remains of nine of the mill's 12 buhr millstones (Figure 2-13). Pioneer Mills had two milling rooms, both of which were on the eastern side of the structure. The northern milling room contained platforms for 12 millstones and the southern milling room contained platforms for seven millstones. The platforms were about 4 ft (1.2 m) in dimension and spaced approximately 13-15 ft (4.0-4.6 m) apart, center to center. They were organized in rows, with enough space to add three additional platforms in the northern room, suggesting that Pioneer Mills had been built with the intent of enlarging its capacity. Two side passages on the southern side of the mill and the remains of the engine room on the northwestern side of the mill also were identified.

The remains of Pioneer Mills were documented and the building removed. Driven piles that supported the foundation walls and mill platforms were revealed. These also were documented and removed.

Research Question 7

Can we identify historic resources associated with the Civil War occupation of the waterfront?

The answer to this question was actually no. Although the Union Army had used Pioneer Mills and its cooper shop during the Civil War, both structures were destroyed by fire in 1897 and razed shortly after. A new building was built on the foundation of the cooper shop, but the ca. 1860s ground surface around these buildings was

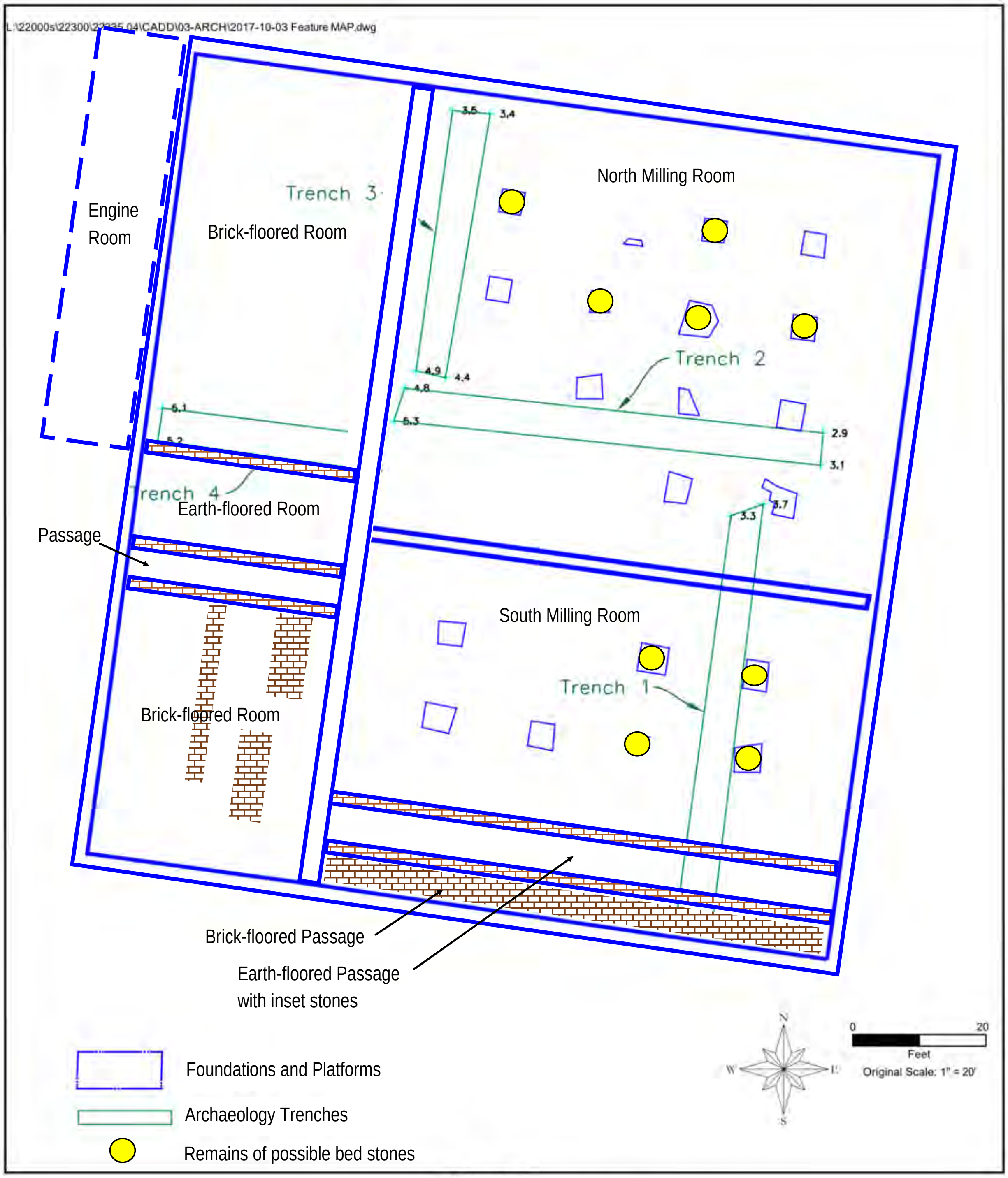


Figure 2-12 Annotated map of Feature 134 (WSSI staff 2007, annotated by RCG&A 2024)

Figure 2-13 Photograph showing comparison between platforms containing possible bed stones (left foreground and left background) and empty platforms (right mid-ground), view northeast (WSSI staff, 9/21/2017)

not preserved and no evidence of use of the Project Area by the Union Army was identified.

Research Question 8

Can we attribute any historic remains (features or artifacts) to the various industries on the block- blacksmiths, carpenters, coopers, grocers, etc? To the domestic component of the block?

The RTS project area encompasses three historical properties: Town Lot 77; Town Lot 85; and the land owned by the Trustees of the Town of Alexandria, referred to as Lot PL (Public Lands on Point Lumley) in this report series. Each volume of this report examined in detail the archaeological features identified within those properties, as well as provided detailed historical contexts for each property and sub-property or parcel. The supplemental, detailed historical contexts developed for these properties aided in the understanding of the overall development of the RTS project area, from its initial development during the mid-eighteenth century through the modern period. Many of the research questions posed for the RTS project are addressed within the preceding volumes of the report, either through the developed historical narrative, or through feature and artifact discussions.

On the topic of local commerce and industry, there were several industries and commercial enterprises that operated within the RTS project area. The earliest industries were associated with maritime commerce and included a potential mid-eighteenth shipyard or dock, as well as a progression of warehouses, stores, and shops that emerged during the mid-late eighteenth century as the RTS project area became more fully developed. Most of the early businesses were small individually-owned operations, including a bake house, a tavern, a cooperage, and a woodworking shop. A number of warehouses and storehouses also stood within the project area and were rented or leased by various individuals and businesses. Larger businesses and industries emerged during the mid-nineteenth century, including a large merchant mill (Pioneer Mills), a lumber yard and coal depot, a railroad siding and warehouse, and a large fertilizer factory. Many of these businesses were owned or operated by individuals who were well-known in Alexandria and who had ties outside of the region and even internationally.

While it is clear that most of the development within the project area was focused on industrial and commercial use, a small number of residences were located within the RTS project area. The earliest residences dated from the late eighteenth century and stood along Wolfe Street and the Strand. These residences were varied and included a substantial two-story brick dwelling, as well as smaller one-story frame dwellings. Many of the residences were rented and may have functioned more as tenements or boarding houses. By the late eighteenth century, residences also lined Union Street and the western portion of Duke Street. Residences along Union Street and the central part of Wolfe Street are well-represented archaeologically; these had substantial foundations with deep cellars. Residences in other portions of the project area, however, are not well-represented and their existence is known primarily from documentary sources.

Archival research identified numerous industries and commercial enterprises that operated within the Project Area from the mid eighteenth century through the modern period. The earliest industries were associated with maritime commerce and included a potential shipyard operated by Thomas Fleming during the mid-eighteenth century. A progression of warehouses, stores and shops oriented toward the receipt and sale of import and export goods followed Pioneer Mills (1854-1859) briefly operated within the Project Area, as did the lumber yards of James Green (ca. 1843-1857) and the Acheson Brothers (1892-1918). Several small business also appear to have operated in the Project Area including a bake house operated by Andrew Jamieson (1791-1802), a tavern run by Josiah Davis (ca. 1826-1846), and the woodworking shops of Loudon and William Campbell (ca. 1802-1827). Archibald McCliesh may have briefly taken over Jamieson's bakery; he also operated a cooper shop in the Project Area during the early nineteenth century.

Some of these resources were identified archaeologically. The foundation of Pioneer Mills (Feature 134), the foundations of two tavern's (Features 120 and 112) operated by Josiah Davis on his Wolfe Street property, and the possible foundation of Jamieson's bake house (Feature 81) and a bake oven (Feature 83).

Chapter 6 of this volume takes an in-depth look at Feature 125, a warehouse on Wolfe Street that yielded cooper's tools and evidence of a seamstresses or tailor. Feature 125 was attached to a wharf (Feature 122/161) begun by Thomas Fleming in the early 1770s. Fleming also built a shipway (Feature 160) and a wharf (Feature 155) on Corporation land he leased on Point Lumley. The foundations of several later warehouses also were identified; these features (Features 135, 148, 149, and 151) lined the eastern side of the Strand.

A number of residential dwellings also were identified. All of these buildings had substantial foundations. Buildings with more impermanent construction, or that were located on Corporation property, are unlikely to have survived. The foundations of four of the dwellings that stood along Union and Duke Streets were found; these were Features 4 and 5; Feature 18; and Feature 4. Portions of at least two other foundations (Features 130-31) were identified at the intersection of Union and Wolfe Streets. William Patterson's dwelling (Feature 188) on Wolfe Street, and Josiah's Davis's taverns (Features 120 and 112) at Wolfe Street and the Strand also were identified.

Feature 125 was one of the few features that contained intact cultural deposits related to its use. Most of the cultural deposits found in foundation features at the RTS Project Area were related to the abandonment or demolition of those features and not to their periods of use or occupation. Several residential foundations had evidence of in-floor drainage systems or sumps; one cellar contained the partial remains of a wooden crate and some lumber that had been stored in the cellar. Overall, however, these features did not contain an abundance of new information. The deposits in Feature 120, while clearly identifiable as a tavern assemblage, was not fully excavated and derived partially from a disturbed context. Evidence of African American presence also was clearly identified in the assemblage from Feature 120.

Privies were one exception that could be directly linked to activity on the property. Of the eight privies identified, most contained "privy contents" related to their use, but only some of the privies could be directly linked to people who resided at or used the property where the privy was located. Three privies were located on the property of George Slacum (Parcel 77.1). All three were different configurations, and all three were built during Slacum's occupation. A brick-lined circular privy (Feature 13) was for Slacum's household, while a small box privy (Feature 12) was for use of his tenants, who also rented the store on his property; the third privy(Feature 46) had been closed and partially removed but may have been a box privy. The box privy (Feature 49) on Campbell's rented lot was a communal privy for use of his tenants and the workers in his shop. The privy behind Samuel Kirk house and later Josiah Davis's rental house on Parcel 77.5 was a small barrel privy (Feature 32), but it could not be dated and its association was unknown. The privy (Feature 32) on Parcel 77.4, behind Theodore Skinner's and later George Harris' house also could not be dated. The barrel privy (Feature 156) in the basement of William Patterson's house (Feature 118) predated the construction of his house, so it evidently was not an early attempt to have an "indoor" privy.

These unassociated privies, like all of the other features identified during the RTS Project provide just a small glimpse into the lives of the thousands of people who have touched and helped to transform the natural landscape of Point Lumley into a living and ever-changing cultural landscape. Many of these people will remain unknown, but for those whose names were recorded in census and tax records, or in notices posted in the local newspapers, their stories can begin to be told. The remaining chapters of this volume and the following volumes of this research report tell the beginnings of those stories.

Chapter 3
The Square through Census and Tax Records

While it is clear that most development within the RTS Project Area was focused on industrial and commercial use, a small number of residences also were located within the Project Area. The earliest residences were along the Strand and Wolfe Street. Sometime after 1780, Robert Townshend Hooe built a dwelling on land he leased at Point Lumley. In 1787, Joseph Caverley built a two-story frame dwelling on land he leased at the corner of Wolfe Street and the Strand. Later lessee constructed brick and frame dwellings and tenements around Caverley's dwelling. Insurance documents suggest that small frame dwellings also stood on the riverside wharves. By the turn of the nineteenth century, more permanent dwellings had been constructed along S. Union Street near the intersection of Duke Street.

While most of the dwellings within the Project Area were of frame construction, only those with substantial stone or brick foundations were well-represented archaeologically. Some of these buildings even survived into the early-twentieth century. Buildings with less substantial foundations, however, were not well-represented archaeologically. The record of their existence was noted on insurance documents and in tax records. Those same documents provide a link to the occupants of those buildings and an opportunity to better understand just how transient or how stable life was along this piece of Alexandria's waterfront.

Owners vs. Renters

Located at the southeast end of town and perched on the bluffs overlooking the Potomac River, the square developed around maritime commerce. When Alexandria was laid out in 1749, there were no roads to formally mark the boundary of the square. Duke Street was later extended eastward to the river to bound the northern side of the square. As the town expanded, Wolfe Street became the southern boundary and, in the 1780s, Union Street became the new western boundary of the square. Two wharves and numerous warehouses were in place by the 1780s, when Union Street was cut through. Buildings soon were erected along the waterfront for the loading, storage and sale of goods.

By the 1820s, the square contained temporary and permanent shops and a lumber yard, all essential businesses supporting maritime trade. Taverns and rooming houses on Union and Duke Street provided short-term and longer-term lodging for mariners and travelers. A ferry that crossed the Potomac River to Prince Georges County was operating on the lower side of Duke Street by the 1830s. While numerous dwellings were situated throughout the square, the only long-term residents lived on Union Street, an area set back from wharf activities. The shift to larger commercial operations began during the mid-nineteenth century with the Pioneer Mills lease of Public Lands in 1854. With the addition of the B&O Railroad, the southern and western sides of the square were transformed. By the end of the nineteenth century the square was primarily commercial/industrial.

A review of the tax assessments and census records for Town Lots 77 and 85, and for the Corporation's Public Lands indicated that there were only two families who owned homes and resided within the square for more than twenty years. Both houses were next to each other on Union Street. Parcel 77.2, owned by the McCliesh family, and Parcel 77.3, owned by the Immohr family provided some basic information on occupations, personal and property values, illustrating how newly arrived immigrants to Alexandria made Lot 77 their home (Tables 3.1 and 3.2).

Temporary, Moveable Housing

For the first half of the nineteenth century Public Lands tax assessments list one-story frame dwellings and shops on the Strand, near the warehouses on Kirk's Wharf and on the alley near Hooe's Wharf, west of the stone warehouse. Small houses were common throughout the square in the Public Lands, Parcels 77 and 85. They were situated within and along alleyways and the Strand. Records show that the houses could be temporary and sometimes moved from square to square (Alexandria Gazette, 1/24/1832 p.3). In most cases there were no formal leases drawn up for the tenants of these dwellings because the properties were sub-let. The assessments were not always clear about the exact location of the houses, however, the names of some of the tenants were sometimes included in the assessments, listed as laborers, apprentices, tradesmen or women. Some of those residing within the square were free African Americans. These individuals were an essential part of the network that supported maritime commerce on Hooe's Wharf and Kirk's Wharf. The Common Council had various way of managing the small communities that developed around the businesses and warehouses. Some Corporation leases required the removal of small frame structures at the end of a lease but brick houses could remain on the property to be purchased by the Corporation (Alexandria Gazette, 3/28/1823 p.3, 1/24/1832 p.3).

Within Parcel 85.4, the frame warehouses on the waterfront were insured by the Mutual Assurance Company in 1803 (Mutual Assurance Society 1803: Policy #2008). The record included a rough sketch plat that depicted three frame warehouses, with building dimensions. The insurance record also noted that there were five other frame houses adjoining the parcel but they were not drawn on the plat. In the western section of Lot 77, fronting Union Street, and even in the alley, were frame houses, that during the early nineteenth century were either occupied long-term by

Table 3-1 Long-term Occupants of Parcel 77.2

Household Head/Origin	Assessment Year	Sex/Age	Occupation	Personal Property Value	Real Estate Value
McCliesh Sr. ***Scotland***	1810	Male/46	Cooper		$1,800
E. McCliesh	1823	Female/46	Keeping House	-	$1,600
E. McCliesh	1830	Female/53	Keeping House	-	$1,600
E. McCliesh	1840	Female/63	Keeping House	-	-
G. McCliesh	1850	Male/48	Cooper		$4,000
G. McCliesh	1860	Male/58	Cooper	$3,000	$14,000
G. McCliesh	1870	Male/68	Unemployed	$1,000	$15,000

Table 3-2 Long-term Occupants of Parcel 77.3

Household Head/Origin	Year	Sex/Age	Occupation	Personal Property Value	Real Estate Value
F. Immohr ***Germany***	1820	Male/39	Captain/Merchant	-	-
F. Immohr	1823	Male/42	Captain/Merchant	-	$750
R. Immohr	1830	Female/50 Has Tenant	Widow/Keeping House	-	$1,000
R. Immohr	1832	Female/52	Widow/Keeping House	$150.00 Household Goods	$1,000
R. Immohr	1840	Female/60	Widow/Keeping House	-	

one family or used as shorter-term housing for tenants, many of whom were mariners, merchants or shopkeepers. The tax assessment/census records for 1810 until 1840 suggest that merchants and workers who were managing or supporting commerce near the wharves were living very close to or within the shops or warehouses.

Rooming Houses and Taverns

Several of the larger, brick or frame houses in the square served as rooming houses or taverns. These appear in the records as being leased from wealthy proprietors to longer-term tenants who had acquired tavern and/or shopkeeper's licenses, who then provided services to short-term tenants. In some cases, the tenants are listed in the assessment as mariners or ships captains who may have been staying in Alexandria temporarily. Records from Parcel 77.1 from 1810 until 1827 provide evidence of a rooming house in the parcel. Captain George Slacum's heirs were proprietors of this Parcel 77.1 which contained four houses during the early nineteenth century.

The 1810 tax assessment states that tenant, William Reed, was residing in one of the two-story houses on Lot 77.1. He was listed as a baker, and a shopkeeper with a tavern license. Reed obtained tavern licenses for the years 1808, 1809, and 1810 with partner, Thomas Cruse, who owned a brewery in Alexandria (Court Minutes, Alexandria, 1801-1847). This information suggests that a tavern may have been in operation on Lot 77 in 1810. Additional evidence for a tavern comes from William Reed's 1814 will and inventory (AX Will Book 1:329, 11/2/1814). When Reed passed away in 1814, Catherine Reed, his wife, was appointed executor of his estate. She was required to make an inventory of William's personal estate, in conjunction with Thomas Cruse and Mark Norris (Alexandria Account Books, Vol. 2:86, 1/20/1815). Three unnamed, enslaved persons were listed on the William Reed's inventory. The document also listed furniture and silver flatware, that when enumerated, typified items more likely to be found in a tavern than a moderately sized two-story family dwelling, such as, two punch bowls, tea boards, a coffee urn, 42 pieces of silver flatware, three looking glasses, over twenty chairs and seven beds (86). It also is possible that Thomas Sellick, a seaman, may have been staying with William Reed, as he is listed as a tenant without a house on the Lot 77.1 assessment. One explanation that takes into consideration the tax assessment, license and inventory, is that one of the two-story houses on Lot 77 served as a tavern or rooming house during that period of time.

The 1827 Tax Assessment establishes that there were four houses on the Slacum's Union & Duke Street property (Alexandria Tax Assessment 1827, Ward 1). The document also corroborates the information in the 1810 Tax Assessment that one of the two-story houses was used as a tavern or rooming house. The overall value of the Slacum property in Parcel 77.1 in 1827 was $4,000. Ann Johnson, who was the occupant of one of the two-story houses had a tavern license. Samuel Smith (seaman) who was occupying the other two-story house also had a tavern license. Two individuals, Baker and Johnson, who were not listed as leasing tenants, were staying at the house with Samuel Smith. John Rodda occupied one of the one-story houses, and Ellenor Sisson, the other one-story house.

Parcel 85.2 in the southern section of the square contained several buildings that were part of a tavern complex during the 1830s and 1840s. By 1830, a brick house and frame house in Parcel 85.2 were operating as taverns. This information is verified by the 1830 tax assessment which states that Josiah Davis was proprietor of two, two-story houses on Wolfe Street and the Strand (Alexandria Tax Assessments 1830, Ward 1). The houses and lots were valued at $3,800. One house was occupied by William B. Stuart and the other by James Allen. The 1830 census states that William Stuart was head of a household with twelve residents and five of these were enslaved persons (Alexandria Census 1830, Ward 1). The 1833 assessment shows that Josiah Davis was taxed for two houses and lots on Wolfe and the Strand. James Posey was the occupant in the first house listed. He was retailing liquor and had a tavern license. The record also lists a second tavern house, on the Strand only, occupied by James Allen who was also licensed and retailing liquor. Referred to simply as the "Tavern House" in an advertisement placed in the *Phenix* Gazette, the tavern may not have had a formal name (*Phenix*

Gazette, 7/7/1830). The brick dwelling referred to in the same advertisement was a new dwelling that Davis built near the northeastern corner of Parcel 85.2. By this period, the property also contained a stable, a carriage house, and several additional outbuildings (*Phenix Gazette*, 20 May 1930). The Lower Ferry, also known as Rozier's Ferry, also operated from the foot of Wolfe Street during this period and Josiah Davis appears to have had some ties to the ferry operation. In 1827, it was operated by Aquilla Emerson, who also resided within the square (*Phenix Gazette*, 6/5/1827).

An 1841 notice advertised the sale of Josiah Davis's real estate including houses with Lot 85.2. These were a brick dwelling, the frame tavern house, and the brick tavern house adjoining (*Alexandria Gazette,* 8/19/1841 p.1: Figure). The description states that buildings were adjoining or situated very close to one another (1). In 1844, Davis advertised his large frame Tavern house for rent, which had been "formerly occupied as a tavern (*Alexandria Gazette*, 7/ 8/1844, p.3)." These advertisements indicate that the tavern went out of operation in 1843 or 1844. Josiah Davis and his wife, Sally, mortgaged the property in 1842 and then defaulted (Alexandria Land Records Book G-3:380). Francis Smith was appointed Trustee by the Circuit Court to sell the mortgaged real estate. The property was sold at public auction in 1845, to James Green, the furniture manufacturer.

Commerce and Taxes

Residents of the square during the first half of the nineteenth century were engaged in the hospitality industry, the maintenance of ships, the production of wares to support shipping, and as merchants or laborers. Goods provided by businesses in the square included barrels, bread and crackers, and lumber. Census records list the occupations of residents as highly variable. They were a mix of seamen, laborers, carpenters, or were licensed shopkeepers or tavern keepers or involved in ferry operations. Newspaper advertisements show that Charles Jamieson occupied one shop near Hooe's Wharf and leased a second shop on Robert Kirk's property on Union Street. Jamieson advertised the sale of barrels at his cooper's shop which was situated near Hooe's Wharf (Alexandria Gazette, 4/2/1802 p.3). However, in a second notice Jamieson advertised the sale or lease of a cooper's shop "with a double chimney fronting Union, between Duke and Wolf Streets, with a lot 75 X 20 feet, enclosed, near the Lower Ferry - an excellent stand for a retail shop (Alexandria Gazette, 5/5/1804 p. 4).

The 1825 assessment taxed William and Loudoun Campbell for Duke Street lots and houses in Public Lands Parcel 3 (Alexandria Tax Assessments 1825, Ward 1). The first property was a one-story "shed" on Duke Street valued at $100.00. This notation likely referred to a carpenter's shop as in earlier assessments. During the 1820s and 1830s, the Campbell brothers supported Alexandria's shipbuilding industry and the regulation of lumber that entered the port. Their skills in carpenters and ship joiners were in demand. A report of the election of officers for the Common Council in March 1825 stated that Loudon and William Campbell were to serve as the "measurers of lumber' (Alexandria Gazette, 3/10/1825, p.3). The brothers were elected to this position as early as 1820 and maintained this position over time.

Commerce was organized and managed at several levels. The Alexandria Town Council established regulations, standards and guidelines for trade. Inspectors of imported goods were elected by the council. Whether it be lumber or whiskey, these inspectors ensured that certain standards were met. Wharf management, shore and causeway maintenance, warehouse keepers, and shopkeepers also had to comply with regulations set forth by the town. The town also had the ability to monitor the port if dangerous situations arose. In 1803 and 1804 there was a serious yellow fever epidemic in Alexandria (Alexandria Gazette, 7/14/1804, Mitchell and Miller 1804). The Common Council regulated the quarantine of vessels coming into port that might contain cargo that could putrefy, surmising that spoiled foods might bring on the fever. The areas near the wharves saw a higher occurrence of cases. Many Alexandria residents moved to the country to avoid getting sick. It is important to note that the Alexandria Common Council also owned the Public Lands with square. Leasing to responsible individuals ensured that the town lots would be well maintained.

Shipmasters and merchants were responsible for managing international imports and exports, and as ships arrived, the safe storage of goods. During the early nineteenth century the Alexandria Gazette documented numerous storms, fires and floods that destroyed warehouses along the Alexandria waterfront. Good storehouse management was essential as perishable goods spoil. The upper levels of storehouses were sometimes occupied as a residence, thus, might provide artifacts or features related to the specific types of goods stored and also artifacts related to various occupants over time. Individuals who owned lots within the square were responsible for paying taxes on time and maintaining their property. This was one of the many issues the owners of Potomac Mills faced. They owned the mill, but not the land beneath it, for this was part of the land that the Corporation had reserved as part of the public lands on Point Lumley.

Chapter 4
Local Commerce and Feature 125

Introduction

> *"Alexandria is a very handsome town, prettily situated on the banks of the Potomac, which is there one mile and a quarter wide. The commerce of the place is diffused in many parts of the globe, but more particular to the West Indies, and the northern seaport towns of America. Flour appears to be the principal article of exportation, in return they receive groceries of various kinds, such as sugar, salt, rum, brandy, etc. The streets of Alexandria intersect each other at right angles, they are well paved, of an extensive width, and kept perfectly clean. It is not less noted for the excellence of its police, than for its many other advantages, which very materially result from that source. There is here open every morning, an abundantly supplied market with all kinds of meats, and every species of vegetables. The buildings are chiefly of brick, some of them stately and elegant. The banks are kept in houses quite magnificent…. The wharves are crowded with vessels of different sizes, many of which are [locally] laden for an immediate departure – when circumstances will permit."*
>
> (Alexandria Archaeology 2009, citing the Journal of Captain Henry Massie in the Tyler Quarterly, vol. IV, no. 2; October 1922, pp. 78-81).

Captain Henry Massie wrote the preceding description of flourishing maritime trade in the City of Alexandria in his journal in 1808. He highlights the handsomeness of the City and the busyness of the waterfront as ships arrived with goods for local markets and left heavy with goods (that's a lot of flour!) for overseas markets. The City of Alexandria functioned as a center of maritime commerce. Importation and exportation of consumer goods to cities like Alexandria during the late eighteenth and early nineteenth centuries, were water dependent. As an active port, Alexandria supported a number of maritime-focused enterprises. Exhaustive studies of the development of Alexandria's waterfront and commercial district enumerate the many businesses, individuals, and trades required to keep such commerce afloat (see e.g., Shomette 1985; Alexandria Archaeology 2010). Industry catering to the needs of waterborne commercial trade littered waterfront wharfs. Contemporary newspaper advertisements also, itemize the range of consumer products available for sale as well as those exported elsewhere. In late 1801, prominent Alexandria merchant Robert Townsend Hooe had for sale:

> Robert T. Hooe and Co.
> HAVE IMPORTED,
> *In the brig Neptune, from Lisbon*,
> AND OFFER FOR SALE,
> 100 casks Lisbon Wine of a
> superior quality,
> 800 bushels of Salt,
> 1bale of Morocco Skins,
> A few boxes of Lemons and Oranges,
> Figs in Frails,
> Olive Oil, Almonds, Filberts,
> 10 bundles floor carpets and foot mats.
> *They have likewise on hand,*
> A few bales of Negro cottons and blankets,
> German Linens,
> Earthen Ware in crates, Sugar in hhds.
> and bis. And coffee in bags and tierces.
> Nov. 30.
>
> (*Alexandria Advertiser And Commercial Intelligencer*, December 23, 1801)

These items were from a single November shipment brought from his brig Neptune, recently returned from Lisbon and docked in Alexandria. Available goods included foodstuffs, textiles, ceramic dishes, hardware, tools, dry goods, and other sundry items of the exotic and mundane.

Significant collections of material culture representative of maritime trade were recovered during archaeological investigations of portions of the RTS Project Area. As summarized in later volumes of this report, during the late eighteenth and early nineteenth centuries numerous industries and commercial enterprises operated within the Project Area. Archaeological evidence of a number of possible warehouses, storehouses, shops, and other small businesses engaged in either the direct sale of imported/exported goods or in support of these endeavors were identified within the Project Area.

Archaeological and archival records illustrated what everyday life may have looked like along the waterfront. A typical day on Fleming's (later Kirk's) wharf from all accounts would have been bustling with people exchanging goods and services as they went about their daily lives. We know of several merchants operating within the Project Area at one time or another. Among them Captain George Slacum, Robert Kirk, Robert Townsend Hooe, and William Hartshorne. Unfortunately, only a handful of features, and even fewer artifact sub-assemblages could be directly tied to any specific man or their enterprise. Despite these hurdles, the cultural deposits within Feature 125, a warehouse foundation, provided a rich microcosm and illustrative example of local commerce and industry on the Alexandria waterfront. This artifact collection will be the focus of this chapter, and materials from other features will be highlighted when appropriate. It is the hope that this large deposit serve as a jumping off point to better understand maritime commerce in the City of Alexandria.

Warehouse-Related Material Culture in Feature 125

The most significant commerce related feature was the warehouse foundation identified as Feature 125 (Parcel 85.1; Figure 4-1). Additional warehouse related features included Features 91 (Parcel PL-1) and 151 (Parcel 85.4). These features contained similar types of artifacts to those identified within Feature 125. Cultural deposits within the warehouse foundation contained a wealth of artifacts and insight into the myriad commercial endeavors on Fleming's (later Kirk's) Wharf during the last quarter of the eighteenth century. By examining the material culture from these contexts alongside the archival record, we can better understand the role of maritime commerce in supplying the City of Alexandria.

As indicated in the summary of Feature 125 (see Parcel 85.1) and in the artifact distribution pattern analysis, material remains indicative of a warehouse, possible coopering, and potentially commercial sewing or tailoring related work were concentrated within the foundation. We know that a grain merchant, James Kirk (and later his son Robert Kirk) owned the land in the area of Feature 125 during its short period of use. It is unclear whether he used the land himself, or if the land was utilized by those it was leased to. Regardless, it is clear that the location of the warehouse with the entrances to its three bays opening onto the wharf was a prime location for the offloading, loading, and storage of goods both for sale and as chandlery for outfitting a merchant ship or fleet. It also was by all accounts, and as the archaeological record suggests, a place to perform other associated tasks. These included preserved and commercial foodstuffs, coopering/warehouse related tools, and sewing related artifacts.

<u>Preserved and Commercial Foodstuffs</u>

Whether consumed by individuals in the City of Alexandria or by sailors aboard vessels leaving port, Jones (1993:26) in her survey of commercial foodstuffs and their containers notes the variety of food products available in urban centers. She enumerates them as "spices of all kinds, fresh, dried, and candied fruits, rice, grains, vermicelli and macaroni, scented waters, seeds for garden vegetables, condiments, hams, butter, cheeses, dried beans, potatoes, salt pork and beef, fishes, flour…processed foods of many types, staples, and baking and cooking supplies." Archaeobotanical analysis of screened samples (non-flotation) from Feature 125 indicated the presence of wood fragments and a few peach pits (see Volume V). Therefore, evidence for preserved and commercial foodstuffs recovered from Feature 125

Figure 4-1 Photograph showing an overview of Feature 125, view south (WSSI staff, 3/1/2018)

was dependent on the remains of the containers used to store and ship products. The presence of fragments of glass containers suggested that alcohol including the ubiquitous porter, ale, beer, and wine as well as a variety of other spirits such as "brandy and gin, cider, punch ingredients such as shrub, lemon or orange juice, perfumed waters, patent and proprietary medicines, olive oil, snuff, mustard, pickles, and sauces were all sold in bottles" (Jones 1993:33-35). While detailed glass analysis was limited to diagnostic portions of glass containers, these types of storage containers were noted and among them were "wine" bottle glass, case bottles that likely held gin or other spirits, and bottles specific to olive oil/capers and snuff.

Detailed faunal analysis of cattle remains (see Volume V) concluded that barreled beef may have been among the foodstuffs stored within warehouse Feature 125. The relative abundance of cattle bones demonstrated, with the documentary record, that a number of slaughterhouses were operating on the City's perimeter. The City of Alexandria brought in grain and livestock for local consumption and to be shipped overseas. The number of cattle bones recovered across the Project Area therefore are a byproduct of Alexandria's trade with Virginia's interior and in turn, beef (and grain) exports overseas. Concentrations of cattle bones in the Project Area, and Feature 125 in particular, had to do with the general preference for beef in the Chesapeake region from early Colonial times, and the urban population's access to it thanks to the interior trade and industrialized processing by slaughterhouses. In turn, the slaughterhouses and their production of barreled beef undoubtedly account for the professionally sawn and similarly sized, portions of meat. New World practices of preserving beef included the use of any anatomical part which was then salted and barreled. Therefore, given body part presence and butchering patterns, it is likely that salted beef was stored in this particular warehouse. Based on the distribution analysis of barrel related artifacts and faunal remains, these items may have been stored in the northern bay of Feature 125.

Jones (1993:27-28) also notes the importance of a wide range of staved wooden containers (including tierces, kegs, casks, barrels, tubs, drums, puncheons, and hogshead) to transport and store large quantities of a specific product. Different containers held either wet or dry goods. Recovery of barrel or other wooden container elements (Figure 4-2) is therefore perhaps most indicative of the function of Feature 125 as a warehouse.

Figure 4-2 **Examples of iron barrel hoop fragments from Feature 125. Hardware like this, in a variety of sizes, would have been used on a variety of wooden staved containers.**

Among the identified elements were ferrous barrel hoops/strap hardware (n=38), a possible barrel stave, and a marked barrel head. The latter was marked "…POST/…YORK/POR…ON/ QUALITY" (Figure 4-3). The markings may, although incomplete, provide some indication of the story of its former contents. Jones (1993:26-27) notes the use of modifiers to describe a product's origin, quality, or quantity for example. A wooden scoop (Figure 4-4) may have been used to dispense dry goods.

<u>Possible Coopering Tools</u>

Tools and equipment associated with the construction and repair of barrels, as well as the moving of stored goods within the warehouse also were recovered from Feature 125. Possible coopering tools (Figure 4-5) included four stock or rattail files, a drawknife, the handle of a flagging iron, a gimlet, and an unidentified tool that appeared similar to a small flagging iron. Flagging irons, a prying tool, were used to remove barrel heads or in the caulking of barrels. The draw knife may have been a specialized version used in the hollowing of the inner faces of staves. A gimlet (Figure 4-6), a hand-held boring tool used to make small holes in wood, also may have been used to inspect barreled products without needing to remove a bung. A sliding rule (Figure 4-7), found in a non-provenienced context, also may have been part of a cooper's tool kit. A wooden pulley recovered from the warehouse was evidence of the rigging and equipment necessary to offload and move barreled goods from arriving and/or departing ships.

Other Local Commerce and Industry

There is plenty of documentary evidence for other local commercial enterprises operating within the Project Area. Business and trades such as coopers, blacksmiths, ship builders, and bakers, directly supported the shipping industry. However, with the exception of the coopering tools mentioned above there was scant material evidence of these other commercial enterprises. Evidence was instead limited to architectural remains or one or two significant artifacts. The possibility of commercial sewing/tailoring and/or the manufacture of utilitarian bone buttons, usually considered to be part of the domestic sphere, was noted in the activity related artifacts from Feature 125 including a possible connection with nearby Fea-

Figure 4-3 Marked barrel head prior to conservation treatment.

Figure 4-4 Wooden scoop prior to conservation treatment.

Figure 4-5 Possible copper's tools. These tools may have been used by a copper onsite or sold as merchandise. Stock/rattail files (top row), handle of possible flagging iron and small undetermined tool (middle row), and drawknife (bottom row).

Figure 4-6 Copper's also used tools like this gimlet. The gimlet, shown prior to conservation treatment, also was recovered from Feature 125.

Figure 4-7 A slide rule fragment recovered from a non-provenienced context also may be a woodworking tool.

ture 120 (to be discussed later). Button manufacture and sewing/tailoring related artifacts were common at both features and may hint at a connected workspace or continuation of activity areas on the landscape, perhaps especially for those in the enslaved community.

Sewing-Related Activity

The ubiquity of sewing related materials in domestic fill throughout the Project Area must be acknowledged. Both Features 125 and 120, however, contained significant quantities of these artifacts in culturally significant contexts. In addition, the identification of bone button manufacture related waste was unique to Feature 125. The presence of tailoring related material culture also speaks to the likelihood of male use of the objects and the possibility of other types of "sewing" including leatherworking such as shoe or saddle/harness work or repair. As Beaudry (2006) argues, the presence of sewing related materials has traditionally been associated with women and the domestic sphere. However, the commercial nature of the context within which these objects were found begs us to consider the possibility of another significant waterfront enterprise and the roles of both men and women, particularly the enslaved, in those activities. Bone button manufacture waste and sewing related artifacts recovered from Feature 125 will be discussed below.

Bone Button Waste

Bone button waste was, with the exception of two specimens in Feature 120 and one from Feature 48, entirely concentrated within Feature 125 (Table 4-1). Bone button producers clearly had developed a specialized, efficient, and repeatable *chaîne opéatoire* for the manufacture of these blanks. As described elsewhere in the relevant literature (Klippel and Price 2007), certain bones were selected, with a preference for, naturally, those anatomical elements that are flat and dense. In the case of cattle, eighteenth century button producers mainly utilized ribs and scapulae (cf. Klippel and Schroedl 1999:224), as in Alexandria (Figures 4-8 and 4-9). Other flat elements could also be used, including certain pelves, vertebral processes, and mandibles (Klippel and Price 2007:123). In the case of the RT South button waste assemblage, it was primarily, but not only, cattle bones that were utilized for buttons. Other animals, and elements

Table 4-1 Bone button waste from the RT South Collection

Feature	FS no.	Species	Element	nh	Diameter of button holes (mm)					
					Hole 1	Hole 2	Hole 3	Hole 4	Hole 5	Hole 6
48	565	Cow	rib	3	8.77	9.34	nm			
120	863	Cow	rib	3	nm	33.31	nm			
120	885	Cow	rib	2	10.54	10.33				
125	923	Cow	uid	3	nm	21.7	22.42			
125	933	Cow	rib	1	11.76					
125	933	Cow	rib	4	nm	9.87	11.08	8.44		
125	933	Cow	rib	6	nm	11.83	11.67	12.04	11.73	nm
125	945	Cow	rib	2	27.61	33.75				
125	947	Cow	rib	2	nm	nm				
125	947	Cow	rib	none						
125	947	Cow	scapula	3	nm	28.79	34.3			
125	959	Cow	rib	2	nm	nm				
125	961	Cow	rib	2	24.21	nm				
125	971	Sturgeon	scute	2	33.09	nm				
125	971	Cow	rib	1	19.75					
125	971	Turtle	plastron	1	28.08					
125	971	Cow	scapula	4	nm	28.41	28.29	nm		
125	971	Cow	rib	1	nm					
125	974	Cow	rib	1	31.27					
125	975	Cow	rib	1	25.03					
125	976	Cow	rib	3	nm	31.77	nm			
125	977	Cow	rib	3	12.13	11.89	11.76			
125	977	Cow	rib	2	10.36	11.64				
125	977	Cow	scapula	2	33.1	26.95				
125	978	Turtle	plastron	3	nm	nm	nm			
125	985	Cow	rib	1	25.61					
125	986	Cow	rib	3	nm	29.77	30.54			
125	986	Cow	rib	2	25.9	nm				
125	986	Cow	rib	2	nm	20.29	22.74			
125	986	Cow	rib	2	35	nm				
125	988	Cow	rib	5	nm	11.71	11.72	10.73	10.57	
125	988	Cow	rib	1	26.42					
125	988	Cow	rib	1	32.17					
125	988	Cow	rib	6	9.95	11.98	11.82	11.94	11.99	10.74
125	988	Cow	rib	4	8.85	11.57	10.69	nm		
125	988	Cow	rib	4	11.48	11.02	11.34	11.91		
125	988	Cow	rib	2	25.36	nm				
125	988	Cow	scapula	4	31.17	27.31	nm	27.93		
125	991	Cow	rib	1	7.86					

Table Key:
nh (number of holes); nm (not measureable); iltalics (estimated diameter based on less than a half circle

Figure 4-8 Cattle rib fragment with at least two button discs removed (FS 986)

Figure 4-9 Two cattle scapulae fragments (FS977) from which both small (upper fragment) and large (lower fragment discs were removed.

used for the purpose included one or more unidentified species of turtle, making use of the flat plastron (lower shell) (Figure 4-10), and a very large sturgeon (Figure 4-11). Some ribs are significantly smaller than others (Figure 4-12) and may be from a smaller domestic animal such as a sheep, goat, or pig. However, no anatomical landmarks remain and these specimens could instead be the narrow, upper portion of cattle ribs. The discs were drilled from bones using a hollow bit with a central guide, creating circles with a hole pierced through the middle. Many specimens had had several discs drilled form them; in this collection up to six (see Figure 4-12). Once the first disc was removed, the drill was placed close to the hole left behind, evidently in order to get as many button blanks as possible from a single bone. While, out of anatomical necessity, button makers arranged their drills on ribs so that the blanks were taken out along a straight line (see Figure 4-8), on the scapula, a broad, flat element, discs were removed in a different pattern, moving out in all directions from the first hole to remove subsequent bone circles, as much as the shape of the bone would allow.

The button making waste also demonstrates accidents that occurred in the manufacture process, as when a disc split during drilling. Bone, however, despite soaking prior to manipulation, part of the manufacturing process (Klippel and Schroedl 1999:226), nonetheless easily split during disc extraction. In those cases, the partially drilled but broken blank was left in the bone and, to the extent possible, the element was used to generate additional buttons rather than thrown away. One cattle pelvis fragment and a rib section (Figures 4-13 and 4-14) are the only two specimens in this collection wherein a button blank was abandoned within the bone. Klippel and Schroedl (1999:224) discussed the process of bone button manufacture in detail. The process they described at a site in St. Kitts appears to have been the same here: ribs were split longitudinally and scapulae were reduced to the blades after articular ends were removed. In the case of the RT South collection, ribs were also prepared by having the cortical surfaces polished and interior cancellous (that is, spongy) bone ground down in order to have two smooth surfaces (cf. Cumbaa [1986:3]).

The button waste was analyzed not only to discover which species and elements were used, along with the manufacture process, but also to understand what size buttons were desired. To do this, the diameters of the holes left from removal of the bone blanks were measured using a Mitutoyo digital caliper (accurate to 0.01 mm) with input to the computer via a cable and foot pedal. As shown in Table 4-1, breakage of the bone after removal of the blanks was common, and many holes were either incomplete or the rest of the bone past one or two holes was entirely missing. Refit attempts were largely unsuccessful. All complete holes were measured, as were holes where large enough portions remained to measure diameters. Holes where less than half the circumference remained produced estimated diameters, shown as italicized numbers in Table 4-1, The measurements indicate that button makers primarily made buttons of two sizes, a small button having a diameter ranging from ca. 8 to 12 mm, and large ones with diameters of some 25 to 33 mm. There is no overlap between the button size range: the smaller ones average 11.5 mm in diameter and the group has a standard deviation of 3.9 mm; the larger ones average 28.3 mm in diameter and also have a standard deviation of 3.9 mm (Figure 4-15). The standard deviations also indicate that the drill bits used by the button makers had a certain size variation, especially for larger-sized buttons. Nonetheless, the difference as the upper and lower ends of each size range was small. Clearly, more than just a cottage industry, button manufacture had by then become a regularized industrial process, and that buttons had to conform to size standards in order to fit with local demands from, presumably, global influences.

The size observations stand in contrast to Cumbaa's (1986) remarks about bone buttons, and button making waste, found in Ottawa. He described the wide size range of buttons found there and therefore concluded that it was a home and/or cottage industry. While things may have been less developed and smaller in scale in the colonies and the early republic, there were certainly button factories in England by the mid-eighteenth century (White 1977:68). Klippel and Schroedl's (1999:229) measurements of disc diameters agree with Cumbaa's observations, since their over

Figure 4-10 Turtle plastron from which bone discs were cut (FS 978).

Figure 4-11 Sturgeon scute from which a large, great coat-sized, button disc was removed (FS 971).

Figure 4-12 Button-making waste from Feature 125, including a scapula fragment (lower left) and two rib shafts. Bone in the lower right, with six holes, may be from a smaller animal (FS 988).

Figure 4-13 Cattle scapula with two discs successfully removed with a third disc only partly drilled and left in place (FS 948).

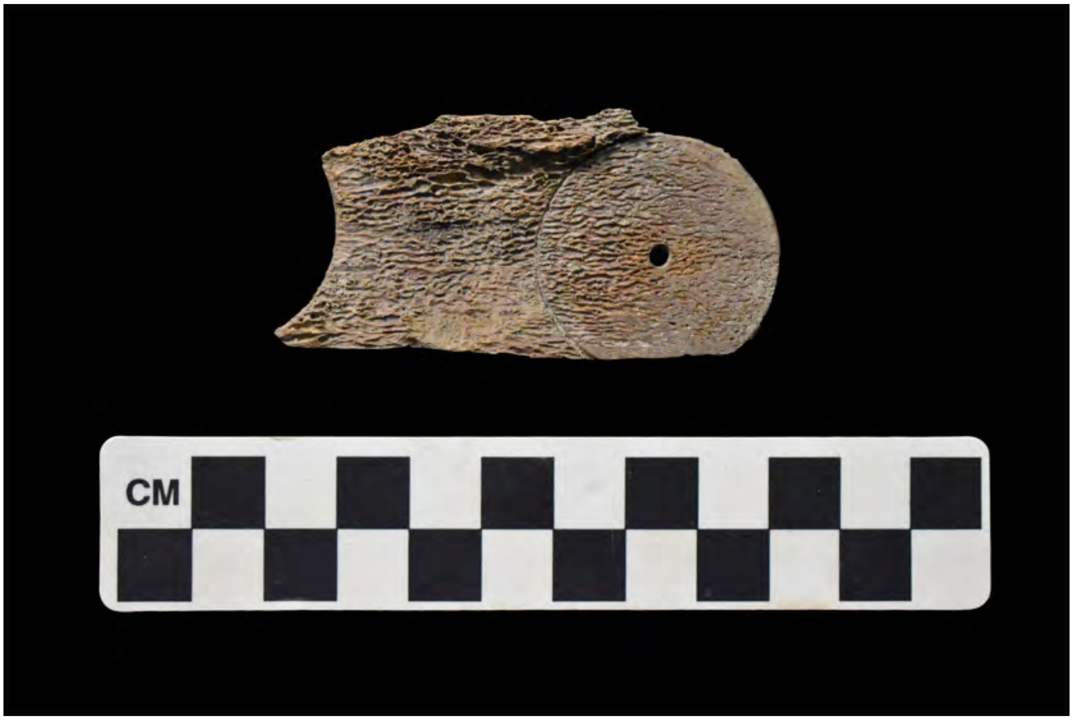


Figure 4-14 Cattle rib with one button disc removed and another only partially drilled (FS 945). Note the ground down cancellous bone of the still-in-disc as compared to the unmodified interior bone to the left.

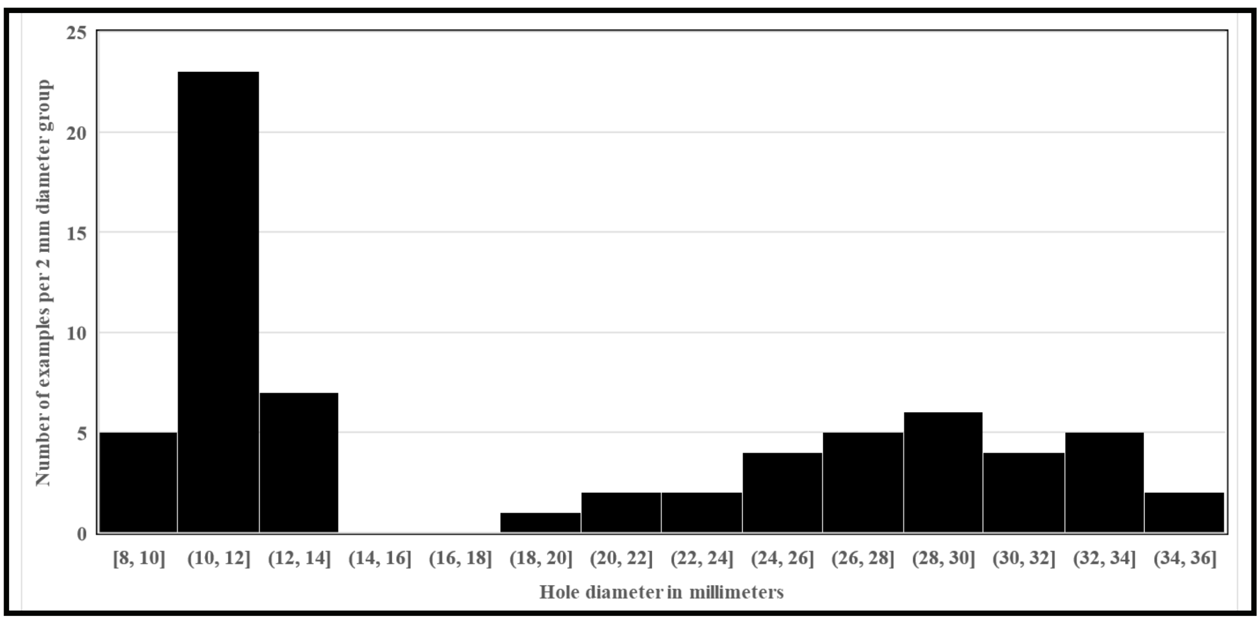


Figure 4-15 Graphical display of button disc hole diameter, showing the presence of two size groups.

600 bone buttons show a near-unbroken diameter range from 8.5 to 32.0 mm, although most buttons fall within a range of 12.0 to 15.0 mm. Klippel and Price (2007:136) later, with the same dataset, argued that the size range included four clusters in 2-3 mm size ranges. These consisted mainly of discs measuring 9-10 mm, 12-14 mm, and 16-18 mm, and "a fourth less prominent cluster between 19 and 22 mm". As Klippel and Schrodel (1999:230) and others logically have concluded, button size, to a degree, correlated with clothing type and placement on the garment.

As mentioned at the beginning of this section, almost all button making waste was recovered from Feature 125. The concentration of that waste within one building foundation suggests, naturally, that button making was located in or near that warehouse. A limited range of button sizes produced, even more so than the use of a limited range of material (no doubt imposed by its physical properties), demonstrates that the demand for clothing fasteners had stabilized by ca. 1800, at least locally, such that essentially only two button sizes were required. That is in contrast to Cumbaa (1986) and Klippel and Schroedl (1999), whose samples both came from military occupations. It in turn suggests that, despite the fact that fashions—including clothing fastener types (White 1977:70)—had already become universal, the military populations who occupied both areas discussed by the latter authors had other tastes or requirements.

Marcel (1994) excerpted a Maryland plantation owner's account of a mill fire. During his investigation of the fire, he wrote down his interview with the slave, Mr. Cox, who ran the mill. The interview mentioned Mr. Cox's garments stored in the mill and presumably lost in the fire, and specifically called out the types of buttons on various clothing pieces, including a broadcloth coat, a waistcoat, and breeches. Klippel and Schroedl (1999:230) state that buttons equal to or larger than 17.5 mm in diameter would have been attached to great coats, while smaller ones were attached to a variety of other clothing items such as the breeches and waistcoat of Mr. Cox. The button size dichotomy observed in the button waste of Feature 125 demonstrates that button making for great coats, but also for other garments, took place in the project area in a surprisingly standardized manner. Given the near-singular location of the button waste within one feature, it appears that the button making industry of Alexandria at the turn of the nineteenth century was centered in one place. To judge from the sizes of the buttons produced, the Alexandria industry appears to have specialized in the manufacture of buttons for a limited range of clothing. Connecting evidence of place with evidence of size, it seems logical that the City's button makers produced utilitarian buttons to fill the needs of, especially, sailors or perhaps other lower class populations such as the enslaved.

Sewing-Related Artifacts

Evidence of the manufacture of utilitarian one-hole bone buttons was found in conjunction with other sewing and tailoring related artifacts within warehouse Feature 125. As Mary Beaudry (2006) concludes in her survey of the types of sewing related artifacts recovered from archaeological sites and their interpretation, while sewing related items are traditionally considered markers of women's domestic work, the who, what, and why matter. The context in which sewing related artifacts are found asks us to consider these objects beyond the domestic sphere. For instance, Beaudry (2006:175-176) specifically highlights the sewing aptitude of sailors as an appropriate example that challenges our traditional interpretation of these objects.

For purposes of this analysis, the category of sewing related artifacts was conflated to include implements and supplies as well as more broadly, clothing related artifacts (namely fasteners). Among sewing and tailoring equipage were straight pins, thimbles, scissors, and clothing fasteners.

Straight pins came in a variety of sizes for a range of uses. Pins dating from the seventeenth and eighteenth centuries were brass was wound heads (Beaudry 2006:16-17; Hume 1969:254-255). Pin making was labor intensive, with a single person able to produce only about 20 per day (Beaudry 2006:20). In addition, the majority of the pins from this period were imported from England. Pins had uses beyond sewing as fasteners for clothing, wigs, lace, upholstery, and for securing burial shrouds among other utilitarian uses. Common sewing pins, known to pinmakers as "short whites" or "middlings," were the most common type of straight pins. The former were typically between 24-30 mm long and 1 mm in diameter, while the later were "pins of medium size," likely somewhere between 30-70 mm and 1.5 mm in diameter (Beaudry 2006:25). In total, 345 complete straight pins were recovered from cultural contexts associated with Feature 125 (Figure 4-16). Sizes for recovered pins in Feature 125 (Table 4-2) ranged from 20-55 mm in length. Nearly 96 percent of the recovered pins measured approximately 30 mm in length. Straight pins from Feature 125 were likely the utilitarian sorts used in sewing or as clothing fasteners.

Table 4-2 Straight pins by length from Feature 125, RT South Collection

Length (mm)	Total
20	1
25	1
30	330
35	4
37	3
40	3
50	2
55	1

Buttons are another common artifact recovered on historic sites. Buttons come in a variety of materials, sizes, and levels of decoration for use on a range of garments and other clothing items. In the eighteenth century buttons were most often used as clothing fasteners on men's dress. Women's clothing was fastened with laces, hook and eye closure, and straight pins. As Hinks (1988:13) concluded, "…specific buttons were generally worn on specific types of clothing…and is normally based on size and construction material."

Raw materials, which changed over time, included bone, ceramic, metal/metal alloys, glass, shell, wood, and synthetic materials. The types of buttons recovered, of course, depends on the preservation of the material in the ground. Shell and wood buttons, for example, degrade easily. Preservation aside, both bone and metal buttons appear to be popular material types for eighteenth century buttons (Marcel 1994; Hinks 1988; Hume 1969:88-93). Button size, as many have concluded, correlated to clothing type as buttons of certain sizes often were used on specific, generally male, garments (Hinks 1988; Klippel and Schroedl 1999:230; Marcel 1994).

Although manufacture method, and more specifically shank type often provide clues to dating, material type and size of the button assemblage from the cultural contexts of Feature 125 were analyzed in order to determine how these buttons were used and by whom. Plain **bone buttons** tend to be utilitarian in nature, used for such purposes as the fastening of undergarments (Marcel 1994:4). Table 4-3 summarizes the sizes of the bone button and button fragments recovered from the cultural context of Feature 125. The majority of the buttons are one hole utilitarian type buttons (n=32), with only one four hole sew through bone button present. Sizes of recovered buttons ranged from small buttons (11 mm) to larger buttons (30 mm and bigger) (Figure 4-17).

Table 4-3 Bone buttons from Feature 125, RT South Collection

Type	Size (mm)	Condition	Total
One Hole	30	Fragment, Crude	1
	31	Fragment	1
	33	Fragment, Crude	1
	35	Fragment	2
	11	Whole	1
	12	Whole	4
	13	Whole	5
	14	Whole	2
	16	Whole	1
	17	Whole	2
	18	Whole	1
	20	Whole	4
	21	Whole	3
	22	Whole	1
	33	Whole, Crude	2
	32	Whole	1
Four Hole	17	Whole	1
Unknown	Unknown	Fragment	1

Based on the functionality of specific button sizes assigned by Klippel and Schroedl (1999:230) it would appear that many of the bone buttons from Feature 125 fall into the category of "great

Figure 4-16 Pins recovered from Feature 125. These were utilitarian pins used in sewing and as clothing fasteners called "short white" or "middlings."

Figure 4-17 Bone buttons from Feature 125. Smaller buttons are for utilitarian uses (top row) and the larger buttons (bottom row) may be larger great coat buttons. Buttons are similar in size (by diameter) to those that were made on site.

coat" being equal to or larger than 17.5 mm in diameter. Those of the smaller size would have been used on a variety of garments such as breeches and waistcoats (Klippel and Schroedl 1999:230). We can assume that the smaller buttons (11 mm to 16 mm) may have been used for these purposes. If we compare the complete bone button assemblage with that of the bone button waste assemblage discussed above, it is apparent that the completed bone buttons likely were manufactured on site. Although there is greater size variation in the completed bone button assemblage, some variability may be attributed to measurement error, but in general the buttons fall into the size categories of smaller buttons (8-11 mm) and larger coat buttons (25-33 mm).

In addition, the backs of many of the buttons, particularly the largest ones, are crude and unpolished suggesting they may have been produced on site and either lost or discarded prior to their completion. It also appears that the larger coast buttons may have broken more easily during production, possibly accounting for the greater number of large fragments. The absence of the smallest button sizes (less than 11 mm) is likely due to preservation. The smaller buttons would have more easily degraded than larger examples. The completed button sub-assemblage supports the conclusion that onsite bone button manufacturing was focused on buttons for specific uses, and generally included utilitarian and larger coat buttons.

Shanked flat disc metal buttons in an assortment of metal and metal alloys were common fasteners through ca. 1820 (Marcel 1994; Hinks 1988; Hume 1969:88-93). The majority, used on everyday clothing, are flat discs with an attached shank. Other two piece buttons and those with decorated faces are less common and may have been used on more extravagant clothing. Using data from the accounts of merchants and store owners, Hinks (1988) developed a typology for the types of buttons recovered on eighteenth century archaeological sites and their historical function. Based on his observations of buttons in archaeological collections, descriptions of historical clothing, and button orders from the papers of merchants and store owners, Hinks (1988:29-30) concluded the following:

> Seven major articles of men's clothing used buttons, including shirts, jackets, coats, frocks, waistcoats, banyans, and breeches. Shirt buttons were normally inexpensive thread/twist buttons. Jacket buttons were probably manufactured in only one size range, and included nearly all of the mentioned glass buttons, many of the pearl buttons, and some horn buttons, and a number of thread/twist buttons. Coat and waistcoat buttons were predominantly made of metal or thread/twist. These buttons came in two sizes, with the larger size used on coats, frocks, and great coats, and the smaller used on waistcoats and banyans. Breeches used both coat and waistcoat buttons. Sleeve buttons were what we normally call cuff links, and were worn on shirt cuffs. Pearl and horn buttons may have been worn on the jacket or the coat or waistcoat.

Based on his observations, waistcoat buttons range in size from 14 mm to 19.5 mm and coat buttons range in size from 18.5 mm to 35 mm and larger (Hinks 1988:39). Obviously there is some overlap in the correlation between button size and function. As "there is no guarantee that specific buttons were always used on such types [of men's clothing]" and it is "conceivable that waistcoat buttons were occasionally used on shirts…or as substitutes for missing game pieces" (Hinks 1988:5).

Outliers aside, the size of the shanked metal buttons recovered in the assemblage from Feature 125 (Figure 4-18), provide some indication of the types of men's clothing that may have been represented. Table 4-4 summarizes the size of recovered metal buttons. Thirty-one shanked metal buttons fall into the smaller button range (13 mm – 19 mm) and likely represent waistcoat buttons. An almost equal quantity (n=32) of larger buttons (20 mm – 35 mm) also were present. These likely represent the buttons of coats, great coats, and frocks. The majority of the buttons were plain, likely representing more everyday clothing. Decoration was noted on only a few of the observed buttons (n=3). At least one was a naval button exhibiting an eagle holding an anchor and another had an English rose motif and was octagonal

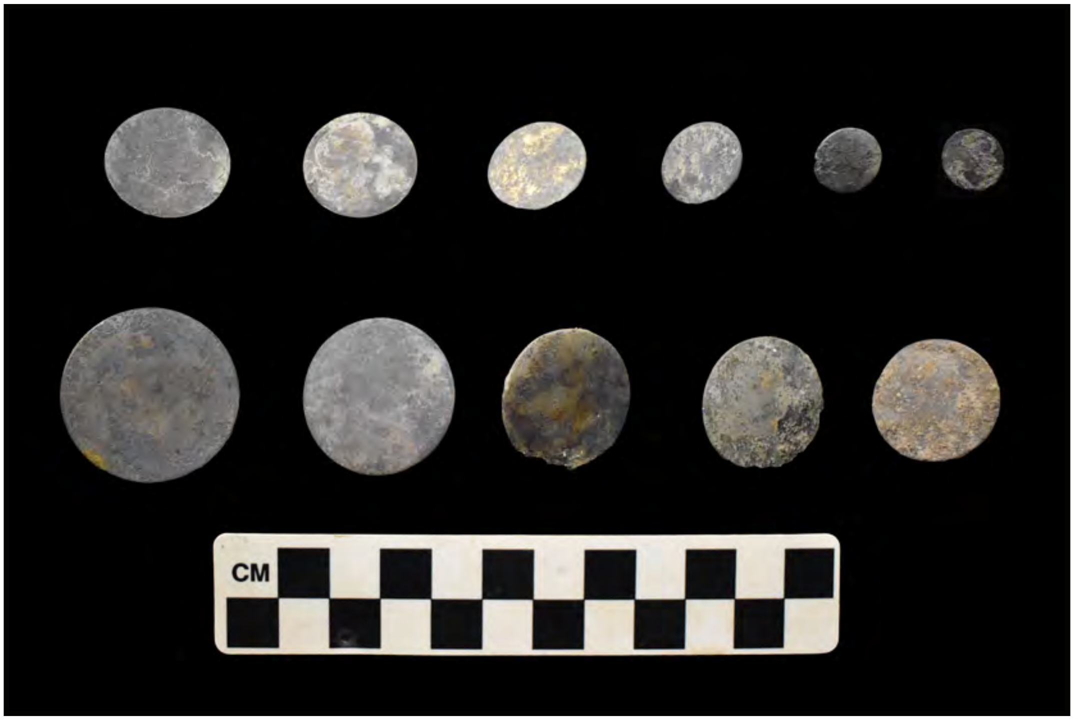


Figure 4-18 Flat disc, shanked metal buttons from Feature 125. The smaller buttons (top row) may represent waistcoat buttons. Larger buttons (bottom row) may represent those used on coats, great coats, and frocks. All the buttons were plain, typical of everyday clothing.

Table 4-4 Metal buttons by size from Feature 125, RT South Collection

Size (mm)	Total
13	2
14	6
15	9
16	3
17	9
18	1
19	1
20	7
21	2
22	2
23	3
24	1
25	5
26	1
27	2
28	1
30	1
31	2
32	2
34	1
35	2

in shape. In addition to shanked varieties, at least two possible button rings, the interior mechanism for thread or cloth covered buttons, and a single four-hole two piece button with bone inset were noted. A set of mother of pearl linked buttons, or cufflinks, also were identified.

Observations regarding material and size within the button assemblage from Feature 125 suggests that the majority of buttons were manufactured, whether on site as was the case for bone buttons, or in England, for use on everyday clothing. The bone buttons in particular would have been utilized on utilitarian garments and the plain style of the shanked metal buttons suggest they were used on everyday waistcoats, coats, and breeches. It is likely that much of the clothing represented by these buttons was worn by men. As with all artifact assemblages, recovered buttons represent only a small percentage of the buttons that would have been either manufactured or worn on site. Hinks (1988:32) offered several reasons for this pattern: 1) buttons are rarely purposefully discarded and are more often lost; 2) buttons, especially metal buttons, would have been recycled and/or reused; 3) the fanciest buttons would have been less often worn and, if lost, more often looked for. Therefore, he concludes that button assemblages are often skewed toward less valuable buttons (Hinks 1988:32). This observation aside, it is likely that the buttons represent the utilitarian, plain clothing worn for everyday use by both free and enslaved men laboring on the waterfront.

Buckles were included only for the similarity to other fasteners for clothing and personal adornment. Buckles were not only used for personal clothing and accessories, but also were used on harnesses. Frame shape and size, as well as chape/hook shape can provide clues to the use of buckles and which clothing or accessory they adorned (Grillo et al. 2012; Hume 1969:84-88; White 2002:185-241). The buckles from Feature 125 were fragmented. However, the large size (approximately 6-9 cm long by 5-9 cm wide) of more complete buckle frames suggest they may have been shoe buckles (n=8) (Figure 4-19). According to Hume (1969:86) shoe buckles were common on American archaeological sites from ca. 1700 through 1815. While the most expensive were made of silver and elaborately decorated, cheaper shoe buckles made of copper or cupreous alloys and pewter were still elaborately cast. Considering that shoe leather was recovered from the same contexts, and the common discovery of shoes (likely due to preservation and trash disposal practices) in port contexts, it is not surprising that shoe buckles may have been among the materials that accumulated in Feature 125 either by happenstance or on purpose. It also is not a leap to assume that harness buckles and other saddlery-related accoutrements may have been present in the multipurpose structure.

Used to protect the finger and to aid in the pushing of the needle through the material while sewing, **thimbles** were common tools of seamstresses, tailors, women, and young ladies. Descriptions of eighteenth and early nineteenth century thimbles indicate that thimbles were most commonly copper alloy, or brass, with straight sides and pattern stamped indentations and little to no decoration (Beaudry 2006:88-110; Hill 1995; Holmes 1985; Hume 1969:256). Hill (1995:314-315) notes correlations between gender and age within assemblages of thimbles. Thimbles, traditionally were a material marker of the feminine in archaeological assemblages (Beaudry 2006; Hill 1995). Domed thimbles in particular signaled sewing and mending activities, tasks associated with female domesticity (Galke 2018). Tailors more commonly utilized thimble rings, or open top thimbles suited to their palm style of sewing (Hill 1995:315). Even still, as Hill (1995:315) notes, "other pursuits which also required thimble rings included harness-making, saddlery, upholstery, and shoe-making." Age also is reflected in thimble assemblages. Children, particularly young girls, were taught to sew as "part of their domestic education" which is reflected in their use of the "tools of their mothers and other female relatives in miniature form" (Hill 1995:315).

Six thimbles and one thimble ring comprised the assemblage of thimbles from Feature 125. Table 4-5 summarizes the dimensions of the recovered thimbles. The thimbles were between 1.25 – 1.65 cm in diameter and 1.3 – 1.8 cm in height. Based on comparative data of children's thimbles from Spanish colonial sites studied by Holmes (1985:169), child-sized thimbles are approximately 1 cm in height. Relying on height alone, it is unclear if any of the smallest thimbles from Feature 125 are intended for use by children. However, the range of sizes both by height and diameter (Figure 4-20) indicated their use by a range of individuals. At least one tailor's thimble, or thimble ring, was recovered from the cultural context of Feature 125 and another was recovered from the fill material. As noted above, these are specifically assigned to use by tailors and/or for leatherworking – both typically male vocatoins. A range of individuals, likely both male and female, utilized the thimbles recovered from Feature 125 to perform a range of tasks. Thimbles

Table 4-5 Thimbles by size from Feature 125, RT South Collection

Type	Width (mm)	Height (mm)	Total
Child's(?) Thimble	12.5	18	1
Child's(?) Thimble	12.5	13.7	1
Adult Thimble	14	15	1
Adult Thimble	15.5	17	1
Adult Thimble	16	16	1
Adult Thimble	16.5	18	1
Adult Thimble Ring/ Tailor's Thimble	17	15	1

Figure 4-19 Shoe buckle frames (top row) and buckle chapes (bottom row) from Feature 125.

Figure 4-20 Thimble recovered from Feature 125. A thimble ring, used by tailors, is shown on the bottom right.

also were highly personal items. They have been documented as objects of ritual and tokens of affection (Galke 2018).

Scissors are defined as a "pair of opposed *blades* with *arms*, pivoted together in the center; at the end of each arm is a *loop*…for manipulating the scissors, and above the pivot, at the junction of the blade and arm, there may be a *stop* to prevent the arms overlapping" (Beaudry 2006:116). Scissors dating from the later eighteenth century tend to be narrower and the hafts are decorated with knops and balusters, particularly for nail and embroidery scissors (Hume 1969:269). Similar to the other sewing related items, scissors were produced in a variety of shapes and sizes for a range of uses. Sewing was just one of those purposes, because as Beaudry (2006:125) points out "people could use a pair of scissors any way they wished." A single pair of scissors was recovered from Feature 125 (Figure 4-21). Based on size and decoration of the scissors, as well as its association with other sewing related items and tools, the scissors are likely sewing scissors.

At least one worked bone object also was identified. It may be a thread barrel lid or a similar type of object (Figure 4-22). In addition, other objects in the collection upon further analysis may be part of a sewing kit or even a commercial tailoring or related operation. For instance, Beaudry (2006:163, 167) describes the use of stilettos, essentially awls made of bone, metal, or ivory as well as the use of lead for hem weights. The latter in particular she notes are "difficult to distinguish from pieces of lead sprue or flattened lead shot" (Beaudry 2006:167). Could some of the unidentified lead in the collection be hem weights, either used in men's coattails as Beaudry illustrates or as weights in other sewed items such as sails?

Evidence for a Possible Ship's Chandlery

The collection of artifacts from Feature 125 is evidence of merchant activity on Fleming (later Kirk's) wharf. The types of products represented archaeologically, including evidence of some of the very products advertised by Hooe (see Introduction, this chapter), coupled with evidence of packing and shipping containers and related tools illustrate the many commodities that were moved via ship. The distribution of these types of artifacts across the foundation suggests that the warehouse was multipurpose, likely serving as a storage location, possibly a packing location, and even a space for manufacture and other commercial activity. Glass bottle fragments, barrel parts, and coppering tools are evidence of the containers used to ship an assortment of goods. Butchered cattle remains suggest the storage of barreled beef. And, the array of other consumer goods such as ceramic vessels, utensils, and glassware also identified in the assemblage (although not discussed specifically), as well as those items which do not survive in the archaeological record (namely foodstuffs), also are likely goods moved by merchants in the area.

Archaeological investigation of the Hoff Store, a mid-nineteenth century ship chandlery in San Francisco, California, provides an additional hypothesis for the types of goods and activities identified within Feature 125. Hoff's Store was noted as a ship chandlery, a merchant who "supplied vessels for all kinds of stores" (Delgado 1990:29). Utilizing the documentary record including a chandler's catalog and broadsheet, archaeologists were able to identify objects within the archaeological record that would have been necessary for outfitting ships. Researchers found that this ranged from specific ship chandlery consisting of canvas, cordage, hardware, paint, and tools to more general items such as clothing, dining vessels, cutlery, and foodstuffs necessary to sustain a ship's crew (Delgado 1990:25-47). Chandlers are noted in the Project Area, although not necessarily in this specific location. Merchants, as noted in the documentary record had the responsibility to outfit and supply their own vessels (Ford 2001:16). Therefore, merchants would have likely needed either a place to purchase such supplies and stores and/or a place to store them near to the water for easy loading onto outgoing vessels.

The possibility of button manufacture and perhaps commercial sewing activities within Feature 125 adds another dimension to the warehouse foundation and way of life on Alexandria's waterfront. Much of the sewing related implements also arrived by ship and were sold by local

Figure 4-21 Utilitarian scissors likely used in sewing recovered from Feature 125 (FS 960).

Figure 4-22 Polished bone object from Feature 125 (FS986). The object may be a lid from a thread barrel.

merchants. For instance, in November of 1801 the firm of Bennett & Watts imported the following array of clothing related goods:

> BENNETT & WATTS
> HAVE IMPORTED
> *In the Augusta from London, and Commerce from Liverpool, via Baltimore,*
> The following GOODS,
> *which completes their assortment for the season - - - viz.*
> Superfine cloths and kerfeymeres,
> 5-4 and 6-4 broad cloths of every de-
> serip-
> tion, [sic]
> 4 4 and 7-8 plains,
> 7-4 , 6-4 and 4-4 moleskin cut coatings,
> Kerfeys and half thicks,
> 2 trunks muffs, tippets and ermines,
> 1 box thread, edgings, laces and veils,
> 3 cafes Irish linens,
> 2 do. do. sheetings and diapers,
> 3 trunks printed calicoes,
> 1 café table knives and forks,
> White Chapel needles,
> Fashionable buttons,
> Silk shawls,
> Cotton and silk hosiery,
> 11-8 and 6-4 cotton and linen check,
> Threads, tapes and bobbins,
> 8, 10, 12, and 20d nails, &c. &c.
> All of which will be round and open for sale in a few dayson [sic] moderate terms, at the usual cre-
> dit, by wholesale or retail.
> Oct. 22
>
> (*Alexandria Advertiser And Commercial Intelligencer*, November 02, 1801)

Noticeably absent from this offering are plain bone or utilitarian buttons that were likely produced locally, perhaps in the Project Area.

The types and variety of clothing fasteners and sewing equipage, particularly those of a tailor, identified within the collection from Feature 125 seem beyond what would be necessary for a domestic sewing kit. Bone button waste indicates that these types of buttons were manufactured on site, perhaps at a commercial scale, and may also represent products for sale. Therefore, Feature 125 in addition to its use as a warehouse, also may have functioned as a workspace. Recovery of buttons and other clothing fasteners also could be evidence of laundering activities or clothing repair on site (Beaudry 2006:171). Sewing related artifacts may also have a maritime connection. Beaudry (2006:175-176) notes, "sailors had to be adept at sewing and mending the heavy canvas sails of ships before the days of steam, but they also produced and mended their own clothing." By necessity they performed the domestic tasks usually seen as women's work. In addition, the likely connection between Feature 125 and Feature 120 asks us to consider the role that enslaved persons may have played either as skilled labor or even the owners of the clothing represented.

It is impossible to separate those items and activities which may have been consumed on site, destined for sale in the hinterland, part of the stores for outfitting a merchants vessel bound for trade posts overseas, or simply flotsam that accumulated on site. However, the material culture present in Feature 125 serves as a microcosm for the types of maritime trade and local commerce that occurred throughout the Project Area and along the waterfront. Dependent on ship-borne products the use and function of Feature 125 serves as an example of the role of these types of features and the individuals who labored in support of the maritime trade of the City.

Chapter 5
Identity along the Alexandria Waterfront

Introduction

The ability to link particular sub-assemblages of artifacts from the RT South Collection with individuals or households was, in most cases, nearly impossible. Despite the limitations of the Collection, a few notable groups of artifacts are worth highlighting for their potential to illuminate the identities of distinct groups of individuals who all lived, labored, and called Alexandria's waterfront home. Collections of artifacts from Parcel 77.1 had direct links between recovered materials and the merchant class. Materials recovered from a set of privies, in particular, revealed more about the lives of Alexandria's merchants and emerging middle class. As a point of contrast, artifacts groupings and collections indicative of African Americans, either enslaved or freed, provided data about Alexandria's marginalized populations, particularly the enslaved. In this case Feature 120 (and its connection to Feature 125, discussed previously) is used as the primary example. These features are emphasized for their ability to better understand who lived and labored in Alexandria during the late eighteenth and early nineteenth centuries.

American Merchant Class & Identity

Upon his death in October of 1810 the following was said of Captain George Slacum:

> DIED, yesterday morning, after a short Illness, Capt. GEORGE SLACUM, an old and respectable inhabitant of this town. In the character of this amiable man were blended all those virtues that distinguish the affectionate husband and fathers, and kind friend. His family and society have to regret a loss that to them is irreparable. His friends and acquaintance are requested to attend his funeral from his late dwelling to the new Episcopal burying ground, this evening at half after three o'clock.
>
> (*Alexandria Daily Gazette, Commercial & Political* 15 October 1810)

The words used to describe George Slacum after his death reveal his importance and social standing in the City of Alexandria. During the eighteenth century, merchants like Captain Slacum enjoyed elite social status and all of the material trappings of gentility. Unlike the English system based on birth and title, in colonial America many of the elites were of new wealth, acquired through land and trade in the colonies. Self-made, they legitimized their elite social status by presenting themselves as knowledgeable and fashionable members of genteel society (Bushman 1993; Goodwin 1999). This was especially true just after the American Revolution, at the turn of the nineteenth century as economic prosperity and the spread of republican ideals allowed gentility to reach down into the middling portions of the population in a phenomenon Richard Bushman (1993:208) terms "modest vernacular gentility." This opened up genteel culture to the emerging middle class. A social group made up of smaller merchants, professionals, tradesmen, small scale farmers, clerks, shopkeepers, etc. Where previously it had only be available to the colonial elite comprised of the "great merchants and planters, the clergy and professionals, the officers of courts and government" (Bushman 1993:xiii). Even as genteel status reached further down through the social classes of American society, the idea that one expressed their genteel status through acquiring material goods and the correct use of such items remained. As Lorinda Goodwin argues in her manuscript *An Archaeology of Manners* (1999:ix), for example:

> Manners played a critical role in the struggle for the cultural legitimacy of gentility; mannerly behavior –along with exhibition of refined taste in architecture, fashionable clothing, elegant furnishings, and literature – provided the means through which the new-sprung colonial elites defined themselves and validated their claims on power and prestige to accompany their newfound wealth.

As both social mobility and wealth expanded, particularly in the new Republic, Goodwin (1999:x) argued that the "pursuit of cultural legitimacy" was dynamic and therefore, "specific forms and props of mannerly behavior [had to] change just enough over time to ensure that manners continue[d] to set elites apart from nonelites." Therefore, both Bushman (1993) and Goodwin (1999) highlight the ability to study gentility through material culture. Discussion, in the previous section, of the materials imported and exported by Alexandria merchants during this period, highlights the increases in wealth and access enjoyed by both those of elite social class and the evolving middle class. In the RT South collection, the expression of the gentility and status of members of the mercantile community is best expressed through various collections and features on Parcel 77.1 owned by Captain Slacum.

Merchant Identity in the RT South Collection

As Goodwin (1999:100) points out the mercantile community were some of their own best customers and would have had extraordinary access to consumer goods. We saw evidence, in the previous discussion, of Alexandria merchants' market access and their role in the goods that were produced, exported, imported, and sold. How did Alexandria's upper and middling sort express their gentility and social status? As trade expanded in the 1790s one visitor to Alexandria remarked "Alexandria is a considerable place of trade, is well situated on the river which is ¾ of a mile wide. It…is not thriving rapidly; the situation of the town, a capital one, a fine eminence, plain level, and bounded by a pretty range of hills and excellent, safe and commodious harbour, a find back country to it, will soon make it a very important post; much business is done here;…there are about 3,200 inhabitants; the houses principally of brick; the streets are not paved and being of clay, after rain they are so slippery it is almost impossible to walk in them. I went to the top of Col. Howe's house, a very loft one, the prospect a magnificent one. The town laid out at right angles the harbour, river to great distance, with its windings, creeks, and island, the extensive plain contiguous to the city, all formed a fine scene" (Alexandria Archaeology 2009; From the Journal of William Loughton Smith, 1790-1791, pp. 62-63, as quoted in Tidewater Towns by John W. Reps, p. 209).

It should be noted that the RT South Project Area generally encompassed the "working" and commercial section of the waterfront. The area where mazes of wharfs and piers gave way to warehouses and stores and numerous businesses focused on maritime trade. It is likely that much of the housing in this area consisted of ephemeral wooden shanties, hastily constructed and taken down or destroyed with equal speed. Parcel 77.1 appeared to be one exception.

Parcel 77.1 was located in the northwest corner of the Project Area. Archaeological features and artifact collections were related to the development of the property in the 1790s by Captain George Slacum and its subsequent redevelopment of the property by his heirs. Captain Slacum was a successful local merchant along with being a mariner and shipmaster. He had built himself a warehouse a wharf on Gilpin's wharf not from the Project Area from which he conducted trade with the West Indies, the Mediterranean, and local markets. Parcel 77.1 was first utilized by Chapman and Fleming in the early eighteenth century. Although it is likely that he leased or rented most of the dwellings he constructed and did not live on the parcel, it was with Slacum's purchase of the parcel in 1794 that development of the property began. Most notably, Slacum was responsible for the construction of the three "necessaries" on the property (Pulliam 2006; AX Deeds L:46). It appears that Samuel Hilton was renting much of the property in the vicinity of these privies during the 1790s and early 1800s. The focus of this discussion will be privy features 12 and 13. Both privies appeared to have been utilized during the late eighteenth century and capped during the early nineteenth century. The intact layers within the privy indicated that the materials were likely the result of a "cleaning out" episode which likely coincides with a change in ownership of the property with Slacum's death in 1810 or a change in tenancy (Figure 5-1). Working in urban New England, archaeologist Stephen Mrozowski (2006:164) notes "this phenomenon – one generation disposing of material culture reflecting the taste of an earlier generation – is now well recognized." Artifacts appeared to have been discarded as complete, or nearly complete vessels, and generally consisted of ceramic and glass dining and serving wares. A similar artifact assemblage also was apparent in foundation Feature 5 which may have been constructed on a previous yard deposit from Slacum's tenure.

Results of vessel analysis (see Chapter 4 for a detailed description of the vessel analysis from privy Features 12 and 13) of the ceramic and glass sub-assemblages from privy features 12 and 13 indicated that the majority of the ceramic vessels were creamware and pearlware, considered popular and relatively inexpensive dining wares. Creamware was typically found in the royal shape while pearlware was largely shell-edge decorated and hand painted in both earlier china glaze and later polychrome floral motifs. Teaware in contrast were identified in more expensive ware types such as Chinese export porcelain (Figure 5-2) and Black Basalt stoneware. Use wear patterning (e.g. cut marks and mending) suggest that these vessels were used prior to their disposal. It also was apparent that many of the dining vessels, such as the royal shape creamware may have been purchased as a set. In the case of teaware, the pieces appear to have been purchased piecemeal, however they formed matching or nearly matching sets. Similarly, the glass vessel assemblage, particularly from privy Feature 13 included a minimum of 51 table glass vessels. High quantities of tumbler/flip cups (Figure 5-3) and other such vessels were evidence of popular social drinking as part of genteel entertaining. Altogether, these vessels would have made for a handsomely set dining table or tea service.

An understanding and preference for fashionable ceramic and glass table settings would have signaled to others the owner's understanding of genteel dining reinforcing their social status. As Goodwin (1999) argues, these material props, knowledge of their proper use, and their replacement as styles changed would have been integral and necessary to the promotion of one's elite social status. For example, at least three royal shape creamware platters were discarded whole or nearly whole. Evidenced by the cross-mending of various sherds, this is further confirmed by the evidence of a contemporary mending of the rim which would have allowed for the continuation of its use at the time. Therefore these items were discarded for reasons that were not based on the fact that they were broken or no longer useable. Instead, it is likely the objects were discarded as styles changed and items were replaced by the newest trends.

While diagnostic artifacts from privy contents date to the period of ownership by Slacum and tenancy by Hilton, it is unclear exactly who used these materials. What is obvious is that whomever chose and used these objects to serve their meals likely possessed some societal clout and was likely part of the American gentry. Slacum would make an obvious choice, yet it is possible that he and his family never lived on the property (living elsewhere in town or at a country estate). Those who may have leased the property are therefore the next logical candidates, but they are complicated by the fact that some of them may have also been shop owners or small scale merchants themselves.

Materials from contemporary foundation Feature 5 included maritime related material culture such as a fragment of a commemorative ware vessel, a variety of coins including those from foreign locales, including a token from Gibraltar, an English trading post and garrison. The ceramic exhibited a maritime motif known as "Come Box the Compass" (Figure 5-4) and was common on pottery intended for maritime trade and within seafaring trades (Teitelman et al. 2010:105). Among recovered coins was a Swedish ½ skilling (Figure 5-5) and a 2 Quartos token for the firms of Robert Keeling & Sons located on Gibraltar (Figure 5-6). Keeling manufactured these copper tokens in both 1802 and again in 1810 to pay troops garrisoned in British-controlled Gi-

Figure 5-1 Whole or nearly intact vessels were discarded into the privy in a single deposition episode. Examples of reconstructed vessels.

Figure 5-2 Teaware also was identified in more costly overglaze hand-painted Chinese export porcelain. Decorations like that on this matching saucer (Vessel #13-010) and cup (Vessel #13-012) were common types manufactured for the American market.

Figure 5-3 A significant quantity of flip cup/tumbler bases like these were recovered from the privy. Most were plain and likely discarded whole.

Figure 5-4 Commemorative creamware bowl. Interior black bat printed maritime motif "Come Box the Compass" (FS 93). This motif is common on vessels intended for maritime trade. The merchant community would be familiar with the tradition of boxing the compass "a test of seamanship" that "involved naming all thirty-two principal points of the compass in clockwise order" (Teitelman et al. 2010:105).

Figure 5-5 Swedish ½ Skilling (FS 102).

Figure 5-6 Token issued by the firm of Robert Keeling & Sons (FS 89). Ironmonger, wine-house keeper, and Garrison Turnkey on British-controlled Gibraltar, Keeling issued the token as pay to troops to be redeemed in his wine house for 2 quarts of drink (Garcia 2016).

braltar (Garcia 2016). While it is possible that these items were just part of imported fill (similar items have been found elsewhere in Alexandria and would have been common in an international port) they at the very least suggest a connection between the owners of these materials and the merchant world. Use-wear would suggest these items were used on site, however it is possible that the materials represented items for sale like those in the advertisements mentioned previously. At any rate, archaeological collections from Parcel 77.1 provide an indication of the consumption patterns of the upper and middling classes and how they expressed their gentility through material culture.

African American Identity & Spirit Management

Both archaeological and ethnographic research can been utilized in order to identify groups of individuals largely absent from the historical record. African Americans, either enslaved or freed are one of these groups. Extensive research into the African diaspora and the archaeology of slavery has resulted in an abundance of dynamic research. Among that research have been efforts to identify, in the absence of historical documents, African Americans within the archaeological record. As such, certain objects or collections of objects such as pierced coins, quartz crystals, blue beads, modified potsherds, animal bones, nails, straight pins, and buttons (just to name a few) have been identified as signals of African American identity based on the modifications and context of such items (Artemel et al. 1987; Fesler 2021; Jones 2000; Klingelhofer 1987; Kraus et al. 2010; Leone and Fry 1999; Patten 1992; Russell 1997; Samford 1996; Singleton 1995; Wilkie 1997)

Beginning in the 1980s, archaeologists attempted to identify direct links between the enslaved and their West African heritage. More recent scholarship has focused, not on the direct transference of these traits but, "how African cultural traditions were modified by the slaves' experience of new environments, different social groups and altered power relations" and how this contributed to the formation of an African American identity (Samford 1996:102). As part of this, scholars have looked at the role that material objects – made, modified, and used by the enslaved –played in the formation of this cultural identity. Curious, out-of-place, or modified artifacts encountered within collections associated with enslaved communities and contexts have been given new meaning.

Leone and Fry's (1999) groundbreaking work in the late nineties aimed to interpret the archaeological remains of African religious practices identified on eighteenth and nineteenth century sites in Annapolis, Maryland through historical data from folklore sources about conjure and African religious and spiritual practices. This seminal work alerted archaeologists to the way that objects found within the archaeological record may have been used by those of African descent as part of their spiritual practice and ultimately as a means to provide protection under the oppression of slavery. The most notable example is one so-called cache from the Charles Carroll House, in Annapolis, Maryland, which consisted of quartz crystals, pierced discs, pierced coins, beads, pins, and a rounded black pebble beneath a white potsherd marked with a blue asterisk (Leone and Fry 1999). Cached for protection, these items were interpreted as West African conjure used to control spirits of the dead (Leone and Fry 1999).

Recent scholarship by Garret Fesler (2021) is working to "ground truth" interpretations of conjure and challenges Leone's loose definition of what constitutes archaeological instances of spiritual practices. His approach to understanding what he calls "spirit management" is based on the principal that individuals "project[ed] divine power on to physical objects so as to influence the health and well-being of themselves or others" (Fesler 2021). He identifies three basic forms of *spirit management*: body charms, ritual displays, and ritual concealments used either to cause harm or provide protection. Charms took the form of modified objects worn by an individual for protection, ritual displays included shrines and "dressed yards," and ritual concealments were defined as an object or group of objects cached or bundled and buried usually in relation to structures (e.g. beneath floors, hearths, at thresholds, or inside walls, etc.) as a spiritual practice. Where Fesler (2021) challenges Leone's ideas about these "spirit deposits" is on what he calls the defining characteristic: human intentionality. In other words, it is not enough for these objects to be present in an archaeological context, they must indicate that an individual intentionally modified, assembled, or placed the objects, where they are found.

Two examples from Alexandria, the Bruin Slave Jail (1844-1861) and the Alexandria Slave Pen site associated with the Franklin & Armfield slave trading complex (1828-1861), are worth noting. These two sites in particular provide an intimate understanding of slavery in nineteenth century Alexandria. Specifically, the sites are associated with the confinement of individuals awaiting their sale and transfer as commodities in the domestic slave trade. The former (44AX0172) included a two-story brick building located at 1707 Duke Street, additional slave quarters, kitchen, and cistern/wash house. This location served as the center of operations for slave trader, Joseph Bruin in the mid-nineteenth century. Here slaves were held before being sold, many to New Orleans and other locations in the southeastern United States. Excavations at the site revealed the remains of the enslaved' meals within a kitchen midden and, most interestingly, materials from the wash-house suggested that those being held there also washed, repaired, and produced clothing (Kraus et al. 2010). At the site of the Alexandria Slave Pen (44AX75), the slave trading complex run by Franklin & Armfield at 1315 Duke Street, archaeologists uncovered a similar complex configuration including an "office building," separate quarters for men and women, kitchen, livery, and tailor's shop (Artemel et al. 1987). Using contemporary accounts from abolitionists' visiting in the 1830s, Atemel et al. (1987) specifically notes that on average slaves spent two weeks to two months at the jail during which time those confined were given meals and a sleeping quarter. It is specifically noted that "slaves arrived at the pen with only those personal items carried on their person" and that "these may have been confiscated" as they left the jail "two sets of new clothing" were given to them (Artemel et al. 1987:124). At both locations ritual practice, what Kraus et al. (2010) refers to as Hoodoo, were noted. At the Bruin Slave Jail evidence of ritual took the form of a collection of whole or nearly whole vessels buried in a storage pit near the slave barracks and kitchen (Kraus et al. 2010). Evidence at the Slave Pen site included unusual artifacts such as a pierced Chinese coin, collection of white buttons, worked bone ring, quartz crystals, and a colored glass bead (Artemel et al. 1987; Leone and Fry 1999).

African American Presence within the RT South Collection

On November 21st of 1801 J. H. Hooe of Alexandria, Virginia ran the following advertisement:

> *To be Hired,*
> By the month or year and immediate possession given,
> Several valuable Negro
> Slaves, among which are a good shoe and boot maker, with a complete set of tools; four house carpenters, one of whom can lay floors and do much in the inside of a house. Also, a good seamstress and house servant who has been brought up in a genteel family. Apply to
> J. H. HOOE.
> Nov. 16.
>
> (Alexandria Advertiser and Commercial Intelligencer 21 November 1801)

This advertisement from the turn of the nineteenth century provides a snapshot of urban slavery in Alexandria. It also narrates the interaction between distinct groups of people in society. Hooe, possibly a relative of the merchant R. T. Hooe from the Project Area, enumerated and marketed the skills of his enslaved property. Some of these enslaved individuals are identified as possessing the very skill sets for which there is material evidence for within or near Feature 125. Furthermore, Hooe highlights that the shoemaker possesses a "complete set of tools." We know then, that certain trade related objects in the archaeological record may have directly belonged to enslaved craftsmen/women. The evidence from Feature 125, discussed previously, for a variety of tasks, particularly those related to sewing and tailoring, may in fact be *tool kits* belonging to African Americans bought and sold along the waterfront. This interpretation is bolstered by potential evidence of African Americans, both enslaved or freed, at nearby Feature 120 and other features within the Project Area.

Feature 120 was determined to likely be a two story frame dwelling built by Joseph Caverly and later used as a tavern by the mid nineteenth century. Intact deposits associated with the early use of the structure were identified in the western half of the foundation as stratified deposits (referred to as Cultural/Alluvial Context) associated with the ground-floor level portion of the building that may have served as an open space or work yard. When the archaeological assemblages from this context were compared with other portions of Feature 120, a significant concentration of personal and activity items were noted. The preponderance of these classes of artifacts suggested the location may have served as a quarters or a functional domestic/work space within the house yard. It was clear that the house yard would have occasionally flooded, but it also appears that this area was periodically cleaned. Overall, excluding intrusive mid-nineteenth century materials, the artifacts encountered dated from the late eighteenth and early nineteenth centuries. This corresponds to the period during which William Patterson leased the property and may coincide with his use of the property as a commercial establishment.

A full description of Feature 120 can be found in Chapter 11, however the collection of materials from the Cultural/Alluvial deposits indicative of African Americans' presence within the space will be revisited in this discussion. The collection of objects likely attributable to African Americans at Feature 120 consisted of a faceted blue glass bead, pierced coins, buttons, straight pins, and spoons. It should be noted that these materials were recovered from a single stratigraphic context consisting of mixed materials. It is entirely possible that the materials were historically cached and later disturbed and distributed to their recovery locations either during demolition of the structure or current archaeological investigations. Therefore, while these materials could be part of what Fesler (2021) refers to as *ritual concealments*, they will be discussed more broadly as solely signals of an African American presence, but not necessarily for their definite use in *spiritual management*.

Both the blue glass bead and the pierced coins may be examples of *body charms* worn by enslaved persons for protection. The pierced coins from Feature 120 included three pierced silver Spanish reals dating between 1759 and 1788. Considering the coins would have been legal tender at the time, there modification signals their use as *charms* (Figure 5-7). Spoons, buttons, and straight pins were recovered from Feature 120 in notable quantities as compared to the remainder of the feature. The objects are noted here as they have been singled out for their possible use as ritual objects. Eleven spoons or portions of spoons were recovered from Feature 120, although none were noted to have visible markings. Thirty-four buttons and 126 straight pins also were noted across the context (Figure 5-8). While these items could have had a ritual purpose, it is more likely that they represent daily activity at this location. The proximity of sewing/tailoring related activity at Feature 120 with Feature 125 is also curious. Perhaps individuals moved between these areas as they completed daily tasks. At any rate, the modified coins and other potential ritual objects coupled with the high instance of daily activity at Feature 120 provided strong evidence for the presence of African Americans laboring and potentially quatering at this location.

The presence of the objects raises several new lines of inquiry. We know that African Americans, both enslaved and freed, were part of early nineteenth century Alexandria society and economy. Ownership of slaves by individuals at this property, in fact, was documented although nothing more was known about their identity or their daily lives. It seems plausible therefore, that the ground-floor of this building may have functioned as a quarter and/or a gathering and working space for freed or enslaved African Americans. Did these individuals serve as servants or labor within the tavern? Based on accounts of the early nineteenth century slave trade, it is also possible that this area was used as a temporary quarter associated with the tavern for those traveling with an enslaver as they conducted business or continued on their journeys. What is abundantly clear is that this was a dynamic space used for both per-

Figure 5-7 **Pierced silver Spanish reals from Feature 120.**

Figure 5-8 **Pins and buttons like these were found in notable quantities in the Cultural deposits associated with Feature 120.**

forming tasks (e.g. sewing, tailoring etc.) as well as a likely gathering space for social interactions.

At least two ritual concealments were identified within in the RT South collection. This included one such concealment in the foundation of Feature 18 associated with a dwelling house owned by Archibald McCliesh (McClish) and another possible concealment in sub-feature 5-4, an historic pit beneath foundation Feature 5. The former consisted of a chicken bone beneath an overturned complete china glaze decorated pearlware bowl (Figure 5-9). Noted as recovered in this configuration, the items were recovered in Test Unit 26 that was located along the northern foundation wall. McCliesh, a cooper, was noted as being taxed for four titheables in 1802 (Alexandria Taxes 1802, Ward 1). The concealment was likely related to one of his enslaved laborers or servants. The final possible ritual concealment included a complete copper alloy pot lid, ceramic and glass, a medium-sized rock (Figure 5-10). These items were buried together in an historic pit under the western wall of the foundation identified as Feature 5. It was noted in the field at the time of excavation that the pot lid directly underlay the western wall of the foundation, although it was found with a number (n=156) of other historic period ceramic and glass. Like the identification of these objects as example of *spirit management*, the ownership and use of this foundation (Feature 5) is tenuous at best.

The turn of the nineteenth century was a period of widespread change, not only in Alexandria, but throughout the new United States of America. No doubt these changes also were reverberating through African American populations laboring, living, and being bought and sold in the City. The historic living surface associated with Feature 120 may have not only served as a place to perform daily tasks, but a place where individuals socialized and expressed themselves. The other instances of caching in the Project Area provide additional examples of the African American presence in the City. Possible material evidence of the cultural practice of *spirit management* in these locations speak to the continuation of a cultural identity and retention of control in the face of the horror and uncertainty wrought by slavery. These collections of artifacts should serve as point from which to further explore the African Americans within the RT South Project Area.

Conclusion

> Forty Dollars *Reward*
>
> RAN AWAY from the subscriber, on Tuesday, 26th instant, a colored man, named HANSON, but calls himself *Hanson Peirson,* upwards of six feet high, very slim from his shoulders down, long arms boney and straight, complexion yellow—it is supposed a white man was his father from the color and growth of his hair, which is about 6 or 7 inches long, and which he generally wears queued—his cloathing [sic] consists of an oznaburg shirt and trowsers [sic], a striped linsey waistcoat and old shoes—all his best cloaths [sic] he left in the country, as he came to town that morning to cut a small lot of grass—he is very fond of liquor, and has a brazen look – Whoever takes up and secures him in jail so that I get him again, shall have, if taken within the county, *Twenty Dollars;* if out of it *Forty Dollars*, and reasonable charges if brought home.
>
> Masters of vessels and others are forewarned from harboring or carrying him off at their peril.
>
> George Slacum
> July 29.
>
> (*Alexandria Daily Gazette, Commercial & Political 29 August 1808*)

Notice the stark contrast in the adjectives used by Captain George Slacum to describe his runaway slave Hanson and those found in his own death announcement. What's perhaps more interesting is that the expression of these divergent identities both are expressed in the archaeological assemblages from the RT South Project Area. The wealth and elite status earned from maritime commerce and associated enterprises is evident through the materials associated with commercial structures, as well as domestic assemblages from the homes of upper and middling

Figure 5-9 **Hand-painted pearlware teacup found in situ during excavations overturned atop a chicken bone. Recovered from Feature 18, Test Unit 26, Fill 3.**

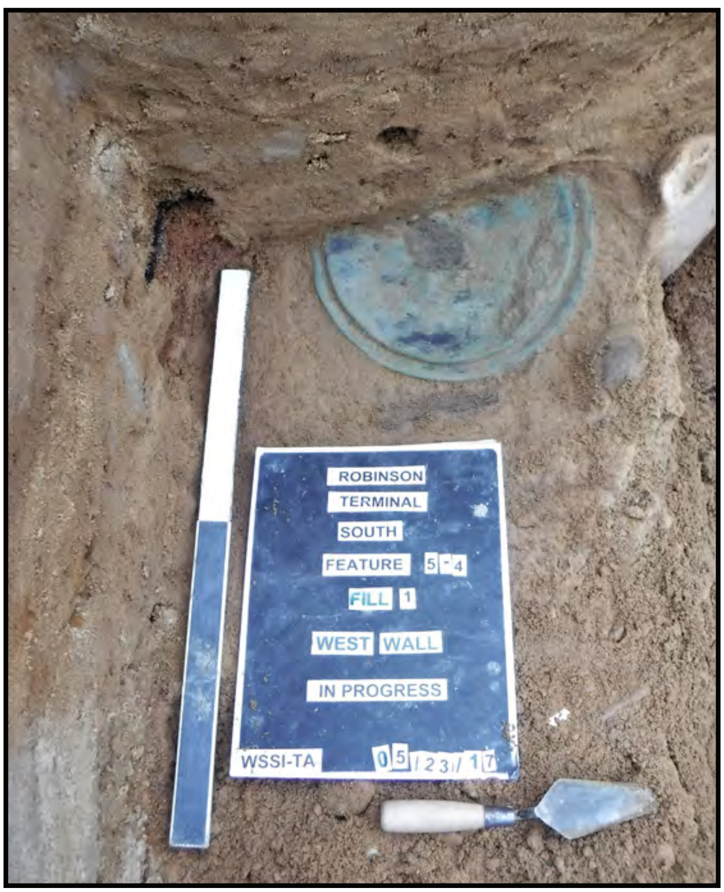


Figure 5-10 **Parcel 77.1: Photograph showing plan view of stockpot lid exposed in Feature 6-4, view west (5.8 ft amsl) (WSSI staff, 5/23/2017)**

sorts. At the same time, lower class and enslaved populations are revealed in the activity related artifacts they utilized as they performed their role in commercial enterprise as well as in more personal items. The latter they appear to have used to express their own identities and maintain and sense of self under the subjugation wrought on them by American slavery. Both archaeological and documentary evidence therefore serve as an example of the social and racial stratification of Alexandria society at the turn of the nineteenth century. This research only scrapes the surface of the potential within the RT South Collection to tell the story of the daily lives of those on the waterfront. These interpretations should serve as beginning points of new lines of inquiry to be used with collections based research in Alexandria by future researchers.

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Part 2:

Archaeobotany Report
Dendrochrology Report
Faunal Analysis Report
Parasitology Report
Photogrammetry Report
Pollen and Phytolith Report

Archaeobotany Report

Report on the Analysis of Macro-botanical Remains Recovered from Archeological Data Recovery at the Robinson Terminal South Site (44AX0235), Alexandria, Virginia

A screen-recovered floral sample from the Robinson Terminal South Site (recovered from privy Feature 13, Sample Number 177)

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August 4, 2021

Report on the Analysis of Macro-botanical Remains Recovered from Archeological Data Recovery at the Robinson Terminal South Site (44AX0235), Alexandria, Virginia

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August 4, 2021

INTRODUCTION

Robinson Terminal South (44AX0235) describes the archaeological remains of an historic period urban site that includes domestic, commercial, and industrial components. Cultural occupations at 44AX0235 span the middle eighteenth century through the modern period. The site is located along the Potomac River waterfront within the City of Alexandria, occupying the entirety of City Block 73 which is bounded by Duck Street, South Union Street, and Wolfe Street. Warehouse facilities associated with the Robinson Terminal Warehouse Corporation recently occupied this block. Archaeological data recovery at site 44AX0235 is being conducted in advance of construction of a planned residential development.

The site contains dense and extremely well-preserved archaeological resources. A total of 245 historic archaeological features (or deposits) were identified, and an aggressive sampling strategy for the recovery of macroplant remains was an integral part of the data recovery effort. The site's location on the western shore of the tidal Potomac resulted in saturation of cultural features and the enhanced preservation of organic remains. A rich array of unburned plant materials and scant carbonized plant remains were observed during field excavation and all are considered to be historically significant. Macrobotanical samples were produced via wet and dry screening and the flotation of feature fill. The abundance of plant artifacts preserved within archaeological features poses a challenge to the scope of the project, as the quantity of floral material far exceeds available resources. A sampling strategy and modified analysis plan was devised to maximize archeobotanical information about key features while working within the scope of the data recovery. Samples selected for archeobotanical analysis derive from four privy features (Features 12, 13, 48, and 49), a refuse pit (Feature 46), a non-privy barrel (Feature 93), and deposits within four structural foundations (Features 45, 91, 120, and 125). A total of 44 archeobotanical samples are included in the current study (see Table 01). Analysis of macrobotanical remains was undertaken in an effort to document the range of plant materials preserved at the site, examine patterns of plant utilization, explore dietary preferences and practices, inform feature interpretation, and document past landscape conditions in the vicinity of the project area.

Archeobotany is the study of botanical artifacts preserved archaeologically. The discipline seeks to understand the cultural and ecological relationships between past peoples and plants. Beyond cataloguing which plants were consumed, burned, used for building, or used medicinally, the discipline explores the interdependency of plants and people. Employing an ecological approach to elucidate the nature of human–plant interaction, archeobotany seeks to understand not only which plants were used, but in what ways they were used and for what reasons they were selected. In addition to exploring the ways in which plant taxa present within an archaeological site influenced settlement, foodways, and site economy, archeobotany studies the effects that past human populations may have had on the distribution of plant taxa and plant communities. Archeobotany informs our understanding of settlement and subsistence, the interactions between historic people, communities, and the environment, patterns of ecological change, and the cultural manipulation of space and resources over time.

Table 01: Summary of analyzed macro-botanical samples from Site 44AX0235

Feature	Feature Type	Flotation			Screened	
		Number of Samples	Sample Numbers	Volume (liters)	Number of Samples	Sample Numbers
Fea 12	privy	2	5027, 5028	3.75	4	153, 154, 158, 159
Fea 13	privy	2	5032, 5033	7.75	6	168, 169, 170, 177, 178, 179
Fea 45	foundation				1	462
Fea 46	pit				1	550
Fea 48	privy	2	5089, 5091	1.5	4	557. 558. 565. 566
Fea 49	privy	4	5090, 5094, 5095, 5096	6.75	3	576, 577, 578
Fea 91	foundation				2	662, 667
Fea 93	barrel	2	5139, 5140	4.25		
Fea 120	foundation				2	881, 885
Fea 125	foundation				9	947, 949, 962, 966, 969, 975, 976, 977
Total		**12**		**24**	**32**	

METHODS

Flotation Samples

Twelve soil samples from five historic features (Features 12, 13, 48, 49, and 93) were delivered to the author's archeobotanical laboratory in West River, Maryland for flotation processing and analysis. Samples ranging from 0.5 to four liters in original volume were individually water-flotation processed using a Flote-Tech flotation system equipped with 1.0 millimeter coarse fraction and 0.325 mm fine fraction screens. The Flote-Tech system is a multi-modal flotation system which facilitates the separation and recovery of organic remains from the soil matrix. Processing resulted in light (flotable) and heavy (sinkable) fractions. Floted portions were air dried.

Interestingly, the samples submitted for flotation were altered little by the process, as site feature fill was composed of densely bedded artifacts and organic debris. Flotation samples secured from the privy features were particularly rich in organic conglomerate material and the remains of insects along with household waste. The flotation samples contained both uncarbonized and carbonized plant macroremains, but the assemblage was overwhelmingly comprised of unburned plant artifacts.

Analysis proceeded in accordance with standard practices (Pearsall 2000; Fritz and Nesbit 2014). Taxonomic identifications were attempted on all nut, seed, and miscellaneous plant artifacts recovered. Wood remains were noted but identifications were not attempted. Botanical identifications were made to the genus level when possible, to the family level when limited diagnostic information was available, and to the species level only when the assignment could be made with absolute certainty. Identifications were made under low magnification (10X to 40X) with the aid of standard texts (Schopmeyer 1974; Martin and Barkley 1961), and checked against plant specimens from a modern reference collection representative of the flora of northern Virginia (Digital Atlas of the Virginia Flora; Weakley et al. 2012).

Screen-recovered Archeobotanical Samples

Dry-screening through 1/4 inch mesh, and waterscreening through 1/16" window screen facilitated the recovery of plant macroremains and other small artifacts from feature matrices. Botanical remains were separated from other artifacts and thoroughly dry plant specimens were examined under illuminated magnification and rough sorted into general material types. Thirty-two samples of screen-recovered plant material from nine historic features (Features 12, 13, 45, 46, 48, 49, 91, 120, and 125) were submitted for analysis.

The screen-recovered botanical assemblage contained wood charcoal, unburned wood fibers, woody bark or cambium material, nuts, an abundance of unburned seeds and pits, and vegetal miscellany (rind, tissue, bract). Plant remains were examined under low magnification (10X to 40X) and sorted into general categories of material. Specimen counts and aggregate weight by type were recorded. Where seeds were particularly abundant, specimen counts were extrapolated based on weight. Taxonomic identifications were attempted on all nuts, seeds, and miscellaneous plant remains, and on a maximum random subsample of 20 fragments of wood charcoal and 20 fragments of uncharred wood fibers from each sample containing more than 20 fragments following standard procedures (Fritz and Nesbitt 2014; Pearsall 2000). A clean transverse cross-section of wood tissue is required for the examination of morphological features, and this was secured by snapping the wood fibers. All identifications relied upon measurements made under low magnification (10X to 40X), consultation with standard texts (Schopmeyer 1974; Martin and Barkley 1961; Edlin 1969; Panshin and deZeeuw 1980; Kozlowski 1972; Hoadley 1990), and confirmation by comparison to modern plant materials from a reference collection representative of the flora of the project area (Digital Atlas of the Virginia Flora; Weakley et al. 2012; USDA 2021).

RESULTS

Flotation Samples

A total of 12 soil samples for flotation were processed and analyzed from historic privy and barrel features excavated at the Robinson Terminal South site. Samples were collected from

Features 12, 13, 48, 49, and 93. In addition to floral remains, the flotation-recovered samples submitted for analysis contained a variety of geologic materials, cultural artifacts, and natural ecofacts. Organic conglomerate material, brick, concrete, plaster, rock/gravel, bone, fish scales, hen's eggshells, marine shell, glass, ceramics, lithic material, woven fibers, and abundant insect remains were noted within flotation sample matrices. Flotation of 24 liters of feature fill produced carbonized and unburned plant artifacts for study. Flotation results are presented in Appendix Table 01 and summarized in Table 02. Unburned plant materials dominated the flotation assemblage, and seeds (and seedlike structures) were conspicuously abundant.

Plate 01: Flotation matrix from Feature 13 (Sample No. 5033)

Carbonized plant materials within the flotation samples were limited to scant but ubiquitous wood charcoal, and unidentifiable amorphous carbon. Unburned wood fibers were more abundant than wood charcoal within the assemblage, but less ubiquitous, and likely these represent the remains of architectural debris associated with privy structures.

The remains of fruits, garden vegetables, and weeds were extremely well represented within the Robinson Terminal South flotation samples. Present in conspicuous abundance were the seeds of five edible sweet fruits: raspberry or blackberry (*Rubus*), cherry (*Prunus*), huckleberry (*Gaylussacia*), strawberry (*Fragaria*), and watermelon (*Citrullus lanatus*). The seeds of other comestible fruits and vegetables were also well-represented within the flotation assemblage, including pepper (*Capsicum*), cucumber or melon (*Cucumis*), apple (*Malus domestica*), gum (*Nyssa sylvatica*), peach or nectarine (*Prunus persica*), plum (*Prunus*), tomato (*Solanum lycopersicum*), blueberry (*Vaccinium*), black haw (*Viburnum prunifolium*), and grape (*Vitis*).

Evidence for local weedy vegetation include the seeds of pigweed (*Amaranthus*), spikenard (*Aralia spinosa*), goosefoot/pigweed (*Chenopodium/Amaranthus*), jimson weed (*Datura stramonium*), goose grass (*Eleusine indica*), poke (*Phytolacca americana*), knotweed (*Polygonum*), grass (Poaceae), club rush (*Scirpus*), knotweed (*Polygonum*), daisy (Asteraceae), purslane (*Portulaca oleracea*), and violet (*Viola*). A bract (a modified leaf structure) was also noted within Feature 93.

Table 02: Summary of flotation-recovered plant remains

	12 flotation samples
	Features 12, 13, 48, 49, 93
	Sample Numbers 5027, 5028, 5032, 5033, 5089, 5090, 5091, 5094
	ubiquity (n=12)
WOOD CHARCOAL (presence)	75%
UNCARBONIZED WOOD (presence)	83%
UNCARBONIZED SEEDS, MISC (presence)	100%
Amaranthus (pigweed) seed	42%
Aralia spinosa (spikenard) seed	8%
Capsicum (pepper) seed	8%
Chenopodium/Amaranthus (goosefoot/pigweed) seed	8%
Cucumis (cucumber, melon) seed	8%
Citrullus lanatus (watermelon) seed	58%
Datura stramonium (jimson weed) seed)	8%
Diospyros virginiana (persimmon) seed	50%
Eleusine indica (goose grass) seed	17%
Fragaria (strawberry) seed	83%
Gaylussacia (huckleberry) seed	75%
Malus domestica (apple) seed	50%
Nyssa sylvatica (gum) seed	8%
Phytolacca americana (poke) seed	8%
Polygonum (knotweed) seed	25%
Portulaca oleracea (purslane)seed	17%
Prunus persica (peach) pit	8%
Prunus (cherry) pit	100%
Prunus (plum) pit	50%
Rubus (blackberry/raspberry) seed	100%
Scirpus (rush) seed	8%
Solanum lycopersicum (tomato) seed	17%
Vaccinium (blueberry) seed	17%
Viburnum prunifolium (blackhaw) seed	8%
Viola (violet) seed	75%
Vitis (grape) seed	100%
ASTERACEAE (daisy) seed	8%
POACEAE (grass) seed	8%
bracht	8%

Screen-recovered Archeobotanical Samples
Thirty-two large samples of wet-screen and dry-screen recovered archeobotanical samples were submitted for analysis from nine historic features classified as privies, pits, or foundations (Features 12, 13, 45, 46, 48, 49, 91, 120, and 125). The screen-recovered samples submitted for study had been cleaned and pre-sorted into general types. In addition to the floral remains, a scant quantity of non-botanical debris and artifacts were contained within the samples (leather fragments, glass shards, bone fragments, hen's eggshells, and coal products). In addition, some of the samples submitted for analysis contained a sample "remainder" of material residue from which the floral artifacts had been removed. Due to time constraints, this material was not subjected to additional analysis. The screen-recovered archeobotanical materials from the Robinson Terminal South site were abundant, and the samples contained a rich array of plant materials largely representing comestibles. Plant remains were predominantly unburned, but wood charcoal and a single carbonized cereal grain were also recovered. Flotation results are presented in Appendix Table 02 and summarized in Table 03.

Plate 02: The screen-recovered macrobotanical samples were generally large and rich in foodstuffs (Sample 177 from Feature 13 is shown)

The screen-recovered macrobotanical assemblage included 172 carbonized botanical specimens weighing 76.38 grams, and approximately 206,381 uncharred plant artifacts weighing 26,594.7 grams. The samples contained a rich diversity of edible plant remains, with wild fruits and nuts, garden and orchard products, agricultural commodities, and exotic imported foods represented. Local landscape plants are also represented within the seed assemblage, and wood charcoal and unburned wood fibers (some representing worked wooden objects) were identified.

Table 03: Summary of screen-recovered plant macroremains

	32 Samples	
	9 Features (12, 13, 45, 46, 48, 49, 91, 120, 125)	
	Sample Numbers 153, 154, 158, 159, 168, 169, 170, 177, 178, 179, 462, 550, 557, 558, 565, 566, 576, 577, 578, 662, 667, 881, 885, 947, 949, 962, 966, 969, 971, 975, 976, 977	
	count/weight (g)	ubiquity (%)
WOOD CHARCOAL	171/76.36	28%
Carya sp. (hickory)	4	6%
Castanea sp. (chestnut)	8	3%
Fraxinus sp. (ash)	1	3%
Liriodendron tulipifera (yellow poplar)	1	3%
Pinus sp. (pine)	19	19%
Quercus sp. (white oak)	12	9%
Quercus sp. (red oak)	9	9%
Quercus sp. (oak)	1	3%
diffuse porous	2	6%
ring porous	2	6%
unidentifiable	7	3%
SEEDS (carbonized)	1/0.02	3%
Triticum aestivum (bread wheat) kernel	1	3%
UNCARBONIZED WOOD	187/452.72	100%
worked wood		9%
Fagus grandifolia (American beech) twig	2	6%
Pinus sp. (pine)	50	22%
Quercus sp. (white oak)	2	6%
Quercus sp. (oak)	4	6%
Robinia pseudoacacia (black locust)	2	6%
deciduous	44	13%
unidentifiable	18	22%
bark/cambium	14	13%
SEEDS, NUTS, COBS, MISC (uncarbonized)	206194/26141.975	97%
Carya illinoinensis (pecan) nutshell fragment	5	6%
Carya sp. (hickory, thick-walled) nutshell fragment	8	6%
Castanea sp. (chestnut) shell fragment	13	19%
Cocos nucifera (coconut) shell fragment	2	6%
Corylus sp. (hazel) nutshell fragment	10	22%
Crataegus sp. (hawthorn) seed	18	9%
Cucumis sp. (cucumber, melon) seed	16	19%
Citrullus lanatus (watermelon) seed	20071	56%
Diospyros virginiana (persimmon) seed	1134	47%
Diospyros virginiana (persimmon) seed fragment	640	47%
Fragaria sp. (strawberry) seed	1505	16%
Gaylussacia sp. (huckleberry) seed	4644	16%
Gossypium hirsutum (cotton) seed	5	13%
Juglans cinerea (bitternut) nut	2	6%
Juglans nigra (black walnut) nut	6	13%
Juglans nigra (black walnut) nutshell fragment	104	63%
Juglans regia (English walnut) nutshell fragment	5	13%
Malus domestica (apple) seed	146	44%
Nyssa sylvatica (gum) seed	8	9%
Phytolacca americana (poke) seed	1	3%
Prunus dulcis (almond) pit	1	3%
Prunus persica (peach) pit	154	75%
Prunus persica (peach) pit half	143	38%
Prunus persica (peach) pit fragment	316	38%
Prunus sp. (cherry) pit	161819	59%
Prunus sp. (plum, type 1) pit	8928	56%
Prunus sp. (plum, type 2) pit	21	6%
Prunus sp. (plum, type 3) pit	30	9%
Prunus sp. (plum, type 4) pit	24	9%
Quercus (oak acorn) shell fragment	3	9%
Rubus sp. (blackberry/raspberry) seed	6938	19%
Viburnum prunifolium (blackhaw) seed	196	41%
Viola sp. (violet) seed	865	16%
Vitis sp. (grape) seed/seed fragment	12636	47%
other	36	16%

Wood charcoal within the screen-recovered assemblage totaled 171 fragments weighing 76.36 grams. Of this total, 66 (a maximum of 20 fragments per sample) were randomly selected for identification. A minimum of seven different arboreal taxa were identified: pine (*Pinus*), white oak (*Quercus*), and red oak (*Quercus*), chestnut (*Castanea*), hickory (*Carya*), ash (*Fraxinus*), yellow poplar (*Liriodendron tulipifera*), and nonspecific oak (*Quercus*). Eleven specimens of wood charcoal were not taxonomically classifiable. See Figure 01.

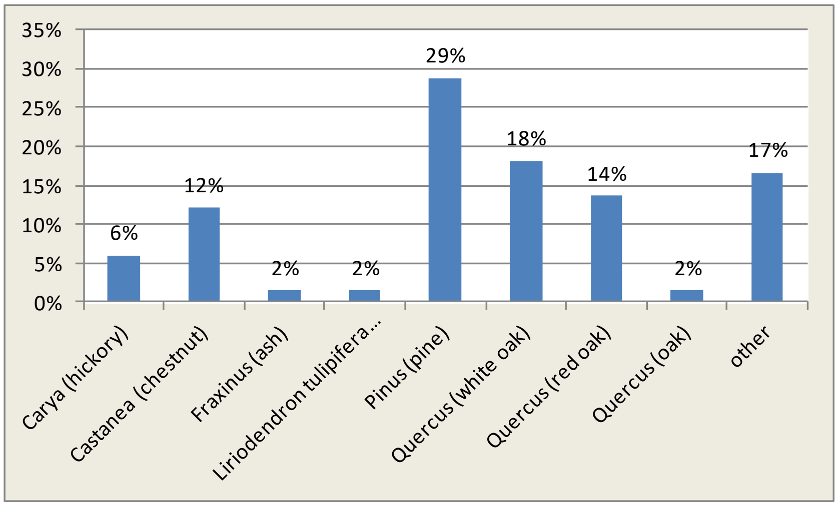

Figure 01: Percentages of wood charcoal types identified from the screen-recovered assemblage (n=66)

A single carbonized wheat kernel (*Triticum aestivum*) was recovered from a Feature 13 screened sample (Sample Number 177).

Plate 03: Carbonized wheat (*Triticum aestivum*) kernel recovered from privy Feature 13 (Screened Sample No. 177). Scale = 1mm grid.

Unburned wood fragments totaled 187 weighing 452.72 grams. Of this total, 68 (a maximum of 20 fragments per sample) were randomly selected for taxonomic classification. Five distinct taxa were identified: Pine (*Pinus*), oak (*Quercus*), American beech (*Fagus grandifolia*), white oak (*Quercus*), and black locust (*Robinia pseudoacacia*). Sixty-two fragments were not minimally classifiable to plant family, and 14 fragments were classified as woody bark or cambium material. See Figure 02.

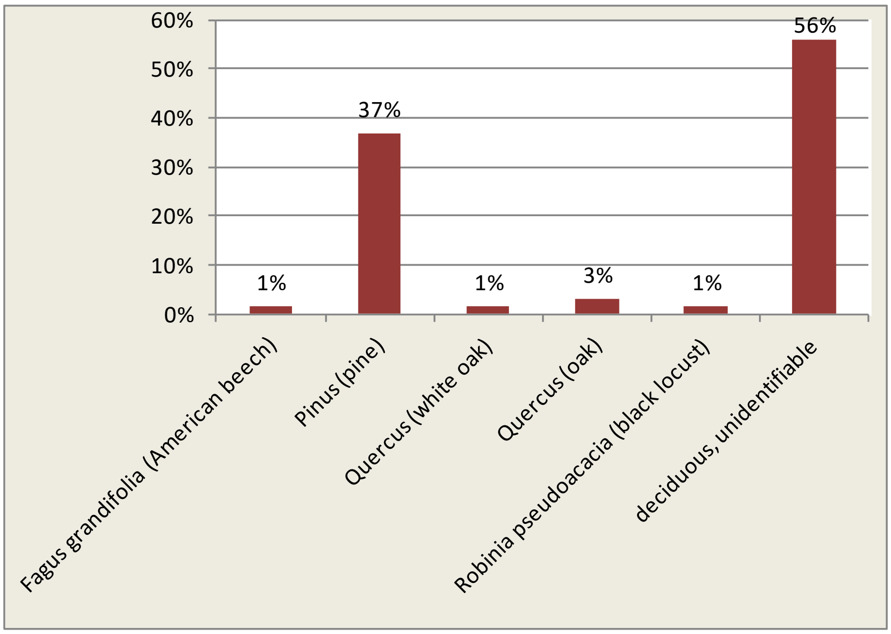

Figure 02: Percentages of unburned wood types identified from the screen-recovered assemblage (n=68)

The screen-recovered macrobotanical assemblage was predominantly composed of unburned, durable seeds of edible fruits. Best-represented were the seeds of cherry (*Prunus*), watermelon (*Citrullus lanatus*), grape (*Vitis*), various plums (*Prunus*), raspberry/blackberry (*Rubus*), and huckleberry (*Gaylussacia*). Each of these taxa represents sweet fleshy fruits. Other comestible fruits and vegetables identified within the screen-recovered assemblage include cucumber or melon (*Cucumis*), hawthorn (*Crataegus*), at least four varieties of plum (*Prunus*), persimmon (*Diospyros virginiana*), apple (*Malus domestica*), peach or nectarine (*Prunus persica*), blackhaw (*Viburnum prunifolium*), strawberry (*Fragaria*), and gum (*Nyssa sylvatica*). Seeds of poke (*Phytolacca americana*) and violet (*Viola*) were also identified. Cotton (*Gossypium hirsutum*) seed was recovered from two of the sampled privies (Feature 12 and Feature 13).

The remains of eight different kinds of tree nuts were also identified: hazel/filbert (*Corylus*), black walnut (*Juglans nigra*), English walnut (*Juglans regia*), butternut (*Juglans cinerea*), chestnut or chinquapin (*Castanea*), hickory (*Carya*), pecan (*Carya illinoinensis*), and oak acorn (*Quercus*). Almond (*Prunus dulcis*) and coconut (*Cocos nucifera*) were also represented.

Miscellaneous plant remains observed within the screen-recovered macrobotanical assemblage include a bract, unidentifiable rind material, and an unknown papery tissue.

Plate 04: Grape (*Vitis*) seeds were abundant within privy Feature 13 (Screened Sample No. 177). Scale = 1mm grid.

Plate 05: Watermelon (*Citrullus lanatus*) seeds recovered privy Feature 13 (Screened Sample No. 177).

Plate 06: Peach or nectarine (*Prunus persica*) pits recovered from Feature 13 (Screened Sample No. 177).

Plate 07: Persimmon (*Diospyros virginiana*) pits recovered from Feature 13 (Screened Sample No. 177).

DISCUSSION

Archeobotanical remains represent largely biodegradable artifacts, with the great majority decomposing quickly following their deposit. As a result, archeobotanical remains offer a limited view of ethnobotanical practices, and it is essential to acknowledge that there are tremendous biases inherent in interpreting archeobotanical data. These biases are due both to the cultural factors involved in deposition of organic remains and to the physical factors governing the differential preservation of deposited plant artifacts. Despite these biases, plant macroremains recovered from archaeological sites provide us with critical information about human-plant relationships in the past. At the Robinson Terminal South site, saturated features provided extreme conditions favorable to organic preservation, resulting in the recovery of a rich array of plant materials (such as unburned seeds) that are usually lost to decomposition.

The plant artifacts recovered from 44AX0235 include native species endemic to the project area. The city of Alexandria is located within the Coastal Plain Physiographic Province, and lies within the Atlantic Slope Section of the Oak-Pine Forest Region as defined by Braun (1950:268-269) and the Oak-Hickory-Pine forest association (Kuchler 1964:1:1). Prior to European contact, native forest cover was typified by a medium tall to tall forest of broadleaf deciduous and needleleaf evergreen trees. Dominants would have included white oak (*Quercus alba*) and post oak (*Quercus stellata*), hickory (*Carya*) and pines (*Pinus*). Sub-dominants include a variety of other hickory and oak species, dogwood (*Cornus florida*), persimmon (*Diospyros virginiana*), sweetgum (*Liquidambar styraciflua*), yellow poplar (*Liriodendron tulipifera*), and black gum (*Nyssa sylvatica*) (Kartesz 1999; Little 1971). Native forest development within the Coastal Plain district of this region has been largely influenced by topography and the abundance of water. Specific forest communities within the Oak-Hickory-Pine forest association would have been influenced by various other factors including elevation, hydrology, slope, soils, and underlying geology. While native plants were well represented within the archeobotanical samples from 44AX0235, crops introduced from Europe and the tropics and grown locally in Virginia in the eighteenth and nineteenth centuries were abundant at the site. In addition, coconut and almond were identified, and these suggest the import of crops.

Based on the material culture recovered from archaeological excavations at Site 44AX0235, we know that plants and plant products were essential to the lives of people who lived and worked on the Alexandria waterfront for more than 200 years. The archeobotanical materials collected from 10 cultural features – including privies - reveal important information about natural resource utilization, commerce, foodways, and waste disposal habits. The combination of multiple macrofloral datasets (dry and wet screen-recovered and flotation derived) from the Robinson Terminal South site from well-preserved, organic-rich contexts resulted in an abundant floral dataset dominated by a wide variety of economically important plants. Comestibles were plentiful and diverse. Results offer evidence of clear reliance on farm products, wild-gathered edible fruits and nuts, locally available plant resources, and exotic imports from far away. Wood remains reference construction materials used in local architecture, and spent fuel used for heating and cooking fires. Interestingly, the collective floral data show a firm reliance on plant products obtained from a variety of sources. The remains of edible fruits were both ubiquitous and abundant, and the identified taxa document that both wild-gathered and orchard-grown fruit crops were heavily utilized. Similarly, identified nuts include both cultivated types and endemic forest species. The remains of garden produce (e.g. tomato, squash, strawberry, pepper) are well-represented. Most of the species identified at the site represent economically important plants, but the recovery of cotton seed within privy features (Feature 12 and Feature 13) suggests the presence of commodity crops associated with the city waterfront. Coconut and almond reveal the use of exotic foods not grown in region. Cereal grains were not well represented, with a single carbonized wheat kernel recovered from Feature 13. Maize (corn) remains were conspicuously absent within the analyzed contexts.

A comparison of results by cultural feature reveals a high density of plant artifacts within privy Feature 13, Feature 12, and Feature 49 (see Figure 03). A high diversity of plant material types and plant foods is also observed within these features, and, interestingly, Feature 48 produced a wide variety of plant foods but not in abundance.

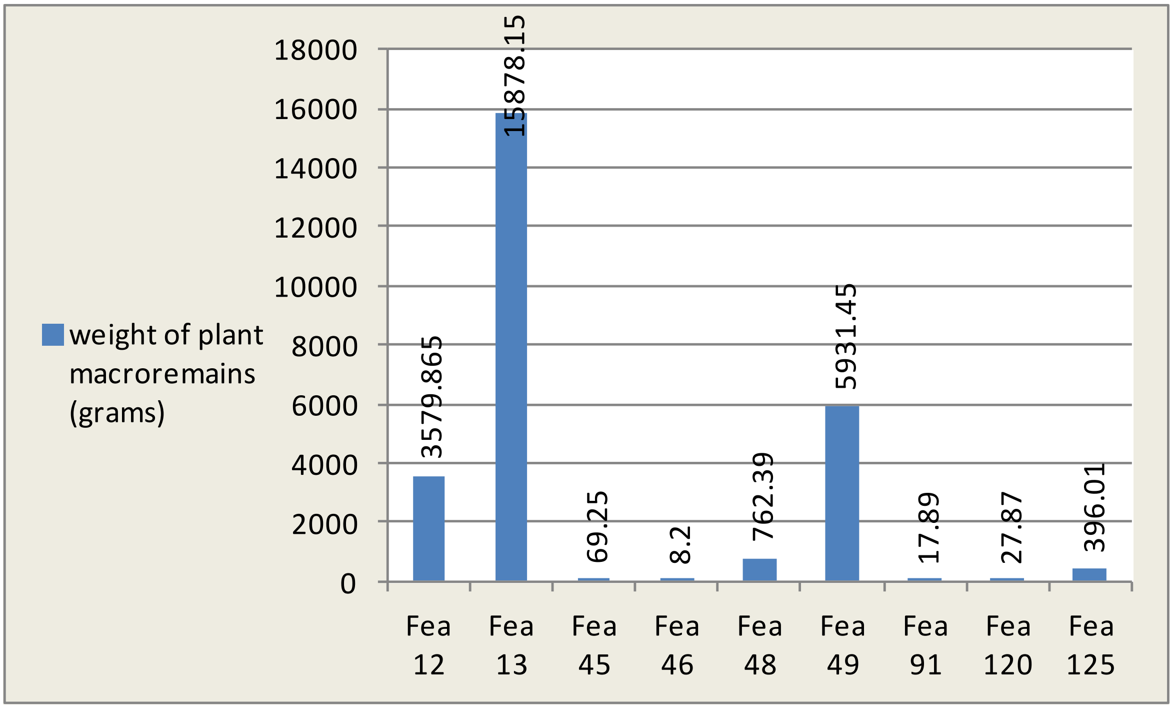

Figure 03: Weight of screen-recovered plant macroremains by feature.

Seasonality

Archeobotanical remains can provide strong markers for seasonality, but the presence of storable foods can complicate the identification of seasonal patterns. The remains of many nuts and fruits can enter the archaeological record at other times of the seasonal cycle than that in which they ripened. The plant products documented within the Robinson Terminal South site assemblage reveals that seasonal produce and tree nuts played an important role in the economic activities associated with sampled features. A variety of summer and fall ripening fruits, nuts, and crops suggest that features were developed during these seasons, but it is also possible that the recovered remains represent stored food resources. All of the plant foods documented archaeologically represent products that could have been stored for future use or used in the preparation of preserves, jellies, or beverages. These products could have been utilized throughout the seasonal round.

A valuable comparative dataset to the Robinson Terminal South site is offered from features at the Indigo Hotel site (44AX0229), where a suite of features dating between the late eighteenth and early nineteenth centuries produced rich floral information (Puseman 2017). Macrobotanical remains from privies, foundations/floorboards, barrel features, and a vessel hull included an array of economically important plants and plant products and information about local ecology. Like the Robinson Terminal South site features, the Indigo Hotel site was particularly rich in fleshy fruits, but nut remains were less abundant and less diverse. The two site assemblages were similar in the scarcity of cereal grains overall, but maize (absent from the Robinson Terminal South site assemblage) is present within the Indigo Hotel site features. The two sites are complementary in documenting other crop plants of economic significance: Tobacco, flax, sunflower, and tentatively identified hops at Indigo Hotel, and cotton, wheat, almond, and coconut at Robinson Terminal South. Small seeds are better represented at 44AX0229, where a wide array of weeds, herbs, vegetables, and therapeutic plants were both ubiquitous and abundant. Wetland taxa are also better-represented at Indigo Hotel. Their presence may be a product of feature sampling, as the Indigo Hotel site analysis included contexts associated with fast land development processes along the Potomac River waterfront during the eighteenth century.

SUMMARY

Data recovery efforts at the Robinson Terminal South site (44AX0245) produced an abundance of historically significant macrobotanical remains from rich feature contexts associated with middle eighteenth century through middle nineteenth century occupation of City Block 73 on the Potomac River strand. The analyzed macroplant remains derived from both soil flotation and waterscreening, and the assemblage was largely composed of unburned plant artifacts from privy contexts. The Robinson Terminal South site macrobotanical analysis documents the use of a wide variety of wild and cultivated plant products that were locally endemic or cultivated as well as imported. Sampled contexts contained extremely well preserved plant artifacts associated with the homes and workspaces of Alexandria's historic residents. The remains of plant foods were extremely well-represented, and their abundance within privy features reveals dietary details and information about waste disposal habits along the urban waterfront. These results expand the historic city's growing archeobotanical dataset, augment archival resources available for the property, and enhance our knowledge of the many ways in which people and plants were interconnected in Alexandria throughout the historic era.

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Appendix
Macrobotanical Data Tables
Robinson Terminal South Phase III
Site 44AX0235

Appendix Table 01: Flotation-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	5027	5028	5032	5033	5089	5091	5090
Feature	12	12	13	13	48	48	49
Feature Type	privy	privy	privy	privy	privy	privy	privy
Bisection	west	west	south	south	south	south	south
Fill	4	5	6	6	4	6	5
Level			1	2			
soil volume (liters)	1.25	2.5	4	3.75	0.5	1	1.25
WOOD CHARCOAL (presence)	x		x	x		x	
UNCARBONIZED WOOD (presence)	x	x	x	x	x		x
UNCARBONIZED SEEDS, MISC (presence)	x	x	x	x	x	x	x
Amaranthus sp. (pigweed) seed	x				x	x	x
Aralia spinosa (spikenard) seed							
Capsicum sp. (pepper) seed							
Chenopodium/Amaranthus (goosefoot/pigweed) seed							
Cucumis sp. (cucumber, melon) seed							
Citrullus lanatus (watermelon) seed	x	x	x	x	x		
Datura stramonium (jimson weed) seed)							
Diospyros virginiana (persimmon) seed	x	x	x	x			
Eleusine indica (goose grass) seed			x		x		
Fragaria sp. (strawberry) seed	x	xx	x	x	x	x	x
Gaylussacia sp. (huckleberry) seed	x	xx	x	xx	xx		x
Malus domestica (apple) seed	x	x	x		x		
Nyssa sylvatica (gum) seed			x				
Phytolacca americana (poke) seed							
Polygonum sp. (knotweed) seed							x
Portulaca oleracea (purslane)seed	x				x		
Prunus persica (peach) pit					x		
Prunus sp. (cherry) pit	xx	xx	xx	x	x	x	x
Prunus sp. (plum) pit	x	x					
Rubus sp. (blackberry/raspberry) seed	xx	xx	xx	xx	xx	xx	x
Scirpus sp. (rush) seed						x	
Solanum lycopersicum (tomato) seed							
Vaccinium sp. (blueberry) seed			x		x		
Viburnum prunifolium (blackhaw) seed		x					
Viola sp. (violet) seed	x		x	x	x	x	

Appendix Table 01: Flotation-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	5027	5028	5032	5033	5089	5091	5090
Feature	12	12	13	13	48	48	49
Feature Type	privy	privy	privy	privy	privy	privy	privy
Bisection	west	west	south	south	south	south	south
Fill	4	5	6	6	4	6	5
Level			1	2			
soil volume (liters)	1.25	2.5	4	3.75	0.5	1	1.25
Vitis sp. (grape) seed	x	x	x	x	x	x	x
ASTERACEAE (daisy) seed							
POACEAE (grass) seed							
bract							
non-botanical artifacts	concrete, brick, plaster, rock, insect remains, bone, glass, lithics	coal, plaster, brick, rock, bone, insect remains, hen's eggshell fragments, glass	plaster, marine shell, insect remains, organic conglomerate, fish scale, bone, ceramic, glass, rodent skull	brick, bone, plaster, insect remains, rock, clam shell fragments, fish scale, organic conglomerate, glass	brick, plaster, bone, fish scale, insect remains, ceramics	brick, bone, fish scale, hen's eggshell fragments, ceramics	brick, plaster, bone, fish scale, ceramic

large fragments isolated for further analysis

x indicates presence, xx denotes most abundant type

Appendix Table 01: Flotation-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	5094	5095	5096	5139	5140	total
Feature	49	49	49	93	93	12 samples
Feature Type	privy	privy	privy	barrel	barrel	
Bisection	west	west	west	east	west	
Fill	3	3	3	3	3	
Level	1	2	3			
soil volume (liters)	2	1	2.5	2	2.25	24
WOOD CHARCOAL (presence)	x	x	x	x	x	75%
UNCARBONIZED WOOD (presence)	x	x	x	x		83%
UNCARBONIZED SEEDS, MISC (presence)	x	x	x	x	x	100%
Amaranthus sp. (pigweed) seed			x			42%
Aralia spinosa (spikenard) seed			x			8%
Capsicum sp. (pepper) seed	x					8%
Chenopodium/Amaranthus (goosefoot/pigweed) seed	x					8%
Cucumis sp. (cucumber, melon) seed		x				8%
Citrullus lanatus (watermelon) seed	xx	x				58%
Datura stramonium (jimson weed) seed)					x	8%
Diospyros virginiana (persimmon) seed		x	x			50%
Eleusine indica (goose grass) seed						17%
Fragaria sp. (strawberry) seed		xx	x		x	83%
Gaylussacia sp. (huckleberry) seed	x	xx	x			75%
Malus domestica (apple) seed	x		x			50%
Nyssa sylvatica (gum) seed						8%
Phytolacca americana (poke) seed			x			8%
Polygonum sp. (knotweed) seed			x	x		25%
Portulaca oleracea (purslane)seed						17%
Prunus persica (peach) pit						8%
Prunus sp. (cherry) pit	xx	x	xx	x	xx	100%
Prunus sp. (plum) pit		x	x	x	x	50%
Rubus sp. (blackberry/raspberry) seed	x	xx	xx	xx	xx	100%
Scirpus sp. (rush) seed						8%
Solanum lycopersicum (tomato) seed				x	x	17%
Vaccinium sp. (blueberry) seed						17%
Viburnum prunifolium (blackhaw) seed						8%
Viola sp. (violet) seed	x	x		x	x	75%

Appendix Table 01: Flotation-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	5094	5095	5096	5139	5140	total
Feature	49	49	49	93	93	12 samples
Feature Type	privy	privy	privy	barrel	barrel	
Bisection	west	west	west	east	west	
Fill	3	3	3	3	3	
Level	1	2	3			
soil volume (liters)	2	1	2.5	2	2.25	24
Vitis sp. (grape) seed	x	x	xx	x	x	100%
ASTERACEAE (daisy) seed	x					8%
POACEAE (grass) seed	x					8%
bract				x		8%
non-botanical artifacts	brick, coal, insect remains, bone, fish scale, lithics, glass, woven fibers	brick, plaster, bone, insect remains, fish scale bone, organic conglomerate, ceramic	plaster, bone, organic conglomerate, abudant fish scale, abundant insect remains, rodent excrement, ceramics, glass, oystershell	brick, plaster, ferrous metal, fish scale, bone, oystershell, nail/tack, glass	ash, bone, brick, fish scale, crushed glass and ceramics, fish scale, glass bottle fragments	

large fragments isolated for further analysis

x indicates presence, xx denotes most abundant type

Appendix Table 02: Screen-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	158	153	159	154	177	168	178	169	179
Feature	12	12	12	12	13	13	13	13	13
Feature Type	privy	privy	privy	privy	privy	privy	privy	privy	privy
Portion	west bisection	east bisection	west bisection	east bisection	south bisect	north bisect	south bisection	north bisection	south bisect
Fill	4	4	5	5	6	6	6	6	7
Level					1	1	2	2	1
WOOD CHARCOAL (no. of fragments)	0	0	2	0	0	5	0	4	0
total weight (grams)	0	0	0.35	0	0	5.18	0	4.72	0
Carya sp. (hickory)						3		1	
Castanea sp. (chestnut)									
Fraxinus sp. (ash)						1			
Liriodendron tulipifera (yellow poplar)			1						
Pinus sp. (pine)			1			1		1	
Quercus sp. (white oak)									
Quercus sp. (red oak)									
Quercus sp. (oak)								1	
diffuse porous									
ring porous								1	
unidentifiable									
total fragments upon which identification was attempted			2			5		4	
SEEDS (carbonized) (no. of specimens)	0	0	0	0	1	0	0	0	0
total weight (grams)	0	0	0	0	0.02	0	0	0	0
Triticum aestivum (bread wheat) kernel					1				
UNCARBONIZED WOOD (no. of fragments)	0	1	0	0	0	2	0	3	0
total weight (grams)	0	10.53	0	0	0	169.77	0	5.97	0
(worked wood)		yes				yes			
Fagus grandifolia (American beech) twig									
Pinus sp. (pine)		1				1		2	
Quercus sp. (white oak)									
Quercus sp. (oak)									
Robinia pseudoacacia (black locust)									
deciduous									
unidentifiable						1		1	
bark/cambium									
total fragments upon which identification was attempted		1				2		3	
SEEDS, NUTS, COBS, MISC (uncarbonized)	5724	3268	16683	4752	43949	10213	27479	21537	26464
total weight (grams)	565.53	297.57	2126.865	579.02	3627.33	2110.43	3889.47	2282.38	2441.85
Carya illinoinensis (pecan) nutshell fragment			3						2
Carya sp. (hickory, thick-walled) nutshell fragment			2		6				
Castanea sp. (chestnut) shell fragment		2	2	3			1	4	
Cocos nucifera (coconut) shell fragment								1	
Corylus sp. (hazel) nutshell fragment	1	2		3	1		1	1	

Appendix Table 02: Screen-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	158	153	159	154	177	168	178	169	179
Feature	12	12	12	12	13	13	13	13	13
Feature Type	privy	privy	privy	privy	privy	privy	privy	privy	privy
Portion	west bisection	east bisection	west bisection	east bisection	south bisect	north bisect	south bisection	north bisection	south bisect
Fill	4	4	5	5	6	6	6	6	7
Level					1	1	2	2	1
Crataegus sp. (hawthorn) seed							10		5
Cucumis sp. (cucumber, melon) seed						3	3	1	2
Citrullus lanatus (watermelon) seed	367	372	663	307	5102	2458	1706	1905	1380
Diospyros virginiana (persimmon) seed	24	19	247	89	196	97	107	98	104
Diospyros virginiana (persimmon) seed fragment	37	18	130	44	76	92	116	30	17
Fragaria sp. (strawberry) seed						659	372		253
Gaylussacia sp. (huckleberry) seed						1177	1015		916
Gossypium hirsutum (cotton) seed			1			1			1
Juglans cinerea (bitternut) nut									
Juglans nigra (black walnut) nut									1
Juglans nigra (black walnut) nutshell fragment	6	1	10	7	22	4	2	4	7
Juglans regia (English walnut) nutshell fragment							2	1	
Malus domestica (apple) seed		3	1	1	33	2	27	4	7
Nyssa sylvatica (gum) seed						4	2		
Phytolacca americana (poke) seed							1		
Prunus dulcis (almond) pit									
Prunus persica (peach) pit	5	1		7	33	13	11	15	15
Prunus persica (peach) pit half					5	43	6	70	4
Prunus persica (peach) pit fragment	1	2	11		18	112	13	137	8
Prunus sp. (cherry) pit	4972	2695	14372	4068	30162	15912	19619	18258	22114
Prunus sp. (plum, type 1) pit	89	43	357	83	5851	537	380	381	492
Prunus sp. (plum, type 2) pit							19		2
Prunus sp. (plum, type 3) pit							4		16
Prunus sp. (plum, type 4) pit								12	4
Quercus (oak acorn) shell fragment		1						1	1
Rubus sp. (blackberry/raspberry) seed			1			2387	2053		1030
Viburnum prunifolium (blackhaw) seed	2	1	72	27	10	38	22	6	8
Viola sp. (violet) seed	219					282	136		70
Vitis sp. (grape) seed/seed fragment		108	811	113	2411	646	1851	608	
unknown seed, ovoid									5
nutshell, thin type						3			
bract	1								
rind, unidentifiable					23				
unknown papery tissue						2			
non-botanical artifacts	bone		bone, coal					leather	

Appendix Table 02: Screen-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	170	462	550	557	558	565	566	576	577
Feature	13	45	46	48	48	48	48	49	49
Feature Type	privy	foundation	pit	privy	privy	privy	privy	privy	privy
Portion	north bisection	northeast quad	southwest quad	north bisection	north bisection	south bisection	south bisection	east bisection	east bisection
Fill	7	9	3	5	6	4	5	3	3
Level	1							1	2
WOOD CHARCOAL (no. of fragments)	0	0	0	0	0	0	0	0	0
total weight (grams)	0	0	0	0	0	0	0	0	0
Carya sp. (hickory)									
Castanea sp. (chestnut)									
Fraxinus sp. (ash)									
Liriodendron tulipifera (yellow poplar)									
Pinus sp. (pine)									
Quercus sp. (white oak)									
Quercus sp. (red oak)									
Quercus sp. (oak)									
diffuse porous									
ring porous									
unidentifiable									
total fragments upon which identification was attempted									
SEEDS (carbonized) (no. of specimens)	0	0	0	0	0	0	0	0	0
total weight (grams)	0	0	0	0	0	0	0	0	0
Triticum aestivum (bread wheat) kernel									
UNCARBONIZED WOOD (no. of fragments)	0	1	0	0	0	0	0	0	0
total weight (grams)	0	67.69	0	0	0	0	0	0	0
(worked wood)									
Fagus grandifolia (American beech) twig									
Pinus sp. (pine)									
Quercus sp. (white oak)									
Quercus sp. (oak)									
Robinia pseudoacacia (black locust)									
deciduous									
unidentifiable		1							
bark/cambium									
total fragments upon which identification was attempted		1							
SEEDS, NUTS, COBS, MISC (uncarbonized)	16309	2	63	2569	10	1064	3917	9666	6571
total weight (grams)	1341.03	1.56	8.2	235.16	0.54	76.27	450.42	4650.37	744.52
Carya illinoinensis (pecan) nutshell fragment									
Carya sp. (hickory, thick-walled) nutshell fragment									
Castanea sp. (chestnut) shell fragment						1			
Cocos nucifera (coconut) shell fragment									
Corylus sp. (hazel) nutshell fragment									

Appendix Table 02: Screen-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	170	462	550	557	558	565	566	576	577
Feature	13	45	46	48	48	48	48	49	49
Feature Type	privy	foundation	pit	privy	privy	privy	privy	privy	privy
Portion	north bisection	northeast quad	southwest quad	north bisection	north bisection	south bisection	south bisection	east bisection	east bisection
Fill	7	9	3	5	6	4	5	3	3
Level	1							1	2
Crataegus sp. (hawthorn) seed	3								
Cucumis sp. (cucumber, melon) seed	5							2	
Citrullus lanatus (watermelon) seed	811		30	70	1	511	185	2544	871
Diospyros virginiana (persimmon) seed	34			19			14	18	41
Diospyros virginiana (persimmon) seed fragment	19			7			6	10	22
Fragaria sp. (strawberry) seed	217						4		
Gaylussacia sp. (huckleberry) seed	1483						53		
Gossypium hirsutum (cotton) seed	2								
Juglans cinerea (bitternut) nut									
Juglans nigra (black walnut) nut									
Juglans nigra (black walnut) nutshell fragment	6						3	8	1
Juglans regia (English walnut) nutshell fragment	1								
Malus domestica (apple) seed	3					12	2	30	15
Nyssa sylvatica (gum) seed	2								
Phytolacca americana (poke) seed									
Prunus dulcis (almond) pit			1						
Prunus persica (peach) pit	15		1	3		3	3	4	5
Prunus persica (peach) pit half	5	2		1					3
Prunus persica (peach) pit fragment	9								
Prunus sp. (cherry) pit	11599		28	1903	6	270	3104	5059	4316
Prunus sp. (plum, type 1) pit	251		3	61		10	48	191	81
Prunus sp. (plum, type 2) pit									
Prunus sp. (plum, type 3) pit	10								
Prunus sp. (plum, type 4) pit	8								
Quercus (oak acorn) shell fragment									
Rubus sp. (blackberry/raspberry) seed	1399						68		
Viburnum prunifolium (blackhaw) seed	2							1	6
Viola sp. (violet) seed	158								
Vitis sp. (grape) seed/seed fragment	265			505	3	257	427	1799	1210
unknown seed, ovoid	1								
nutshell, thin type									
bract									
rind, unidentifiable	1								
unknown papery tissue									
non-botanical artifacts	leather								

Appendix Table 02: Screen-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	578	667	662	881	885	975	969	977	976	966	949
Feature	49	91	91	120	120	125	125	125	125	125	125
Feature Type	privy	foundation	foundation	foundation	foundation	foundation	foundation	foundation	foundation	foundation	foundation
Portion	east bisection	northwest quad	northeast quad	Block 001A	Block 001B	Block 010	Block 008	Block 010	Block 010	Block 007	Block 003
Fill	3	6	6	3	3	4	4	6	5	4	3
Level	3										
WOOD CHARCOAL (no. of fragments)	0	1	0	0	11	0	0	2	1	115	0
total weight (grams)	0	0.05	0	0	3.73	0	0	2.79	0.08	15.5	0
Carya sp. (hickory)											
Castanea sp. (chestnut)										8	
Fraxinus sp. (ash)											
Liriodendron tulipifera (yellow poplar)											
Pinus sp. (pine)					1			2			
Quercus sp. (white oak)					1					6	
Quercus sp. (red oak)					2					5	
Quercus sp. (oak)											
diffuse porous		1							1		
ring porous										1	
unidentifiable					7						
total fragments upon which identification was attempted		1			11			2	1	20	
SEEDS (carbonized) (no. of specimens)	0	0	0	0	0	0	0	0	0	0	0
total weight (grams)	0	0	0	0	0	0	0	0	0	0	0
Triticum aestivum (bread wheat) kernel											
UNCARBONIZED WOOD (no. of fragments)	0	0	4	0	3	0	0	7	18	139	0
total weight (grams)	0	0	6.62	0	3.17	0	0	8.05	54.01	107.18	0
(worked wood)			yes								
Fagus grandifolia (American beech) twig			1								
Pinus sp. (pine)								4		15	
Quercus sp. (white oak)									1		
Quercus sp. (oak)										2	
Robinia pseudoacacia (black locust)								1			
deciduous									16	3	
unidentifiable			1		3			2			
bark/cambium			2						1		
total fragments upon which identification was attempted			4		3			7	18	20	
SEEDS, NUTS, COBS, MISC (uncarbonized)	5897	0	4	2	7	9	5	1	4	10	2
total weight (grams)	536.56	0	11.22	0.79	20.18	33.3	13.48	7.17	30.49	27.21	2.04
Carya illinoinensis (pecan) nutshell fragment											
Carya sp. (hickory, thick-walled) nutshell fragment											
Castanea sp. (chestnut) shell fragment											
Cocos nucifera (coconut) shell fragment										1	
Corylus sp. (hazel) nutshell fragment	1										

Appendix Table 02: Screen-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	578	667	662	881	885	975	969	977	976	966	949
Feature	49	91	91	120	120	125	125	125	125	125	125
Feature Type	privy	foundation	foundation	foundation	foundation	foundation	foundation	foundation	foundation	foundation	foundation
Portion	east bisection	northwest quad	northeast quad	Block 001A	Block 001B	Block 010	Block 008	Block 010	Block 010	Block 007	Block 003
Fill	3	6	6	3	3	4	4	6	5	4	3
Level	3										
Crataegus sp. (hawthorn) seed											
Cucumis sp. (cucumber, melon) seed											
Citrullus lanatus (watermelon) seed	788										
Diospyros virginiana (persimmon) seed	27										
Diospyros virginiana (persimmon) seed fragment	16										
Fragaria sp. (strawberry) seed											
Gaylussacia sp. (huckleberry) seed											
Gossypium hirsutum (cotton) seed											
Juglans cinerea (bitternut) nut						1					
Juglans nigra (black walnut) nut				2		1			2		
Juglans nigra (black walnut) nutshell fragment			4			4	3		1	5	
Juglans regia (English walnut) nutshell fragment	1										
Malus domestica (apple) seed	6										
Nyssa sylvatica (gum) seed											
Phytolacca americana (poke) seed											
Prunus dulcis (almond) pit											
Prunus persica (peach) pit	3				7	2	1	1	1	3	
Prunus persica (peach) pit half							1				2
Prunus persica (peach) pit fragment	2					1					
Prunus sp. (cherry) pit	3361										
Prunus sp. (plum, type 1) pit	69									1	
Prunus sp. (plum, type 2) pit											
Prunus sp. (plum, type 3) pit											
Prunus sp. (plum, type 4) pit											
Quercus (oak acorn) shell fragment											
Rubus sp. (blackberry/raspberry) seed											
Viburnum prunifolium (blackhaw) seed	1										
Viola sp. (violet) seed											
Vitis sp. (grape) seed/seed fragment	1622										
unknown seed, ovoid											
nutshell, thin type											
bract											
rind, unidentifiable											
unknown papery tissue											
non-botanical artifacts		glass								hen's eggshell, leather, clinker	

Appendix Table 02: Screen-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number		947	962	971	total
Feature		125	125	125	32 samples
Feature Type		foundation	foundation	foundation	
Portion		Block 002	Block 006	Block 009	
Fill		2	3	4	
Level					
WOOD CHARCOAL (no. of fragments)		0	30	0	171
	total weight (grams)	0	43.96	0	76.36
Carya sp. (hickory)					4
Castanea sp. (chestnut)					8
Fraxinus sp. (ash)					1
Liriodendron tulipifera (yellow poplar)					1
Pinus sp. (pine)			13		19
Quercus sp. (white oak)			5		12
Quercus sp. (red oak)			2		9
Quercus sp. (oak)					1
diffuse porous					2
ring porous					2
unidentifiable					7
total fragments upon which identification was attempted			20		66
SEEDS (carbonized) (no. of specimens)		0	0	0	1
	total weight (grams)	0	0	0	0.02
Triticum aestivum (bread wheat) kernel					1
UNCARBONIZED WOOD (no. of fragments)		0	9	0	187
	total weight (grams)	0	19.73	0	452.72
	(worked wood)				
Fagus grandifolia (American beech) twig					1
Pinus sp. (pine)			2		25
Quercus sp. (white oak)					1
Quercus sp. (oak)					2
Robinia pseudoacacia (black locust)					1
deciduous			3		22
unidentifiable					9
bark/cambium			4		7
total fragments upon which identification was attempted			9		68
SEEDS, NUTS, COBS, MISC (uncarbonized)		1	7	5	206194
	total weight (grams)	9.33	12.01	9.68	26141.975
Carya illinoinensis (pecan) nutshell fragment					5
Carya sp. (hickory, thick-walled) nutshell fragment					8
Castanea sp. (chestnut) shell fragment					13
Cocos nucifera (coconut) shell fragment					2
Corylus sp. (hazel) nutshell fragment					10

Appendix Table 02: Screen-recovered plant macroremains analyzed from the Robinson Terminal South Site 44AX0235

Artifact Collection Number	947	962	971	total
Feature	125	125	125	32 samples
Feature Type	foundation	foundation	foundation	
Portion	Block 002	Block 006	Block 009	
Fill	2	3	4	
Level				
Crataegus sp. (hawthorn) seed				18
Cucumis sp. (cucumber, melon) seed				16
Citrullus lanatus (watermelon) seed				20071
Diospyros virginiana (persimmon) seed				1134
Diospyros virginiana (persimmon) seed fragment				640
Fragaria sp. (strawberry) seed				1505
Gaylussacia sp. (huckleberry) seed				4644
Gossypium hirsutum (cotton) seed				5
Juglans cinerea (bitternut) nut	1			2
Juglans nigra (black walnut) nut				6
Juglans nigra (black walnut) nutshell fragment		3	3	104
Juglans regia (English walnut) nutshell fragment				5
Malus domestica (apple) seed				146
Nyssa sylvatica (gum) seed				8
Phytolacca americana (poke) seed				1
Prunus dulcis (almond) pit				1
Prunus persica (peach) pit		1	1	154
Prunus persica (peach) pit half			1	143
Prunus persica (peach) pit fragment		2		316
Prunus sp. (cherry) pit		1		161819
Prunus sp. (plum, type 1) pit				8928
Prunus sp. (plum, type 2) pit				21
Prunus sp. (plum, type 3) pit				30
Prunus sp. (plum, type 4) pit				24
Quercus (oak acorn) shell fragment				3
Rubus sp. (blackberry/raspberry) seed				6938
Viburnum prunifolium (blackhaw) seed				196
Viola sp. (violet) seed				865
Vitis sp. (grape) seed/seed fragment				12636
unknown seed, ovoid				6
nutshell, thin type				3
bract				1
rind, unidentifiable				24
unknown papery tissue				2

non-botanical artifacts				

Dendrochronology Report

Oxford Tree-Ring Laboratory
Report 2019/04

The Tree-Ring Dating of the Archeological Evaluation and Mitigation of Site 44AX0235, Robinson Landing, City of Alexandria, Virginia WSSI #22335.04

Michael J. Worthington and Jane I. Seiter

Vince Gallacci of Thunderbird Archeology sampling Ship 3, Feature 159

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August 2019

Summary:

Robinson Landing, Alexandria, Virginia **(38.801219, -77.039935)**

Feature 155-2 Bulkhead Associated with Ship 2	*Felling dates:* **Summer 1765, Winter 1771/2, Winter 1784/5**
Feature 155-4 Bulkhead Associated with Ship 2	*Felling Date:* **Winter 1772/3**
Feature 155-6 Bulkhead Associated with Ship 2	*Felling Date:* **Spring 1772**
Feature 160-6 Bulkhead Between Ship 1 and Ship 2	*Felling Date:* **Winter 1771/2**
Feature 161-1 Bulkhead System Along Wolfe Street	*Felling Date:* **Winter 1767/8 Summer 1770**
Feature 162 Grillage and Disarticulated Logs Possibly Associated with Feature 165	*Felling Date:* **Winter 1735/6 Winter 1770/1**
Feature 164 Addition to Feature 161	*Felling Date:* **Summer 1771 Summer 1773 Winter 1773/4 Spring 1785**
Feature 165 Large Coffer East of Ship 2	*Felling Date:* **After 1792**
Feature 168 Partial Bulkhead on North End near Duke Street	*Felling Date:* **After 1842**
Feature 200 Ship 1	*Felling Date:* **Undated**
Feature 159 Ship 3	*Felling Date:* **Undated**

Site Master 1657-1784 (oak) RTVAx1 (*t* = 8.76 MDZ7; 8.46 POPMASTE; 8.32 ESHORE1).
Site Master 1771-1784 (oak) f155-2 (*t* = 5.53 hs wews3; 5.51 WILDx1; 5.20 WCMDx1).
Site Master 1648-1762 (oak) f155-2-D1 (*t* = 5.70 RHMDx1; 5.22 SOTx12; 5.18 haas1).
Site Master 1727-1784 (oak) rtva1 (*t* = 5.39 GLOx1; 5.14 CBHMx1; 5.01 SGHx1).
Site Master 1703-1785 (oak) f161-a1y (*t* = 7.29 yardAB; 6.84 DCAREA2; 6.55 MDZ8).
Site Master 1686-1767 (tulip poplar) f161-1 (*t* = 5.69 CDMDx6; 5.66 OMBx1; 5.63 PIEDMO).
Site Master 1618-1769 (oak) f161-1-b18 (*t* = 7.29 BPR; 6.74 MATHISTO; 6.71 FTLOUD).
Site Master 1600-1770 (tulip poplar) f162 (*t* = 7.23 DRNx6; 7.13 HESSx; 6.89 flpa).
Site Master 1674-1770 (oak) f162-4-a2 (*t* = 8.13 MTVx4; 6.76 SBK6; 6.36 FDMDx1).
Site Master 1671-1784 (oak) f164-4 (*t* = 6.03 CHVAx1; 5.92 MDOAK; 5.81 SBS2).
Site Master 1632-1816 (oak) f168-2-a1 (*t* = 5.96 CDMDx6; 5.33 WCM; 5.31 eapenn).

Dendrochronological analysis was undertaken at the Robinson Landing site in Alexandria, Virginia, to help understand the development of the site. The analysis targeted several wooden features uncovered during the excavations, primarily bulkhead wharves, square crib wharf structures, and the remnants of three ships that were used as a framework for shore infilling and wharf construction. Dendrochronological samples were taken from eleven features in total, using a mix of sectioning and coring techniques. Nine of the features were successfully dated, providing a series of precise felling dates that ranged from the winter of 1735/6 through to the winter of 1784/5.

Date sampled:	April 6, 9, 16, and 18; May 6; and October 22, 2018
Commissioner:	John P. Mullen, Principal Archeologist/Assistant Manager, Thunderbird Archeology
Client:	Eakin Youngentob and Associates
Street address:	2 Duke Street, Alexandria, VA 22314
Summary published:	**www.dendrochronology.com**

How Dendrochronology Works

Dendrochronology has over the past few decades become one of the leading and most accurate scientific dating methods. While not always successful, when it does work, it is precise, often to the season of the year. Tree-ring dating to this degree of precision is well known for its use in dating historic buildings and archaeological timbers. However, more ancillary objects such as doors, furniture, panel paintings, and wooden boards in medieval book-bindings can sometimes be successfully dated.

The science of dendrochronology is based on a combination of biology and statistics. In temperate zones, a tree puts on a new layer of growth underneath the bark every year, with the effect being that the tree grows wider and taller as it ages. Each annual ring is composed of the growth which takes place during the spring and summer and continues until about November, when the leaves are shed and the tree becomes dormant for the winter period. For the two principal American oaks, the white and red (*Quercus alba* and *Q. rubra*), as well as for the black ash (*Fraxinus nigra*) and many other species, the annual ring is composed of two distinct parts: the spring growth or early wood, and the summer growth, or late wood. Early wood is composed of large vessels formed during the period of shoot growth which takes place between March and May, before the establishment of any significant leaf growth. This is produced by using most of the energy and raw materials laid down the previous year. Then, there is an abrupt change at the time of leaf expansion around May or June when hormonal activity dictates a change in the quality of the xylem, and the summer growth, or late wood, is formed. Here the wood becomes increasingly fibrous and contains much smaller vessels. Trees with this type of growth pattern are known as ring-porous, and are distinguished by the contrast between the open, light-colored early wood vessels and the dense, darker-colored late wood.

Other species of tree, such as tulip poplar (*Liriodendron tulipifera L.*), are known as diffuse-porous. Unlike the ring-porous trees, the spring vessels consist of very small spring vessels that become even smaller as the tree advances into the summer growth. The annual growth rings are often very difficult to distinguish under even a powerful microscope, and one often needs to study the medullary rays, which thicken at the ring boundaries.

Dendrochronology utilizes the variation in the width of the annual rings as influenced by climatic conditions common to a large area, as opposed to other more local factors such as woodland competition and insect attack. It is these climate-induced variations in ring widths that allow calendar dates to be ascribed to an undated timber when compared to a firmly-dated sequence. If a tree section is complete to the bark edge, then when dated a precise date of felling can be determined. The felling date will be precise to the season of the year, depending on the degree of formation of the outermost ring. Therefore, a tree with bark that has the spring vessels formed but no summer growth can be said to be felled in the spring, although it is not possible to say in which particular month the tree was felled.

Another important dimension to dendrochronological studies is the presence of sapwood and bark. This is the band of growth rings immediately beneath the bark and comprises the living growth rings which transport the sap from the roots to the leaves. This sapwood band is distinguished from the heartwood by the prominent features of color change and the blocking of the spring vessels with tyloses, the waste products of the tree's growth. The heartwood is generally darker in color, and the spring vessels are usually blocked with tyloses. The heartwood is dead tissue, whereas the sapwood is living, although the only really living, growing, cells are in the cambium, immediately beneath the bark. In the American white oak (*Quercus* alba), the difference in color is not generally matched by the change in the spring vessels, which are often filled by tyloses to within a year or two of the terminal ring. Conversely, the spring vessels in the American red oak (*Q* rubra) are almost all free of tyloses, right to the pith. Generally the sapwood retains stored food and is therefore attractive to insect and fungal attack once the tree is felled and therefore is often removed during conversion.

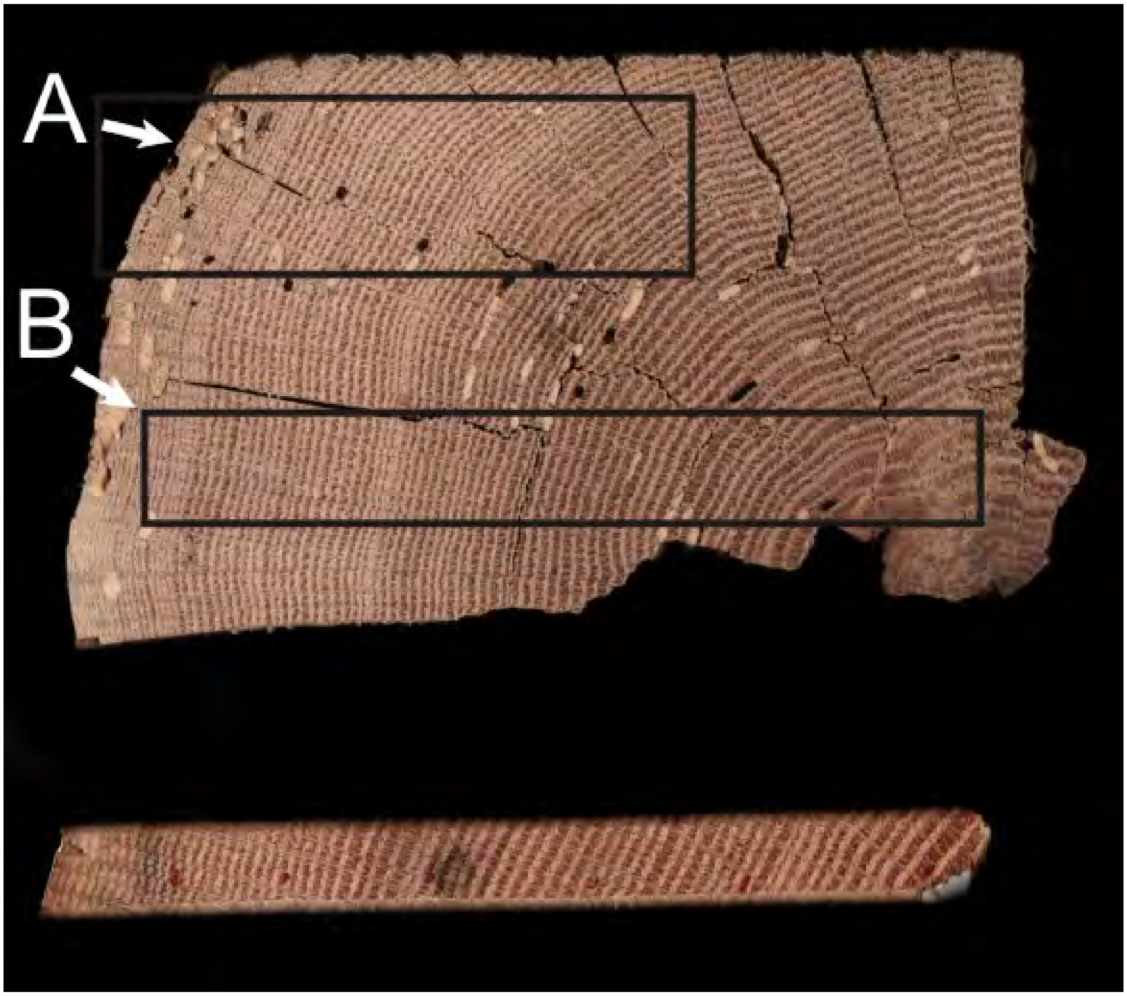

Figure 1. A cross-section of an oak timber with sapwood rings on the left-hand side (above). The boxes illustrate conversion methods resulting in **A)** a precise felling date and **B)** a *terminus post quem* or felled after date. Also pictured is a core showing complete sapwood (below).

Methodology: The Dating Process

All samples were taken from what appeared to be primary first-use timbers. Timbers that looked most suitable for dendrochronological purposes—those with complete sapwood or reasonably long ring sequences—were selected. *In-situ* timbers were sampled through coring, using a 5 mm hollow auger or sections were cut with a chainsaw.

The dry samples were sanded on a linisher, or bench-mounted belt sander, using 60 to 1200 grit abrasive paper, and were cleaned with compressed air to allow the ring boundaries to be clearly distinguished. They were then measured under a x10/x30 microscope using a travelling stage electronically displaying displacement to a precision of 0.01mm. Thus each ring or year is represented by its measurement which is arranged as a series of ring-width indices within a data set, with the earliest ring being placed at the beginning of the series, and the latest or outermost ring concluding the data set.

As indicated above, the principle behind tree-ring dating is a simple one: the seasonal variations in climate-induced growth as reflected in the varying width of a series of measured annual rings is compared with other, previously dated ring sequences to allow precise dates to be ascribed to each ring. When an undated sample or site sequence is compared against a dated sequence, known as a reference chronology, an indication of how good the match is must be determined. Although it is almost impossible to define a visual match, computer comparisons can be accurately quantified. While it may not be the best statistical indicator, Student's (a pseudonym for W S Gosset) *t*-value has been widely used among dendrochronologists. The cross-correlation algorithms most commonly used and published are derived from Baillie and Pilcher's CROS program (Baillie and Pilcher 1973).

Generally, *t*-values over 3.5 should be considered significant, although in reality it is common to find demonstrably spurious *t*-values of 4 and 5 because more than one matching position is indicated. For this reason, dendrochronologists prefer to see some *t*-value ranges of 5, 6, or higher, and for these to be well replicated from different, independent chronologies with local and regional chronologies well represented. Users of dates also need to assess their validity critically. They should not have great faith in a date supported by a handful of *t*-values of 3s with one or two 4s, nor should they be entirely satisfied with a single high match of 5 or 6. Examples of spurious *t*-values in excess of 7 have been noted, so it is essential that matches with reference chronologies be well replicated, and that this is confirmed with visual matches between the two graphs. Matches with *t*-values of 10 or more between individual sequences usually signify having originated from the same parent tree.

In reality, the probability of a particular date being valid is itself a statistical measure depending on the *t*-values. Consideration must also be given to the length of the sequence being dated as well as those of the reference chronologies. A sample with 30 or 40 years growth is likely to match with high *t*-values at varying positions, whereas a sample with 100 consecutive rings is much more likely to match significantly at only one unique position. Samples with ring counts as low as 50 may occasionally be dated, but only if the matches are very strong, clear, and well replicated, with no other significant matching positions. This is essential for intra-site matching when dealing with such short sequences. Consideration should also be given to evaluating the reference chronology against which the samples have been matched: those with well-replicated components that are geographically near to the sampling site are given more weight than an individual site or sample from far away.

It is general practice to cross-match samples from within the same phase to each other first, combining them into a site master, before comparing with the reference chronologies. This has the advantage of averaging out the "noise" of individual trees and is much more likely to obtain higher *t*-values and stronger visual matches. After measurement, the ring-width series for each sample is plotted as a graph of width against year on log-linear graph paper. The graphs of each of the samples in the phase under study are then compared visually at the positions indicated by the computer matching and, if found satisfactory and consistent, are averaged to form a mean curve for the site or phase. This mean curve and any unmatched individual sequences are compared against dated reference chronologies to obtain an absolute calendar date for each sequence. Sometimes, especially in urban situations, timbers may have come from different sources and fail to match each other, thus making the compilation of a site master difficult. In this situation samples must then be compared individually with the reference chronologies.

Therefore, when cross-matching samples with each other, or against reference chronologies, a combination of both visual matching and a process of qualified statistical comparison by computer is used. For this study, the ring-width series were compared on an IBM compatible computer for statistical cross-matching using a variant of the Belfast CROS program (Baillie and Pilcher 1973).

Ascribing and Interpreting Felling Dates

Once a tree-ring sequence has been firmly dated in time, a felling date, or date range, is ascribed where possible. For samples that have sapwood complete to the underside of, or including, bark, this process is relatively straight forward. Depending on the completeness of the final ring, i.e. if it has only the early wood formed, or the latewood, a *precise felling date and season* can be given. Where the sapwood is partially missing, or if only a heartwood/sapwood transition boundary survives, then the question of when the tree was felled becomes considerably more complicated. In the European oaks, sapwood tends to be of a relatively constant width and/or number of rings, and it is possible to estimate the approximate number of sapwood rings that are missing from any given timber.

Unfortunately, it has not been possible to apply an accurate sapwood estimate to either the white or red oaks at this time. Primarily, it would appear that there is a complete absence of literature on sapwood estimates for oak anywhere in the country (Grissino-Mayer, *pers comm*). The matter is further complicated in that the sapwood in white oak (*Quercus alba*) occurs in two bands, with only the outer ring or two being free of tyloses in the spring vessels (Gerry 1914; Kato and Kishima 1965). Out of some 50 or so samples, only a handful had more than 3 rings of sapwood without tyloses. The actual sapwood band is differentiated sometimes by a lighter color, although this is often indiscernible (Desch 1948). In archaeological timbers, the lighter colored sapwood does not collapse as it does in the European oak (*Q rober*), but only the last ring or two without tyloses shrink tangentially. In these circumstances the only way of being able to identify the heartwood/sapwood boundary is by recording how far into the timber wood boring beetle larvae penetrate, as the heartwood is not usually susceptible to attack unless the timber is in poor or damp conditions. Despite all of these drawbacks, some effort has been made in recording sapwood ring counts on white oak, although the effort is acknowledged to be somewhat subjective.

As for red oaks (*Quercus rubra*) it will probably not be possible to determine a sapwood estimate as these are what are known as "sapwood trees" (Chattaway 1952). Whereas the white oak suffers from an excess of tyloses, these are virtually non-existent in the red oak, even to the pith. Furthermore, there is no obvious color change throughout the section of the tree, and wood-boring insects will often penetrate right through to the center of the timber. Therefore, in sampling red oaks, it is vital to retain the final ring beneath the bark, or to make a careful note of the approximate number of rings lost in sampling, if any meaningful interpretation of felling dates is to be made. Similarly, no study has been made in estimating the number of sapwood rings in tulip-poplar, black ash, or any of the pines.

Therefore, if the bark edge does not survive on any of the timbers sampled, only a *terminus post quem* or *felled after* date can be given. The earliest possible felling date would be the year after the last measured ring date, adjusted for any unmeasured rings or rings lost during the process of coring.

Some caution must be used in interpreting solitary precise felling dates. Many instances have been noted where timbers used in the same structural phase have been felled one, two, or more years apart. Whenever possible, a group of precise felling dates should be used as a more reliable indication of the construction period. It must be emphasized that dendrochronology can only date when a tree has been felled, not when the timber was used to construct the structure under study. However, it is common practice to build timber-framed structures with green or unseasoned timber and therefore construction usually took place within twelve to eighteen months of felling (Miles 1997).

Details of Dendrochronological Analysis

The results of the dendrochronological analysis for the buildings under study are presented in a number of detailed tables. The most useful of these is the summary **Table 1**. This gives most of the salient results of the dendrochronological process, and includes details for each sample, such as its species, location, and felling date, if successfully tree-ring dated. This last column is of particular interest to the end user, as it gives the actual year and season when the tree was felled, if bark or bark edge is present. If bark edge is not present, it gives a *terminus post quem* or date after which the timber was felled. Often these *terminus post quem* dates begin far earlier than any associated precise felling dates. This is simply because far more rings have been lost in the initial conversion of the timber. If the sapwood was complete on the timber but some was lost during coring, an estimated date range can sometimes be given.

It will also be noticed that often the precise felling dates will vary within several years of each other. Unless there is supporting archaeological evidence suggesting different phases, all this would indicate is either stockpiling of timber, or of trees that had been felled or died at varying times but were not cut up until the commencement of the particular building operations in question. When presented with varying precise felling dates, one should always take the latest date for the structure under study, and it is likely that construction will have been completed for ordinary vernacular buildings within twelve or eighteen months from this latest felling date (Miles 1997).

Table 2 gives an indication of the statistical reliability of the match between one sequence and another. This shows the *t*-value over the number of years overlap for each combination of samples in a matrix table. It should be born in mind that *t*-values with less than 80 rings overlap may not truly reflect the same degree of matching and that spurious matches may produce similar values.

First, multiple radii have been cross-matched with each other and combined to form same-timber means. These are then compared with other samples from the site and any which are found to have originated from the same parent tree are again similarly combined. Finally, all samples, including all same timber and same tree means, are combined to form one or more site masters. Again, the cross-matching is shown as a matrix table of *t*-values over the number of years overlaps. Reference should always be made to **Table 1** to clearly identify which components have been combined.

Table 3 shows the degree of cross-matching between the site master(s) and a selection of reference chronologies. This shows the state or region from which the reference chronology originated, the common chronology name, the publication reference, and the years covered by the reference chronology. The number of overlapping years between the reference chronology and the site master is also shown together with the resulting *t*-value. It should be noted that well replicated regional reference chronologies, which are shown in **bold**, will often produce better matches than individual site masters or indeed individual sample sequences.

Figures include a bar diagram that shows the chronological relationship between two or more dated samples from a phase of building and any plans showing sample locations, if available.

Publication of all dated sites for English buildings occurs annually in *Vernacular Architecture*, but regrettably there is at the present time no vehicle available for the publication of dated American buildings. However, a similar entry is shown on the summary page of the report, which could be used in any future publication of American dates. This does not give as much technical data for the samples dated, but does give the *t*-value matches against the relevant chronologies, provides a short descriptive paragraph for each building or phase dated, and gives a useful short summary of samples dated. These summaries are also listed on the web-site maintained by the Laboratory, which can be accessed at www.dendrochronology.com. The Oxford Tree-Ring Laboratory retains copyright of this report, but the commissioner of the report has the right to use the report for his or her own use so long as the authorship is quoted. Primary data and the resulting site master(s) used in the analysis are available from the Laboratory on request by the commissioner and bona fide researchers. The samples form part of the Laboratory archives, unless an alternative archive, such as the Colonial Williamsburg Foundation in association with the Oxford Tree-Ring Laboratory, has been specified in advance.

Overview of Robinson Landing Site, provided by John P. Mullen, Principal Archeologist/Assistant Manager, Thunderbird Archeology

Thunderbird Archeology, a division of Wetland Studies and Solutions, Inc. (WSSI), of Gainesville, Virginia, conducted an *Archaeological Evaluation* and *Archaeological Excavation* (mitigation) study on behalf of Eakin Youngentob and Associates at the site of Robinson Landing in 2017 and 2018. Robinson Landing is located along the historic waterfront in Alexandria, Virginia, and is bounded by Duke Street, South Union Street, Wolfe Street, and the Potomac River.

The remains of a late 18th- to early 19th-century city block were exposed during the archeological excavations beneath the 20th-century Robinson Terminal Warehouse Corporation warehouses that once enclosed the entire city block. Thunderbird Archeology recorded the block as *Site 44AX0235,* which encompassed the stone and brick foundations of residential and commercial buildings facing Wolfe, Union and Duke Streets.

Most of these dwellings had crawl spaces or cellars with intact deposits dating to the occupation of the houses. Numerous privies were found in the backyards, which contained even more clues (in the well preserved "night soil") about the occupants and uses of these buildings. A few structures were located within the interior of the property, delineating the location of previously unknown alleyways that ran across the interior. The entire property was divided in half in 1780 by a well-known “alley” named The Strand; Thunderbird located a flagstone and cobblestone portion of the Strand that likely dates to 1820 based on the artifacts found beneath the cobblestones. The east side of the Strand facing the Potomac River was lined with the foundations of commercial warehouses, situated on wharves. A brick sidewalk with stone curbs fronted the warehouses. Finally, the northeastern end of the site was home to the Hooe’s Warehouse (circa 1783), Hartshorn’s Store, and was later the location of the circa 1851 Pioneer Mill, which was the largest building in Alexandria at that time and a well-known landmark.

However, prior to 1851, the northeastern end of the site (along Duke Street) was the location of Alexandria’s small 18th- and early 19th-century shipbuilding industry. The town of Alexandria was established in 1749 between two points of land on either side of a crescent shaped bay on the Potomac River. The waterfront originally consisted of 15-20 feet high bluffs overlooking the river and the tidal flats. The southernmost point of land on this bay, which the Robinson site and the Hotel Indigo site shared, was named Point Lumley. The rest of the Robinson site consisted of tidal mud flats that were completely infilled between 1750 and 1790, by cutting down the high bluffs and spreading the soil out into the shallow water in a process known as “banking out.”

Thunderbird Archeology also found evidence of how the owners and residents of this city block reclaimed the tidal flats and created new land, so that they could access the deep-water channel of the Potomac River and the benefits of merchant trade opportunities. Several bulkhead wharf remnants, consisting of stacked and interlocked long timbers, were located around the eastern edge of the property, and in other areas were found what appears to be crib wharf construction: a square framework of timbers that sank to the bottom of the river when filled with stone or soil. Given the proximity to the river and an early shipyard, three ship remnants were located at the site that were used as the framework for the wharf construction and for creating new land on this city block.

Dendrochronological Sampling

A dendrochronological study of Robinson Landing was undertaken to help understand the development of the site by providing dates for the wooden archaeological features and the three ships that were found during excavation.

Sixty-eight timbers in total were sampled from the site, comprising a mix of oak, tulip polar, pine, and bald cypress. Samples from the site were given individual codes by the archaeologists; these codes have been used throughout this report to enable cross-comparison between the different site reports. The position of each sample was noted at the time of sampling (see figures 3, 4, and 5).

Summary of Dating

Of the sixty-eight timbers sampled, thirteen were found to be unsuitable for analysis due to insufficient rings or the timber were found to be too rotten and were discarded. Bark edge survived on twenty-nine timber deemed suitable for analysis.

All of the timber sequences were compared with each other. Eleven timbers (**F155-2-D2, F155-2-E1, F155-4, F155-6, F160-6-F1, F161-1-A1, F164-1-A1, F164-1-A2, F164-1-B1, F164-5, and F164-6**) were found to match each other allowing them to be combined into the 126-year site masters **RTVAx1**.

Five timbers **(F159-1, F159-11, F159-2, F159-4, and F159-7)** were found to match each other allowing them to be combined into the 178-year site masters **RTVAx2**.

The site masters and the remaining unmatched samples were compared with more than one thousand master chronologies from the East Coast of the United States. **RTVAx1** was found to date spanning the years 1659 to 1784 (Table 2a). Ten of the individual samples were also found to date (see Table 1).

Interpretation

The dendrochronology study has successfully dated nine of the eleven archeological features sampled. The bulkhead associated with ship2 – f155-2 were found to date to the summer of 1765, winter of 1771/2, and the winter of 1784/5. The bulkhead associated with ship2 – f155-4 was found to date to the winter of 1772/3. The bulkhead associated with ship2 – f155-6 dated to the spring of 1772. The bulkhead between ship1 and ship2 – f160-6 dated to winter 1771/2, the bulkhead system along Wolfe Street – f161-1 dated to the winter of 1767/8 and the summer 1770. The grillage and disarticulated logs associated with 165 dated to winter of 1735/6 and winter of 1770/1. The addition to 161 – f164 dated to summer of 1771, summer 1773, the winter of 1773/4 and the spring of 1785. The large coffer east of Ship 2 dated to after 1792 and the partial bulkhead on north end near Duke Street to after 1842.

Two of the three ships found at Robinson Landing—ship 1 and ship 3 f159—were found to be suitable for sampling; the third was extremely decayed and the remaining timbers lacked a sufficient number of rings to be sampled. Both of the sampled ships were found not to date.

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Table 1: Summary of tree-ring dating

ROBINSON TERMINAL, ALEXANDRIA, VIRGINIA

Sample number & type		Species	Timber and position	Dates AD spanning	Last Ring	No of rings	Mean width mm	Std devn mm	Mean sens mm	Felling seasons and dates/date ranges
Feature 155 Bulkhead Associated with Ship2										
f155-2	s	QUAL		1711-1784	C	74	1.37	0.62	0.186	Winter 1784/5
f155-2-b2	s	QUAL		-	h/w only	97	2.02	1.07	0.177	
f155-2-c2	s	QUAL		-	h/w only	62	3.03	1.35	0.359	
f155-2-c3	s	QUAL		-	13nm	129	1.59	0.55	0.177	
f155-2-d1	s	QUAL		-	C	115	1.89	0.66	0.133	
* **f155-2-d2**	s	QUAL		1680-1771	C	92	1.70	0.61	0.184	Winter 1771/2
* **f155-2-e1**	s	QUAL		1680-1764	½C	85	2.09	0.67	0.169	Summer 1765
* **f155-4**	s	PISP		1674-1772	C	99	1.66	0.57	0.187	Winter 1772/3
* **f155-6**	s	QUAL		1712-1771	¼C	60	2.46	0.83	0.203	Spring 1772
f155-a3	s	TADI		-	h/w only	130	1.70	0.92	0.212	
rtva1	s	QUAL		1727-1784	¼C	58	2.02	1.16	0.262	Spring 1784/5

Key: *, †, § = sample included in site-master; c = core; mc = micro-core; s = slice/section; g = graticule; p = photograph; ¼C, ½C, C = bark edge present, partial or complete ring: ¼C = spring (last partial ring not measured), ½C = summer/autumn (last partial ring not measured), or C = winter felling (ring measured); h/w only = heartwood only; nm = number of unmeasured rings; std devn = standard deviation; mean sens = mean sensitivity; QUAL = *Quercus Alba* (White oak) LITU = *Liriodendron tulipifera L.* (tulip poplar); PISP = *Pinus L.* (Southern yellow pine) QUPR = *Quercus prinus* (chestnut oak) TADI= *Taxodium distichum (L.) Rich.* (Boldcypress)

Table 1: Summary of tree-ring dating

ROBINSON TERMINAL, ALEXANDRIA, VIRGINIA

Sample number & type		Species	Timber and position	Dates AD spanning	Last Ring	No of rings	Mean width mm	Std devn mm	Mean sens mm	Felling seasons and dates/date ranges
Feature 159 Ship 3										
† **f159-2**	mc	QUAL	F13	-	h/w only	91	1.48	0.48	0.196	
f159-3	mc	QUAL	F12-FF4N	-	3nm	80	1.07	0.39	0.147	
† **f159-4**	mc	QUAL	F11-F3N	-	h/w only	107	1.04	0.38	0.191	
f159-5	mc	QUAL	F9-FØ	-	6nm	59	0.66	0.22	0.151	
f159-6	mc	QUAL	F10	-	6nm	48	0.94	0.39	0.202	
† **f159-7**	mc	QUAL	F11	-	5nm	82	0.84	0.42	0.124	
† **f159-11**	mc	QUAL	F31-F3N	-	h/w only	38	1.37	0.61	0.235	
f159-a2	mc	QUAL	F8-F25 a2	-	h/w only	76	0.92	0.54	0.151	
f159-f13	mc	QUAL	F13-FØ	-	h/w only	77	1.84	0.56	0.169	
f159-5-4	mc	QUAL	F5-F4	-	h/w only	67	0.59	0.19	0.115	
† **f159-1-f36**	mc	QUAL	F36-F2n	-	h/w only	64	1.58	0.60	0.111	
f159-1-f37	mc	QUAL	F37-FØ	-	h/w only	72	1.88	1.04	0.135	
f159-1-f7	mc	QUAL	f7-fØ	-	11nm	84	1.33	0.47	0.190	
† = RTVAx2 Site Master				-		178	1.17	0.40	0.164	
Feature 160-6 Bulkhead between ship1 and ship2										
f160-4a	s	LITU	Insufficient annual rings							
f160-7-02	s	LITU	Insufficient annual rings							
f160-7-f2	s	LITU	To rotten to measure							
f160-1-b1	s	Hemlock		-	h/w only	76	2.06	1.07	0.164	
* **f160-6-f1**	s	PISP		1663-1771	C	109	2.65	0.73	0.175	Winter 1771/2
f160-7-g1	s	PISP		-	3nm	117	1.21	0.50	0.213	

Key: *, †, § = sample included in site-master; c = core; mc = micro-core; s = slice/section; g = graticule; p = photograph; ¼C, ½C, C = bark edge present, partial or complete ring: ¼C = spring (last partial ring not measured), ½C = summer/autumn (last partial ring not measured), or C = winter felling (ring measured); h/w only = heartwood only; nm = number of unmeasured rings; std devn = standard deviation; mean sens = mean sensitivity; QUAL = *Quercus Alba* (White oak) LITU = *Liriodendron tulipifera L.* (tulip poplar); PISP = *Pinus L.* (Southern yellow pine) QUPR = *Quercus prinus* (chestnut oak) CADN= *Castanea dentata (Marsh.) Borkh.* (chestnut)

Table 1: Summary of tree-ring dating
ROBINSON TERMINAL, ALEXANDRIA, VIRGINIA

Sample number & type		Species	Timber and position	Dates AD spanning	Last Ring	No of rings	Mean width mm	Std devn mm	Mean sens mm	Felling seasons and dates/date ranges
Feature 161-1 Bulkhead system along Wolfe Street										
f161-a1y	s	QUAL		1703-1785	h/w only	83	1.37	0.30	0.158	After 1785
f161-1	s	LITU		1686-1767	C	82	1.91	0.98	0.132	Winter 1767/8
* **f161-1-a1**	s	QUAL		1659-1747	4nm	89	1.88	0.74	0.158	After 1751
f161-1-a2	s	QUAL		-	½C	68	2.68	1.13	0.170	
f161-1-a3	s	LITU		-	h/w only	68	2.62	1.53	0.227	
f161-1-b1	s	QUAL		-	C	85	1.68	0.61	0.158	
f161-1-b17		QUAL		-	C	83	1.83	0.91	0.137	
f161-1-b18		QUAL		1618-1769	½C	152	0.94	0.50	0.197	Summer 1770
f161-1-b2	**s**	LITU		-	½C	69	2.19	0.58	0.183	
f161-1-c2	s	QUAL		-	C	71	2.49	0.60	0.179	
f161-20-b2		QUAL		-	½C	53	3.07	0.92	0.152	
f161-20-c2		QUAL		-	C	44	2.89	0.66	0.211	
f161-24	s	CADN		-	C	96	1.41	0.63	0.185	
f161-100a	mc	LITU		-	h/w only	148	0.79	0.35	0.202	
f161-100b	mc	LITU		-	5NM	143	0.87	0.42	0.212	
f161-123	s	CADN		-	½C	142	1.42	0.42	0.194	
f161-1919	s	QUAL		-	3NM	68	2.12	1.10	0.279	

Key: *, †, § = sample included in site-master; c = core; mc = micro-core; s = slice/section; g = graticule; p = photograph; ¼C, ½C, C = bark edge present, partial or complete ring: ¼C = spring (last partial ring not measured), ½C = summer/autumn (last partial ring not measured), or C = winter felling (ring measured); h/w only = heartwood only; nm = number of unmeasured rings; std devn = standard deviation; mean sens = mean sensitivity; QUAL = *Quercus Alba* (White oak) LITU = *Liriodendron tulipifera L.* (tulip poplar); PISP = *Pinus L.* (Southern yellow pine) QUPR = *Quercus prinus* (chestnut oak) CADN = *Castanea dentata (Marsh.) Borkh.* (chestnut)

Table 1: Summary of tree-ring dating

ROBINSON TERMINAL, ALEXANDRIA, VIRGINIA

Sample number & type		Species	Timber and position	Dates AD spanning	Last Ring	No of rings	Mean width mm	Std devn mm	Mean sens mm	Felling seasons and dates/date ranges
Feature 162 - Grillage and disarticulated logs associated with 165										
f162-a1	s	LITU		-	h/w only	56	2.02	0.91	0.226	
f162-a2	s	LITU		1600-1735	C	136	1.77	0.67	0.171	Winter 1735/6
f162-a3	s	LITU		-	h/w only	141	1.55	0.78	0.199	
f162-a4	s	LITU		1630-1770	C	141	1.40	0.46	0.139	Winter 1770/1
f162-a6	s	LITU		-	5nm	63	2.31	0.92	0.247	
f162	m		Mean of **f162-a2** + **f162-a4**	1600-1770		171	1.70	0.64	0.141	
Feature 164 - Addition to Feature 161										
* **f164-1-a1**	s	QUAL		1678-1773	C	96	2.03	0.93	0.168	Winter 1773/4
f164-1-a2	s	QUAL		1674-1770	½C	97	2.15	0.90	0.168	Summer 1771
* **f164-1-b1**	s	QUAL		1691-1773	C	83	1.92	0.80	0.166	Winter 1773/4
f164-3	s	QUAL	Insufficient annual rings							
f164-4	s	QUAL		1671-1784	¼C	114	2.22	0.89	0.200	Spring 1785
* **f164-5**	s	QUAL		1711-1784	¼C	74	1.91	0.97	0.258	Spring 1785
* **f164-6**	s	QUAL		1672-1772	½C	101	1.93	0.60	0.189	Summer 1773
Feature 165 – Large Coffer east of Ship 2										
f165-3-b1	s	PISP	Insufficient annual rings							
f165-3-d1	s	QUAL		-	C	126	2.17	1.33	0.192	
f165-3-e1	s	LITU	To rotten to measure							
f165-5-c1	s	PISP		-	h/w only	107	2.21	0.68	0.214	After 1792

Key: *, †, § = sample included in site-master; c = core; mc = micro-core; s = slice/section; g = graticule; p = photograph; ¼C, ½C, C = bark edge present, partial or complete ring: ¼C = spring (last partial ring not measured), ½C = summer/autumn (last partial ring not measured), or C = winter felling (ring measured); h/w only = heartwood only; nm = number of unmeasured rings; std devn = standard deviation; mean sens = mean sensitivity; QUAL = *Quercus Alba* (White oak) LITU = *Liriodendron tulipifera L.* (tulip poplar); PISP = *Pinus L.* (Southern yellow pine) QUPR = *Quercus prinus* (chestnut oak) CADN= *Castanea dentata (Marsh.) Borkh.* (chestnut)

Table 1: Summary of tree-ring dating

ROBINSON TERMINAL, ALEXANDRIA, VIRGINIA

Sample number & type		Species	Timber and position	Dates AD spanning	Last Ring	No of rings	Mean width	Std devn	Mean sens	Felling seasons and dates/date ranges
Feature 168 – Partial Bulkhead on North End near Duke Street										
f168-1-a1	s	Unkn	To rotten to measure							
f168-1-b1	s	Unkn	Insufficient annual rings							
f168-1-b2	s	Unkn	Insufficient annual rings							
f168-1-c1	s	Unkn	Insufficient annual rings							
f168-2a1	s	QUAL		1632-1816	26NM	185	0.87	0.23	0.178	After 1842
f168-2-b1	s	QUAL	Insufficient annual rings							
f168-2-d1	s	LITU	Insufficient annual rings							
f168-7	s	PISP	Insufficient annual rings							
Feature F200 – Ship 1										
RT1	s	QUAL		-		85	1.32	0.37	0.178	
*** = RTVAx1 Site Master**				**1659-1784**		**126**	**2.13**	**0.59**	**0.154**	

Key: *, †, § = sample included in site-master; c = core; mc = micro-core; s = slice/section; g = graticule; p = photograph; ¼C, ½C, C = bark edge present, partial or complete ring: ¼C = spring (last partial ring not measured), ½C = summer/autumn (last partial ring not measured), or C = winter felling (ring measured); h/w only = heartwood only; nm = number of unmeasured rings; std devn = standard deviation; mean sens = mean sensitivity; QUAL = *Quercus Alba* (White oak) LITU = *Liriodendron tulipifera L.* (tulip poplar); PISP = *Pinus L.* (Southern yellow pine) QUPR = *Quercus prinus* (chestnut oak) CADN= *Castanea dentata (Marsh.) Borkh.* (chestnut)

Explanation of terms used in Table 1

The summary table gives most of the salient results of the dendrochronological process. For ease in quickly referring to various types of information, these have all been presented in Table 1. The information includes the following categories:

Sample number: Generally, each site is given a two or three letter identifying prefix code, after which each timber is given an individual number. If a timber is sampled twice, or if two timbers were noted at time of sampling as having clearly originated from the same tree, then they are given suffixes '**a**', '**b**', etc. Where a core sample has broken, with no clear overlap between segments, these are differentiated by a further suffix '**1**', '**2**', etc.

Type shows whether the sample was from a core 'c', or a section or slice from a timber's'. Sometimes photographs are used 'p', or timbers measured *in situ* with a graticule 'g'.

Species gives the four-letter species code used by the International Tree-Ring Data Bank, at NOAA. These are identified in the key at the bottom of the table.

Timber and position column details each timber sampled along with a location reference. This will usually refer to a bay or truss number, or relate to compass points or to a reference drawing.

Dates AD spanning gives the first and last measured ring dates of the sequence (if dated),

H/S bdry is the date of the heartwood/sapwood transition or boundary (if identifiable).

Sapwood complement gives the number of sapwood rings, if identifiable. The tree starts growing in the spring during which time the earlywood is produced, also known also as spring growth. This consists of between one and three decreasing spring vessels and is noted as *Spring* felling and is indicated by a ¼ C after the number of sapwood ring count. Sometimes this can be more accurately pin-pointed to very early spring when just a few spring vessels are visible. After the spring growing season, the latewood or summer growth commences, and is differentiated from the proceeding spring growth by the dense band of tissue. This summer growth continues until just before the leaves drop, in about October. Trees felled during this period are noted as *summer* felled (½ C), but it is difficult to be too precise, as the width of the latewood can be variable, and it can be difficult to distinguish whether a tree stopped growing in autumn or *winter*. When the summer growth band is clearly complete, then the tree would have been felled during the dormant winter period, as shown by a single C. Sometimes a sample will clearly have complete sapwood, but due either to slight abrasion at the point of coring, or extremely narrow growth rings, it is impossible to determine the season of felling.

Number of rings: The total number of measured rings included in the samples analysed.

Mean ring width: This, simply put, is the sum total of all the individual ring widths, divided by the number of rings, giving an average ring width for the series.

Mean sensitivity: A statistic measuring the mean percentage, or relative, change from each measured yearly ring value to the next; that is, the average relative difference from one ring width to the next, calculated by dividing the absolute value of the differences between each pair of measurements by the average of the paired measurements, then averaging the quotients for all pairs in the tree-ring series (Fritts 1976). Sensitivity is a dendrochronological term referring to the presence of ring-width variability in the radial direction within a tree which indicates the growth response of a particular tree is "sensitive" to variations in climate, as opposed to complacency.

Standard deviation: The mean scatter of a population of numbers from the population mean. The square root of the variance, which is itself the square of the mean scatter of a statistical population of numbers from the population mean. (Fritts 1976).

Felling seasons and dates/date ranges is probably the most important column of the summary table. Here the actual felling dates and seasons are given for each dated sample (if complete sapwood is present). Sometimes it will be noticed that often the precise felling dates will vary within several years of each other. Unless there is supporting archaeological evidence suggesting different phases, all this would indicate is either stockpiling of timber, or of trees which have been felled or died at varying times but not cut up until the commencement of the particular building operations in question. When presented with varying precise felling dates, one should always take the *latest* date for the structure under study, and it is likely that construction will have been completed for ordinary vernacular buildings within twelve or eighteen months from this latest felling date (Miles 1997).

Table 2a: Matrix of *t*-values and overlaps for the individual samples

Components of master **F162a2+4**

Sample: *Last ring date AD:*	**f162-a4** 1630-1770
f162-a2 1600-1735	<u>4.48</u> 106

Components of site master **RTVAx1**

	155-2-E1	155-4	155-6	160-6-F1	161-1-A1	164-1-A1	164-1-A2	164-1-B1	164-5	164-6
	1680-1764	1674-1772	1712-1771	1663-1771	1659-1747	1678-1773	1674-1770	1691-1773	1711-1784	1672-1772
155-2-D2R	3.91	4.44	3.73	6.02	5.73	5.84	5.5	6.11	3.63	6.19
1680-1771	85	92	60	92	68	92	91	81	61	92
155-2-E1		4.59	3.8	3.13	5.62	4.77	4.83	4.35	3.38	6
1680-1764		85	53	85	68	85	85	74	54	85
155-4			4.29	5.21	3.86	7.9	9.22	3.26	4.47	10.65
1674-1772			60	98	74	95	97	82	62	99
155-6				4.4	No Test	3.97	3.35	3.38	4.35	6.25
1712-1771				60		60	59	60	60	60
160-6-F1					6.33	5.95	4.79	4.72	1.94	5.99
1663-1771					85	94	97	81	61	100
161-1-A1						4.28	4.53	3.84	No Test	4.03
1659-1747						70	74	57		76
164-1-A1							8.04	6.13	3.61	9.42
1678-1773							93	83	63	95
164-1-A2								6.42	4.88	10.52
1674-1770								80	60	97
164-1-B1									3.92	5.82
1691-1773									63	82
164-5										5.19
1711-1784										62

Components of site master **RTVAx2**

Sample: Last ring Date AD:	F159-11	F159-2	F159-4	F159-7
F159-1	5.8 38	4.37 60	4.3 40	4.03 35
F159-11		3.33 36	3.61 38	No Test
F159-2			4.41 36	1.97 66
F159-4				No Test

Table 3: Dating of site master **RTVAx1** (1659-1784) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	t-*value:*
	Maryland	Maryland Oak Master Chronology	Heikkenen Archive	**MDZ7**	1603-1988	126	8.76
¥	Maryland	Poplar Neck House, Caroline County	Worthington 2010	**POPMASTE**	1653-1830	126	8.46
	Maryland	Eastern Shore Master Chronology	Worthington 2011	**ESHORE1**	1592-1836	126	8.32
¥	Maryland	Linchester Mill, Preston	Worthington & Miles 2009/14	LMP	1592-1823	126	8.18
	Maryland	Main House Concord Plantation	Worthington & Seiter 2014/06	CDMDx1	1675-1788	110	7.80
®	Virginia	Rickneck Corn Crib	Heikkenen Archive	RCBC3	1687-1830	98	7.55
	Virginia	Piedmont Master Oak + Historical QUSP	Columbia unpublished	PIEDMO	1488-2001	126	7.41
®	Virginia	Rickneck Barn, Riverdale	Heikkenen Archive	rickcbar	1685-1830	100	7.40
	Virginia	Mt Vernon	Miles & Worthington 2006/20	MTVx6	1678-1758	81	7.29

Chronologies in **bold** denote regional masters

¥ = Component of **ESHORE1**
® = Possible component of **MDZ7**

Table 3: Dating of site master **f155-2** (1711-1784) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	*t-value:*
®	Unknown	Unknown	Heikkenen Archive	hs wews3	1678-1806	74	5.53
	Maryland	The Wilderness, Trappe	Worthington and Seiter 2013/1	WILDx1	1693-1807	74	5.51
	Maryland	Wrights Chance Centreville	Worthington Forthcoming	WCMDx1	1696-1794	74	5.20
®	Virginia	Rick's Corn Crib	Heikkenen Archive	RCBC3	1687-1830	74	5.02
	Maryland	Barn at Best Farm, Monocacy National Battlefield	Worthington and Seiter 2011/4	MCYx5	1726-1892	59	5.05
	Maryland	Maryland Oak Master Chronology	Heikkenen Archive	**MDZ7**	1603-1988	74	4.92
	Maryland	Linchester Mill, Preston	Worthington & Miles 2009/14	LMP	1592-1823	74	4.80
®	Virginia	Rickneck Barn, Riverdale	Heikkenen	rickcbar	1685-1830	74	4.80
®	Maryland	Manor House St Francis Xavier	Heikkenen Archive	MHC5	1670-1824	74	4.73

Chronologies in **bold** denote regional masters

® = Possible component of **MDZ7**

Table 3: Dating of site master **f155-2-D1** (1648-1762) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	*t-value:*
∞	Maryland	Rich Hill, Bel Alton	Worthington & Seiter 2015/19	RHMDx1	1578-1728	81	5.70
	Maryland	Sotterley Mansion, Hollywood	Miles and Worthington 2006/6	SOTx12	1601-1723	76	5.22
	Unknown State	Unknown Site	Heikkenen Archive	haas1	1654-1746	93	5.18
	Maryland	Charles Carrol House	Heikkenen Archive	WCCHHS3	1565-1748	101	4.90
	New Jersey	Holland Township Master Chronology	Worthington & Seiter 2016/13	**HOLL2016**	1550-1824	115	4.82
	Virginia	William Byrd III House, Williamsburg	Worthington & Seiter 2015/15	WBTVAx1	1637-1749	102	4.77
	Maryland	Cloverfields, Wye Mills _ Oak	Worthington & Seiter 2018/09	CFMDx1	1526-1728	81	4.77

Chronologies in **bold** denote regional masters

∞ = Possible component of **HOLL2016**

Table 3: Dating of site master **rtva1** (1727-1784) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	t-*value:*
	Virginia	Gloucester Courthouse oak master	Miles & Worthington 2006/55	GLOx1	1702-1823	58	5.39
	Maryland	Compton Bassett Chapel, Upper Marlboro	Worthington & Seiter 2013/04	CBHMx1	1684-1787	58	5.14
	Virginia	South Garden House Mount Vernon	Worthington & Seiter 2017/10	SGHx1	1666-1784	58	5.01
	Virginia	Galt Cottage, Williamsburg	Worthington & Seiter 2017/09	GCVAx1	1653-1809	58	4.90
	Virginia	Historic Huntley, Alexandria	Worthington & Seiter 2017/04	HUVAx1	1723-1822	58	4.89
	New Jersey	Britton-Rapp Barn, Milford	Worthington & Seiter 2017/18	BRNJx1	1663-1831	58	4.74
	Maryland	Eyre Hall, Cheriton, VA	Miles & Worthington 2003/08	EYREHALL	1514-1806	58	4.77
	Pennsylvania	Rickett's Glen State Park	Cook E.R World Data Bank	PA010	1637-1981	58	4.60
	Pennsylvania	Davis Chambers House Mercersburg	Worthington & Seiter 2014/20	DCHPAx1	1721-1811	58	4.33

Table 3: Dating of site master **f161-a1y** (1703-1785) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	t-*value:*
	Washington DC	Parcel L Wharf/Barry's Wharf	Worthington & Seiter 2017/04	yardAB	1703-1796	83	7.29
	Washington DC, Maryland and Virginia	DC Area Oak Master Chronology made from sites within a 100-mile radius of Washington DC	Worthington 2013	**DCAREA2**	1536-1892	83	6.84
	Maryland	Area Master Chronology	Heikkenen Archive	**MDZ8**	1603-1988	83	6.55
¥	Virginia	Old Town House, Newtown	Heikkenen Archive	OTHS3	1711-1806	75	6.32
	Pennsylvania	Stone House, Lancaster	Worthington Forthcoming	SHPAx2	1712-1807	74	6.11
§	Virginia	Rose Hill, Winchester	Worthington & Seiter 2012/2	RHVx1	1671-1828	83	5.91
¥	Delaware	Cubbage Mill	Heikkenen Archive	cum2s1	1677-1824	83	5.82
§	Maryland	Doughoregan Manor Maryland composite master	Worthington & Seiter 2011/06	DRNx	1536-1859	83	5.86

Chronologies in **bold** denote regional masters

§ = Component of **DCAREA2**
¥ = Possible component of **MDZ8**

Table 3: Dating of site master **f161-1** (1686-1767) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	t-*value:*
β	Maryland	Tobacco Barn Concord Plantation	Worthington & Seiter 2014/06	CDMDx6	1699-1857	69	5.69
	Maryland	Old Mansion, Bowling Green	Miles & Worthington 2006/52	OMBx1	1570-1790	82	5.66
	Virginia	Piedmont Master Oak + Historical	Columbia unpublished	PIEDMO	1488-2001	82	5.63
#	Maryland	Concord Plantation	Worthington & Seiter 2014/06	**CONCORD1**	1699-1857	69	5.53
	Washington DC, Maryland, and Virginia	DC Area Oak Master Chronology made from sites within a 100-mile radius of Washington DC	Worthington 2010	**DCAREA**	1570-1883	82	5.45
	Maryland	Brome Barn Granary Shingles	Heikkenen Archive	BFS3	1627-1785	82	5.44
	Virginia	Riversdale / Long I	Heikkenen Archive	lghs5	1690-1801	78	5.24
	Maryland or Virginia	Riverdale Sharps VA - Period 2	Heikkenen Archive	rlhs3	1690-1832	78	5.22
	Maryland	Cloverfields Mansion	Worthington & Seiter 2018/09	WCMDx1	1696-1794	72	5.14

Chronologies in **bold** denote regional masters

β = Component of **CONCORD1**

Table 3: Dating of site master **f161-1-b18** (1618-1769) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	t-*value:*
	Virginia	Brockenbrough-Peyton House, Port Royal	Miles & Worthington 2006/51	BPR	1481-1777	152	7.29
	Maryland	Maryland Master Chronology (Columbia University)	Columbia unpublished	MATHISTO	1540-1786	152	6.74
	Pennsylvania	Fort Loudon Pennsylvania	Cook and Callahan 1987	FTLOUD	1624-1786	146	6.71
	New York	Abraham Hasbrouck House, New Paltz	Cook, Krusic & Callahan 2002	npzny	1449-1806	152	6.24
	Virginia	Clifton House, Warrington	Worthington & Seiter 2017/08	CHVAx1	1623-1816	147	6.04
	New York	Mid-Hudson Valley Region Historical	Pederson *et al*	NY041	1449-1799	152	5.88
	Virginia	South West Virginia Master Chronology	Heikkenen Archive	swvz7	1652-1990	118	5.74
	Virginia	Old Mansion, Bowling Green	Miles & Worthington 2006/52	OMBx1	1570-1790	152	5.79
	Virginia	Hanover Tavern VA Oak	Columbia unpublished	WATCH	1595-1981	152	5.67

Table 3: Dating of site master **f162** (1600-1770) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	t-*value:*
Ω	Maryland	Doughoregan Manor Overseers House	Worthington & Seiter 2011/06	DRNx6	1626-1807	145	7.23
Ω	Maryland	Hess House, Keedysville, Washington County	Worthington & Seiter 2014/02	HESSx	1662-1776	109	7.13
	Pennsylvania	Fort Loudon	Cook and Callaham 1987	flpa	1629-1786	142	6.89
	New Jersey	Apgar Barn, Milford	Worthington & Seiter 2014/19	APGNJx1	1619-1808	152	6.72
Ω	Maryland	Joseph Fiery Home Place, Clear Springs	Worthington & Seiter 2014/01	FYMDx2	1591-1768	169	6.65
	Virginia	South West Virginia Master Chronology	Heikkenen Archive	swvz7	1652-1990	119	6.51
Ω	New Jersey	Joseph Fiery Home Place, Clear Springs	Worthington & Seiter 2014/01	FYMDx1	1591-1768	169	6.59
	Maryland	Central Maryland Master Chronology	Worthington 2014	**MARYLAND**	1536-1892	171	6.24
	Unknown	Unknown	Heikkenen Archive	haas1	1654-1746	93	6.07

Chronologies in **bold** denote regional masters

Ω = Component of **Maryland**

Table 3: Dating of site master **f164-1-a2** (1674-1770) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	t-*value:*
	Virginia	Mt Vernon	Miles & Worthington 2006/20	MTVx4	1567-1777	97	8.13
®	Virginia	Stratford Hall	Heikkenen Archive	SBK6	1625-1795	97	6.76
	Maryland	Friendship House La Plata	Worthington & Seiter 2015/01	FDMDx1	1669-1831	97	6.39
®	Virginia	Rick's Corn Crib	Heikkenen Archive	RCBC3	1687-1830	84	6.21
®	Virginia	Rickneck Barn, Riverdale	Heikkenen Archive	rickcbar	1685-1830	86	5.71
	Maryland	Area Master Chronology	Heikkenen Archive	**MDZ7**	1603-1988	97	5.62
	Washington DC, Maryland, and Virginia	DC Area Oak Master Chronology made from sites within a 100-mile radius of Washington DC	Worthington 2010	**DCAREA**	1570-1883	97	5.52
	Virginia	Mt Vernon	Miles & Worthington 2006/20	MTXx6	1678-1758	81	5.53
ʕ	Maryland	Poplar Neck House, Caroline County Maryland	Worthington 2010	POPMASTE	1653-1830	97	5.50

Chronologies in **bold** denote regional masters
® = Possible component of **MDZ7**
ʕ = Component of **DCAREA**

Table 3: Dating of site master **f164-4** (1671-1784) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	t-*value:*
	Virginia	Clifton House, Warrington	Worthington & Seiter 2017/08	CHVAx1	1623-1816	114	6.03
	Maryland	Area Master Chronology	Heikkenen Archive	**MDOAK**	1570-1981	114	5.92
µ	Virginia	Stratford Hall Stable II	Heikkenen Archive	SBS2	1625-1795	114	5.81
	Maryland	Mullberry Field	Heikkenen Archive	MULLx1	1590-1755	85	5.48
	Virginia	Bushy Park Gainesville	Worthington & Seiter 2016/01	BUSHx1	1590-1798	114	5.29
	Virginia	Old Mansion, Bowling Green	Miles & Worthington 2006/52	OMBx1	1570-1790	114	5.21
µ	Unknown	Unknown	Heikkenen Archive	gmcas1	1651-1787	114	5.02
µ	Unknown	Unknown	Heikkenen Archive	cbc2	1603-1805	114	5.02

Chronologies in **bold** denote regional masters
µ = Possible component of **MDOAK**

Table 3: Dating of site master **f168-2-a1** (1632-1816) against reference chronologies

	State or region:	*Chronology name:*	*Short publication reference:*	*File name:*	*Spanning:*	*Overlap:*	t-*value:*
	Maryland	Tobacco Barn Concord Plantation	Worthington & Seiter 2014/06	CDMDx6	1699-1857	118	5.96
	Maryland	Prescott Road Log Cabin	Miles & Worthington 2009/15	WCM	1731-1844	86	5.33
	Pennsylvania	Eastern Pennsylvania Master Chronology	Columbia unpublished	eapenn	1471-2003	185	5.31
	Maryland	Area Master Chronology	Heikkenen Archive	**MDOAK**	1570-1981	185	5.23
	Virginia	Mt Vernon	Miles & Worthington 2006/20	mtvx6	1678-1758	81	5.21
µ	Maryland	Coe Barn, Anne Arundel	Heikkenen Archive	coebarn	1603-1805	174	5.16
µ	Virginia	Long Hook, Riverdale	Heikkenen Archive	LGS7	1734-1835	83	5.08
µ	Virginia	Long Hook, Riverdale Phase 2	Heikkenen Archive	LK1S4	1680-1758	79	5.07

Chronologies in **bold** denote regional masters

µ = Possible component of **MDOAK**

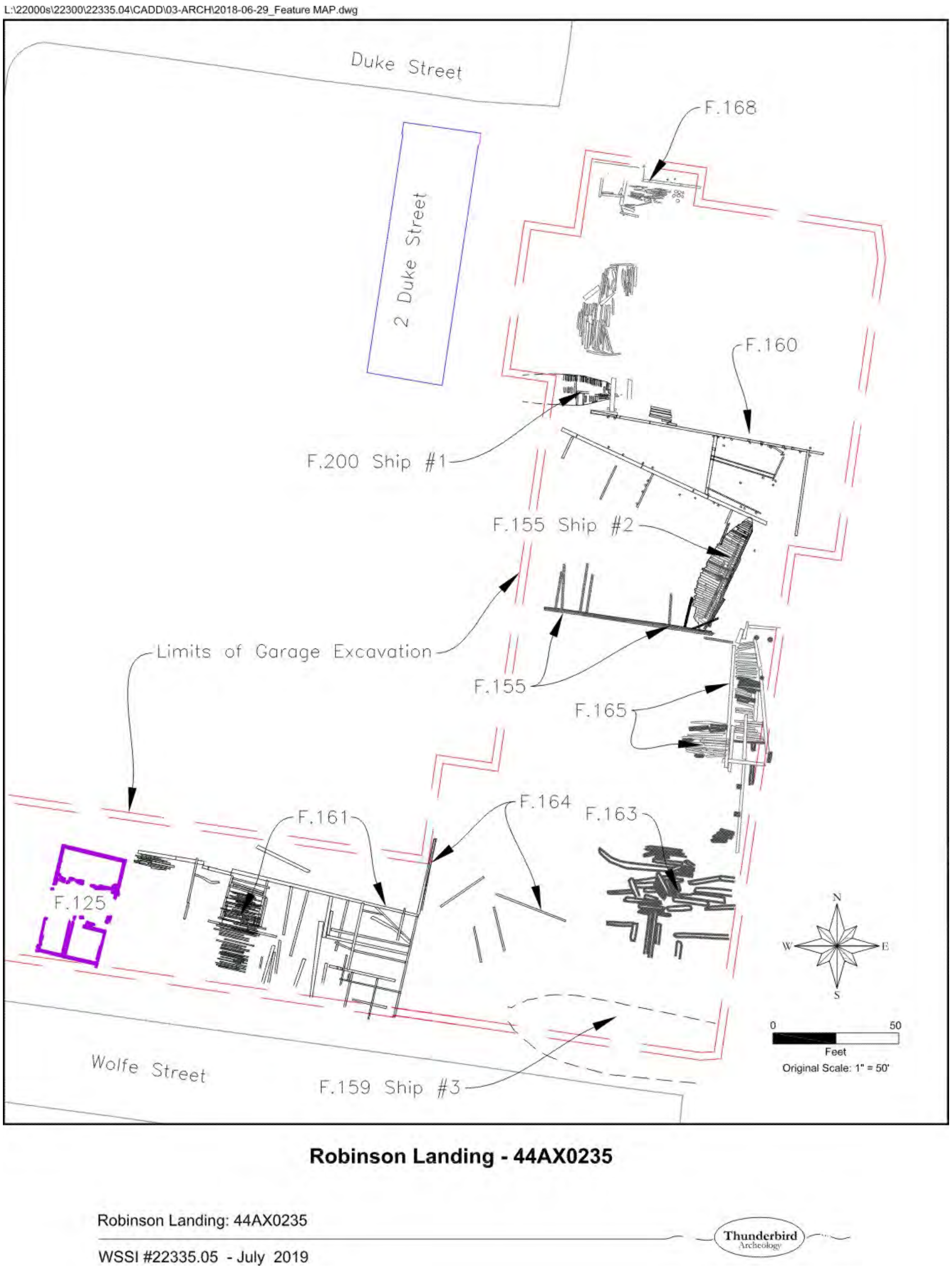


Figure 2. Overview of Robinson Landing John Mullen Thunderbird Archeology.

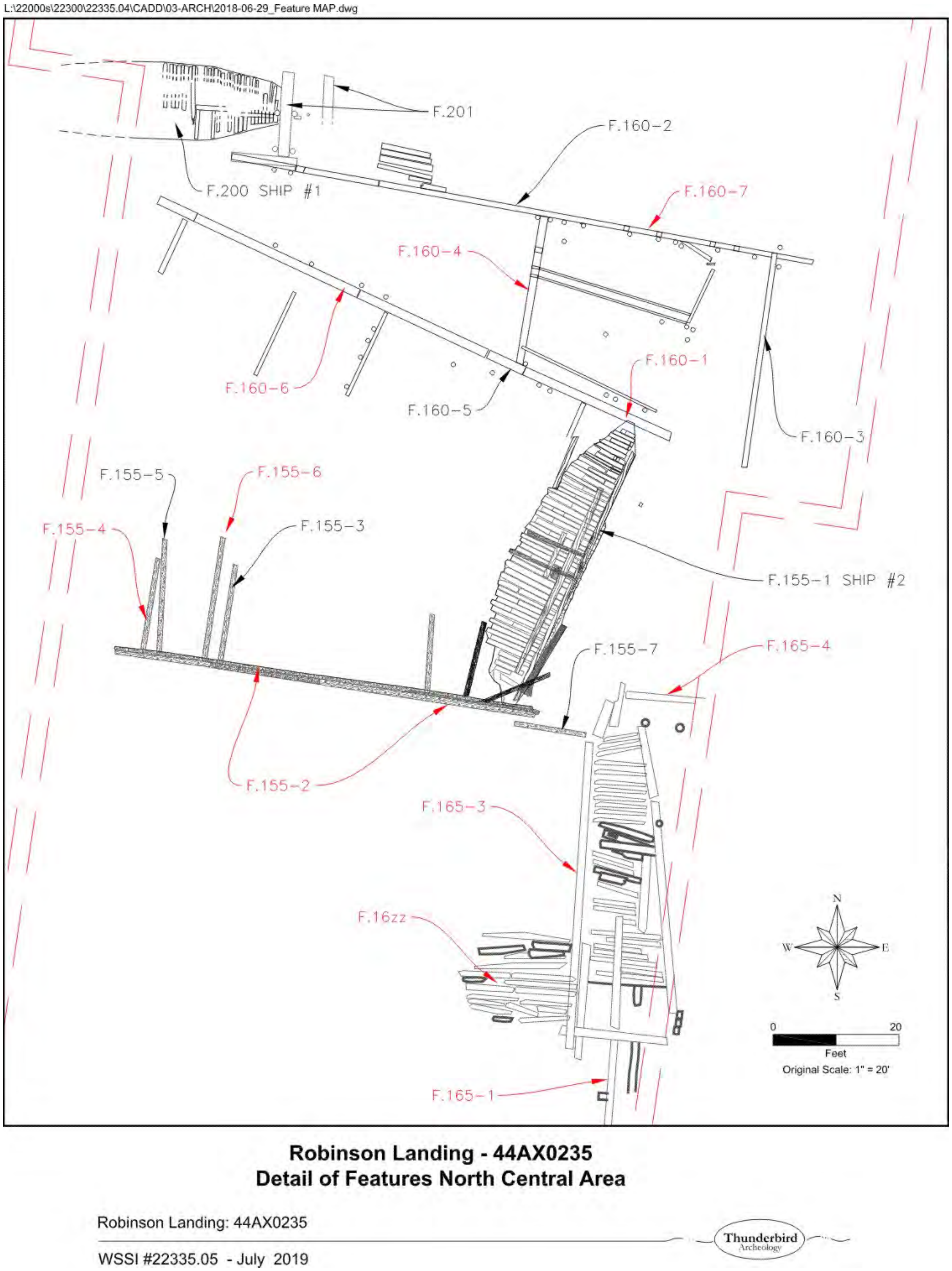


Figure 3. Features in north central area of Robinson Landing John Mullen Thunderbird Archeology.

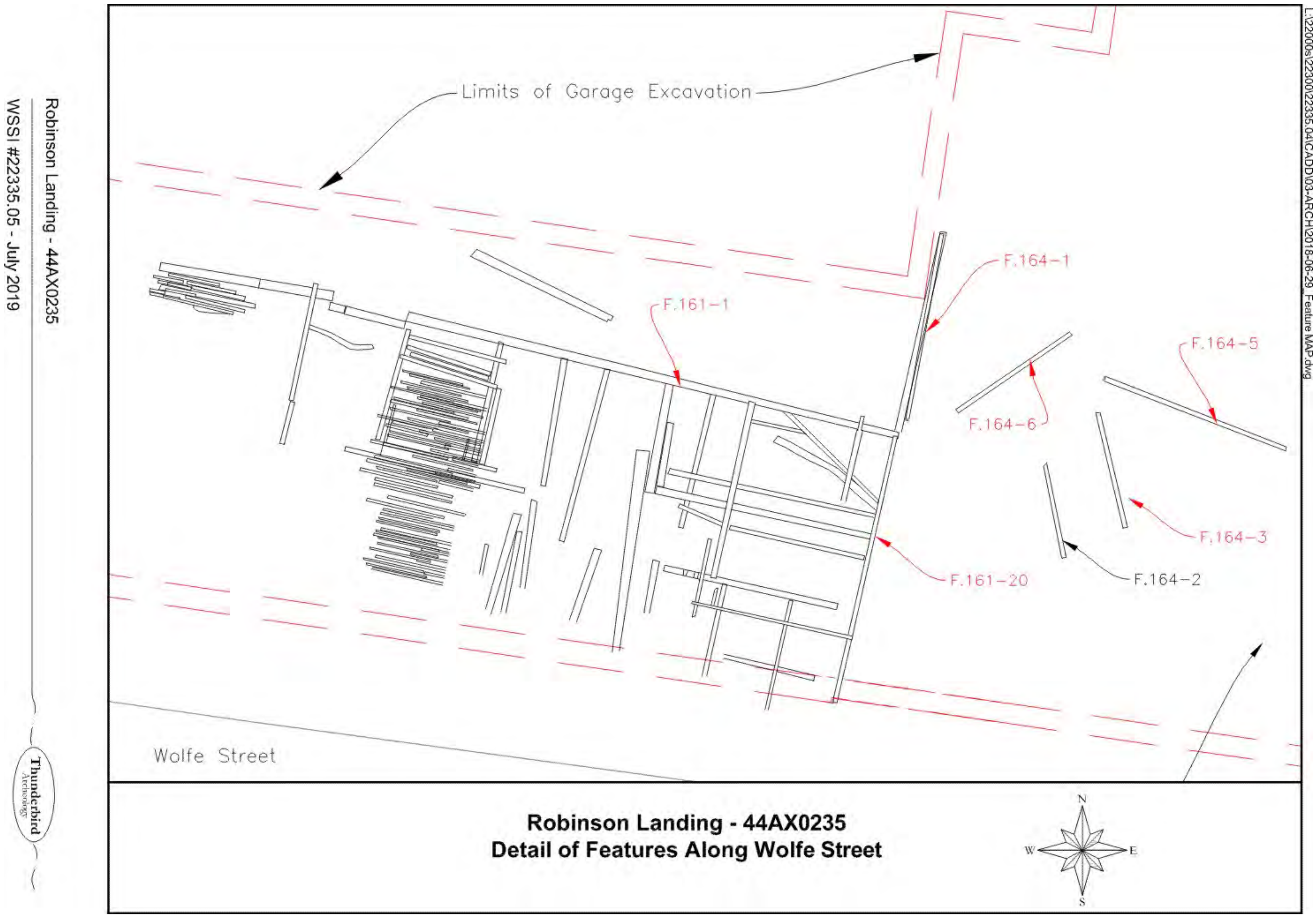
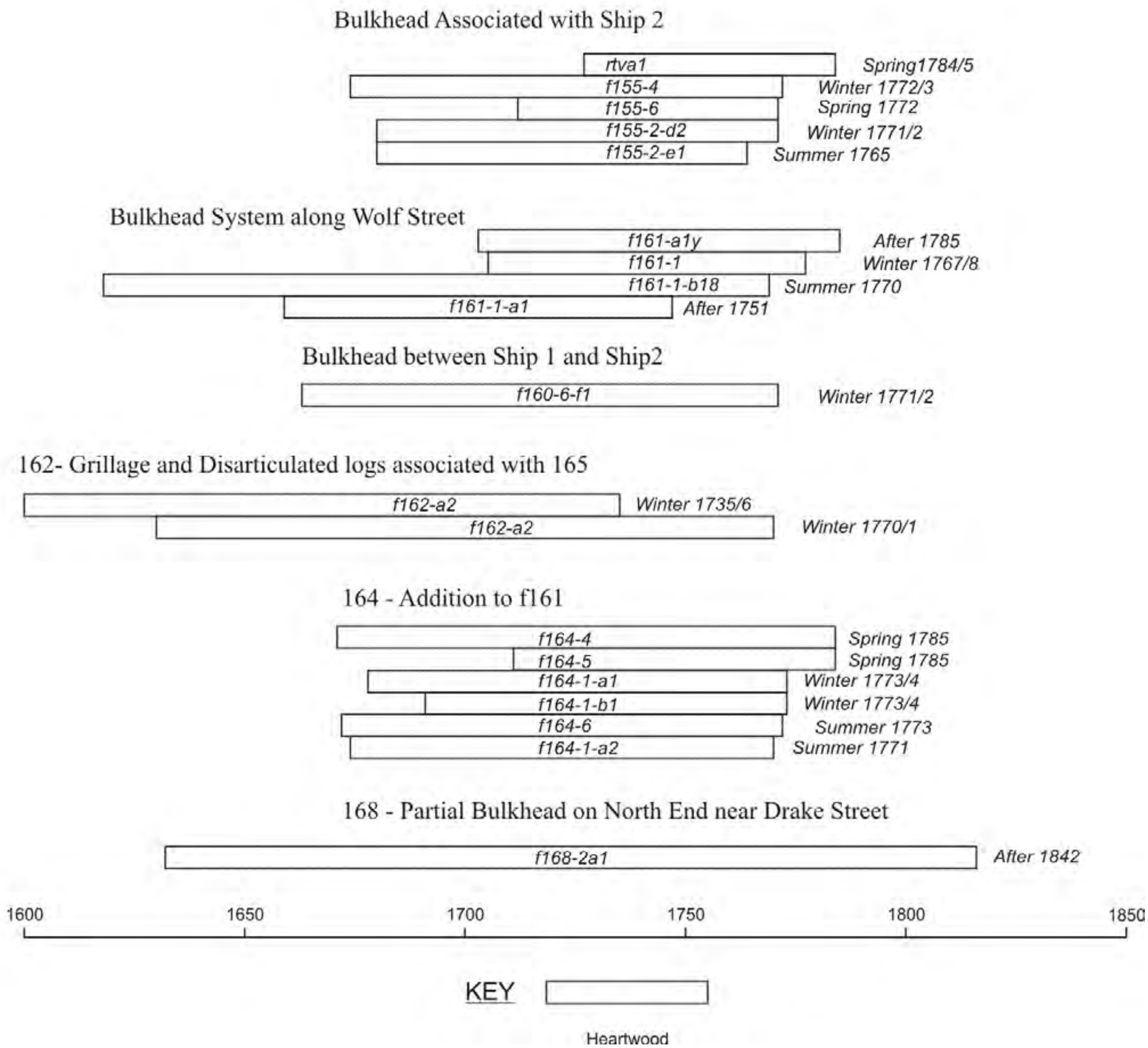


Figure 4. Features in north central area of Robinson Landing by John Mullen of Thunderbird Archeology.

Figure 5. Photograph showing location of samples from ship 3 Feature 159 John Mullen Thunderbird Archeology.



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Faunal Analysis Report

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Analysis of Selected Faunal Remains from Site 44AX235
Alexandria, Virginia

December 2, 2021

Prepared by: Dr. Justin Lev-Tov
For: R. Christopher Goodwin & Assoc., Inc.

Introduction

The faunal collection recovered from the excavation of site 44AX235 was large and emanated from variously dated deposits, including mixed or only broadly dated ones. Analysis of the faunal remains followed a tiered or stratified approach, with all remains receiving basic analysis and only selected remains receiving detailed analysis. Detailed faunal analysis focused on remains recovered from intact late eighteenth/early nineteenth century deposits, particularly remains recovered from sealed contexts such as privies.

The entire faunal collection, whether or not from securely dated deposits, was first examined using a "mass scale" analysis approach. The mass scale analysis included basic examination of animal bones from 56 features and two test units, recovered from a total of 4,235 different contexts, such as sealed privies, foundations, surface collections, and trenches. In order to accomplish a complete inventory of all faunal material, bones from contexts not well dated were identified to the lowest possible taxonomic category and, as a quick method of quantification, weighed but not quantified by any other means. However, the advantage of recording only the weight of animal taxa is that it would allow for calculation of biomass (Reitz and Scarry 1985:17-19) by other researchers. Biomass is a method of meat weight estimation widely promoted by graduates of the University of Florida's "school of zooarchaeology" (e.g., Peres 2009), and through their work has become popular in American historical archaeology.

The total weight of bone recovered from site 44AX235 was approximately 192 kg, both from contexts selected for detailed analysis and those analyzed only as part of the mass scale approach. Cattle were far and away the dominant species across all features and other deposits. When large mammal bones—most likely also cattle—are added to the cattle total, it is clear that the reliance of Alexandria's population on beef was even greater. Other domestic animals, such as pigs and sheep, were much less prominent, while the contribution of wild fauna—even those native to the Potomac River environs like waterfowl and fish—was small. Nonetheless, if not so important by their weight in flesh, wild animals must have provided important variety to meals, including the ability, for those who could afford it, to serve more than one meat per meal.

Methods of Analysis

The detailed analysis of animal bones was based on well-dated features or certain feature levels. During the analysis process, various aspects of the bones were recorded. These attributes included, first, the zoological identification of each bone to the extent possible. I identified animal species and elements based on my own knowledge gained from more than 30 years of experience in the subfield, as well as illustrative manuals, online sources, and a reference collection loaned to R. Christopher Goodwin & Associates by Alexandria Archaeology. Despite these sources for taxonomic identification, I could not identify many bones beyond various general taxonomic groupings. That handicap was due to lack of access to extensive modern comparative collections: many area and wider regional collections were closed during the analysis period, the result of the Covid-19 pandemic. The pandemic forced institutions such as the National Museum of Natural History and the University of Maryland to deny researchers access to collections. It was therefore impossible to separate closely related species (e.g., various ducks or closely related turtles), nor was it advisable to identify most fish species (cf. Gobalet 2001; Wake 2004:179).

In addition to, where possible, taxonomic identification, I recorded the body element, portion, side, and relative age (i.e., fusion state or tooth eruption status). After completing each identifiable specimen's zoological information, I noted cultural modifications or other salient observations as descriptive comments. These comments included impacts from butchering or hunting, use/modification as a tool, and damage caused by other processes, including burning, peri-mortem disease/aging, and from non-human animals such as gnawing and digestion.

After the preliminary mass-scale analysis, RCG&A staff implemented the faunal sampling strategy, deciding to analyze in detail those bones from the best-dated, sealed, contexts. Table 1 lists the selected deposits. After a short discussion of the detailed analysis sample's contents as a whole, I discuss its characteristics in depth, organized by animal group (wild vs. domestic, birds vs. mammals, etc.). In the course of that analysis, I address various research questions brought up by faunal or other data classes.

Table 2 contains a list of the species identified within the entire detailed analysis sample with the quantitative data that shows their relative abundances according to different measures. Each column to the right of the animal common names presents bone abundance measures according to a different method. These are NISP, or the "number of identified specimens," (that is, simple counts of bones per animal category; cf. Klein and Cruz-Uribe 1984); weight in grams (to the nearest tenth of a gram); and the biomass index, an allometric estimate of consumable flesh derived from a ratio is the common name for an animal, or animal groups, present in the examined sample. The quantitative categories are common in, especially, North American historic sites zooarchaeology, and reflect different approaches toward—and academic arguments pro and con—what the best method is to obtain a "realistic" measure of an animal's relative dietary importance (cf. Jackson 1989). The detail-analyzed sample contained over 8,000 bones weighing approximately 27 kg, correlating with a total biomass value of 9500 g. Only domesticated mammals contributed significant amounts of nutrition to the residents' diets, although Reitz and Scarry (1985:19) provide important qualifying remarks regarding the reliability of biomass estimates alone for all taxa. The contribution of domestic animals is also skewed due to the fact that it was impossible to quantify shellfish reliably.

<u>Quantification Methods</u>

The great advantage of the bone count or NISP method is that it is simple to calculate and recalculate, as depositional contexts are added or subtracted (Grayson 1978; Lyman 2008:28), and biasing factors are clear. One such bias is that different depositional contexts within a site, or between sites, may have bones collections that originated in different places, from different activities, or the actual places of deposition affected the in various methods, leading to higher fragmentation—and higher counts—in some areas or sites vs. others. Similarly, some species with

Table 1 Detailed Analysis Bone Quantities from Examined Features and Depositional Contexts

Feature	Type	Parcel	Unit/Block	Unit Portion	Stratum	Level	NISP	Weight (g)
12	Privy	77-1		East, West	Fills 4-5		377	1256.45
13	Privy	77-1		North, South	Fills 6-7	1, 2	3147	4009.3
45	Building Foundation	77-1		Quad A, NE Quad; Quad B, NE Quad	Fill 5; Fill 9		581	1311.8
46	Privy	77-1		North	Fill 3		7	58.9
48	Privy	77-4		North, South	Fills 4-6		339	280.4
49	Privy	PL-3		East	Fill 3	1-3	1093	1308.6
120	Building Foundation	85-2	Block 1A; Block 1B			3	1034	2252.2
125	Building Foundation	85-1	Block 3; Blocks 6-10			3-6	1754	16710.62

Table 2   Total Species List, All Detail-Examined Contexts

Common Name	NISP	Weight (g)	Biomass	% Biomass
Quahog Clam	1	58	n/a	<0.01%
Blue Crab	12	8.3	7.1	<0.01%
Sturgeon	148	105.2	40.25	<0.01%
Gar	3	7.6	4.77	<0.01%
Fish	4199	595.95	164.56	2.00%
Alligator Family	10	18.16	21.96	<0.01%
Box/Water Turtles	14	55.4	9.38	<0.01%
Cooters	2	4.6	1.77	<0.01%
Softshell Turtle	1	145.6	17.92	<0.01%
Chicken	89	160.2	105.13	1.00%
Turkey	28	159.8	104.9	1.00%
Bobwhite	2	0.6	0.65	<0.01%
Duck	76	110.1	74.74	1.00%
Canada Goose	34	148.1	97.88	1.00%
Dove Family	13	4.5	4.07	<0.01%
Unident. Bird	51	16.66	13.43	<0.01%
Sheep/Goat	84	1200.2	653.19	7.00%
Sheep	19	795.9	451.93	5.00%
Goat	1	15	12.67	<0.01%
Cattle	249	13556.8	5797.46	61.00%
Pig	280	4038.3	1949.28	20.00%
Cat	13	31	n/a	<0.01%
Dog	1	17.3	n/a	<0.01%
Cottontail	5	9.8	8.64	<0.01%
Squirrel	2	1.9	1.97	<0.01%
Rat	7	5	n/a	<0.01%
Rodent	31	16.3	n/a	<0.01%
Unidentifiable Small Mammal	2	2.1	n/a	<0.01%
Unidentifiable Medium Mammal	17	101.4	n/a	<0.01%
Unidentifiable Mammal	15	3.2	n/a	<0.01%
Unidentifiable Vertebrate	2900	5795.1	n/a	<0.01%
Total	**8309**	**27188.07**	**9543.64**	**100%**

more fragile bones may be more affected by pre- or post-depositional destructive processes, biasing bone counts in another way. Finally, some species have more bones in their bodies than others: many grazing mammals have just two toes per foot, while pigs and carnivores have five. Perhaps more critically, fish for instance have many more bones in their bodies than do mammals, due to separate evolutionary trajectories: Mammal skulls are made up of several fused plates that remain many separate elements in fish. For these and other reasons, some zooarchaeologists argue that NISP values are problematic as a measure of anything but a very generalized overview of sample content, even if they are convenient to use (Lyman 2008:29-34).

Bone weight in grams is the second measure of abundance displayed in Table 2. Bone weight avoids some problems that NISP has: it is agglutinative as such, it does not matter whether a species has more or fewer elements in its skeleton. However, bone weight may be affected by the diagenetic processes that occur in acidic soils, when material is leached from bones, or soils may instead add to bone weight, as in the case of either improperly cleaned bones (with dirt filling marrow cavities and cancellous pores) or bones from lime-heavy soils, which can deposit a cement-like substance onto the bone. Further, and possibly more troublesome, bone weights do not account for the fact that different bones, and even different individuals, sexes, species, or larger taxonomic groups of animals, have different ratios of bone to soft tissue (cf. Jackson 1989; Lyman 2008:99-102).

To surmount the problems of NISP, and to ameliorate—albeit not eliminate—issues with bone weight, Wing and Brown (1979) developed a different technique several decades ago. That technique is called biomass, and is based on the allometric principle that some constant, such as a linear bone measurement or bone weight, scales consistently with the amount of flesh per animal. Bone weight and linear measurements strongly correlate with soft tissue such as muscle (i.e., meat), scaling in a constant ratio. Biomass calculations most often convert bone weight to flesh weight, regardless of which bones, or parts of bones, are present in a collection. Peres (2009:28) lauded the use of biomass, arguing that the method "is preferred, as it is not based on assumptions of what parts of an animal were considered edible or inedible" That perceived advantage is also the method's weakness, as it treats all bone collections equal if the weight of species within them is equal, regardless of differences in skeletal element relative abundance. Particularly illustrative of the NISP/weight/biomass divergence are the relative abundance statistics for cattle and pigs. Although pig bones are slightly more numerous within the detailed analysis sample than are cattle bones according to NISP, they contributed only a third the weight—and consequently, biomass kg.

Results of Faunal Analysis

Table 3 presents the amount of animal bones per feature according to number of fragments identified to various taxonomic groups. Table 4 presents the same information, but according to weight. These tables give simple overviews only, as they incorporate neither biomass nor percentage calculations. Nonetheless, they provide a useful, basic, overview of taxonomic abundance and species presence/absence across the project area and within the detailed analysis sample. Not surprisingly, the most abundant animals by number of fragments and by weight are domesticated mammals, at least some species of which are present in all of the features. The relative abundance of bones within the selected features and contexts demonstrates great variability by both lot and by individual feature. Below, various aspects of the detail-analyzed faunal sample are organized in a discussion according to zoological-taxonomic or folk-taxonomic grouping:

Tables 3 and 4 both show the same broad patterns of abundance/species importance: domesticated Old World mammals, principally pigs and cattle, were the most common sources of meat for eighteenth/early nineteenth century residents of Alexandria. Other common domestic species in the sample included sheep/goats, chicken, and turkeys. Sheep and goats are difficult to separate osteologically; published and well-studied criteria for the two species' separation were utilized here, following the studies of Boessneck, Müller, and Teichert (1964), Zeder and Lapham (2010), and Zeder and Pilaar (2010). All distinguishable

Table 3 Species Abundance by Feature according to NISP

Common Name	Lot 77					Lot PL-3	Lot 85		Grand Total
	Feature 12	Feature 13	Feature 45	Feature 46	Feature 48	Feature 49	Feature 120	Feature 125	
Quahog								1	1
Blue Crab		2	1		4			2	9
Sturgeon Family		148							148
Gar								3	3
UID Fish	137	2328	37	4	269	909		515	4199
Box/Water Turtles		10			1		2	1	14
Cooters								2	2
Softshell Turtle	1								1
Alligator Family					10				10
Duck		7	4		7	1	46	10	75
Canada Goose		7	3				12	12	34
Bobwhite Quail							2		2
Chicken	3	18	17		8	3	17	25	91
Turkey		6	3				10	9	28
Pigeons and Doves		13							13
UID Bird	44	4				1	1	1	51
White-tailed Deer								1	1
Sheep		3				2	2	13	20
Sheep/Goat		2	4		1	8	5	63	83
Cattle	12	49	6	1	3	2	18	158	249
Pig		53	41		2	53	24	107	280
Cat		2			1	3		7	13
Dog								1	1
Cottontails							4	1	5
Rat		6				1			7
Squirrel Family		2							2
UID Rodent		2				12		17	31
Small UID Mammal								2	2
Medium UID Mammal	1	5					1	10	17
UID Mammal	15								15
UID Vertebrate	164	480	465	2	33	98	890	771	2900
Grand Total	**377**	**3147**	**581**	**7**	**339**	**1093**	**1034**	**1754**	**8310**

Table 4 Species Abundance by Feature according to Weight (g)

Common Name	Lot 77					Lot PL-3	Lot 85		Grand Total (g)
	Feature 12	Feature 13	Feature 45	Feature 46	Feature 48	Feature 49	Feature 120	Feature 125	
Quahog								58	58
Blue Crab		0.9	0.7		2.5			1.4	5.5
Sturgeon Family		105.2							105.2
Gar								7.6	7.6
UID Fish	14.9	345.7	4.1	1.1	36	112.1	0.8	81.21	595.96
Box/Water Turtles		31.1			3.2		19.8	1.3	55.4
Cooters								4.6	4.6
Softshell Turtle	145.6								145.6
Alligator Family					18				18.15
Duck		10.6	7.8		10	1.2	59.3	19.6	108.9
Canada Goose		69	18.4				31.9	28.8	148.1
Bobwhite Quail							0.6		0.6
Chicken	4.5	31.4	38.3		8.9	3.4	27.1	48	161.6
Turkey		45.8	11.8				52.8	49.4	159.8
Pigeons and Doves		4.5							4.5
UID Bird	4.45	6	0.1			0.1	3.3	2.71	16.66
White-tailed Deer								1.8	1.8
Sheep		56.5				417.8	17.1	319.5	810.9
Sheep/Goat		30.8	48.5		16	188.9	27.8	886.4	1198.4
Cattle	874.1	2107	235	52	86	95.8	596.9	9510.3	13556.8
Pig		359.1	230.4		36	337.3	284.7	2790.5	4038.3
Cat		5.5			0.5	1.4		23.6	31
Dog								17.3	17.3
Cottontails							8.2	1.6	9.8
Rat		4.2				0.8			5
Squirrel Family		1.9							1.9
UID Rodent		1				6.8		8.5	16.3
Small UID Mammal								2.1	2.1
Medium UID Mammal	0.8	42.8					4.9	52.9	101.4
UID Mammal	3.2								3.2
UID Vertebrate	208.9	749.9	716.7	6.1	63	143	1117	2793.5	5795.1
Grand Total	**1256.45**	**4009**	**1312**	**59**	**280**	**1309**	**2252**	**16710.6**	**27188.3**

bones in the collection were of sheep, such that most if not all of the sheep/goat bones are presumably those of sheep rather than goats. Since sheep bones are relatively uncommon in the sample, the animals may have been kept principally for wool production. In that scenario, they would have been slaughtered for meat only as a secondary benefit, once their utility as wool producers had been expended.

Non-domestic species consisted principally of fish and birds, along with a few turtles—the latter likely all riverine species. The most numerically important group of wild animals was waterfowl. Many elements of these birds show damage from shotguns or the weapons' forebears: bones are commonly dented, broken, or entirely pierced by small pellet holes. Sullivan (2003:62) stated that uniformly sized shot pellets were invented and became popular around the last quarter of the eighteenth century, for which product Baltimore manufacturers became famous. Eighteenth century residents of Alexandria, or local professional hunters, focused on Canada geese and ducks. A professional hunting and fishing trade had developed by the late eighteenth century, and these waterfowl hunters and watermen supplied urban markets with their catches and kills. The same markets that sold waterfowl may also have sold fish and shellfish, albeit the latter may instead have been sold in barrels of salt water or even dried (Waselkov 1987:105-108). Various fish and shellfish species are present in the larger (mass and/or detailed) samples, including claws of blue crabs, a quahog clam, gar, and sturgeon.

Detailed Discussion

The discussion I present below is organized according to types of fauna, wild animals (fish, reptiles, exotic species, and birds) in one section and domesticated animals in another. Within each of those sections, I compare the contents of lots and features. By the end of the eighteenth century, Alexandria was a thriving port and not a muddy riverfront frontier town. Residents had full-time occupations in an urban setting. Those not employed in meat procurement (whether as watermen, hunters, fowlers, or butchers/slaughterers) likely would not have had the time or the means to regularly obtain food for themselves/family members (Yentsch 1992). Instead, they would have gone to a fishmonger for fresh or preserved seafood, a butcher or slaughterhouse for the meat of domestic animals, and a game seller for waterfowl and other native fauna. The animals came to Alexandria by various means. Their meat or whole carcasses may have been sold by different tradesmen/women in different locations, and they were consumed to differing degrees by different households. The organization of Alexandria's turn of the nineteenth century food supply is the rationale for the discussion's organization: If the question is what the population of ca. 1800 Alexandria ate, how they obtained their meats, and, ultimately, what it may mean about that society, then it makes sense to separate fauna according to where and how it likely was obtained. For the discussion below, refer to basic relative abundance information presented in a series of tables: Table 5 (Feature 12), Table 6 (Feature 13), Table 7 (Feature 45), Table 8 (Feature 46), Table 9 (Feature 49), Table 10 (Feature 48), Table 11 (Feature 120), and Table 12 (Feature 125).

Wild Fauna

In the following section I discuss wild game including fish as well as exotic animals, which may or may not have been food. Due to consideration about how the animals were obtained, as well as overarching questions about the importance of wild game to period diets, I consider the meaning of the exotic species separately from the remains, and interpretations surrounding, other wild fauna. In general, wild taxa were present in only low numbers and are distributed unevenly across the project area. Numerical issues present a significant barrier to in-depth spatial comparisons. Therefore, I instead concentrate on the historic context of late eighteenth/early nineteenth century fishing, fowling, and hunting as raised by species present.

Fish

Despite the excavation area's location close to the Potomac River, fish are not universally common across all features. Their low numbers in some features is an interesting pattern, given both the excavation area's proximity to the Potomac River and the fact that fish have more

Table 5 Faunal remains from Feature 12, Lot 77-1

Common Name	NISP	Weight (g)	Biomass	Biomass %	NISP %
Fish	137	14.9	8.23	1.48%	36.34%
Softshell Turtle	1	145.6	17.92	3.22%	0.27%
Chicken	3	4.5	2.82	0.51%	0.80%
Bird	44	4.5	32.44	5.82%	11.67%
Cattle	12	874.1	491.70	88.25%	3.18%
Medium Mammal	1	0.8	0.91	0.16%	0.27%
Mammal	15	3.2	3.15	0.57%	3.98%
Vertebrate	164	208.9	n/a	n/a	43.50%
Total	**377**	**1256.5**	**557.17**	**100%**	**100%**

Table 6 Faunal Remains from Feature 13, Lot 77-1

Common Name	NISP	Weight (g)	Biomass	Biomass %	NISP %
Blue Crab	2	0.9	n/a	n/a	0.06%
Sturgeon	148	105.2	40.25	1.63%	4.70%
Fish	2328	345.7	105.75	4.28%	73.98%
Box/Water Turtles	10	31.1	6.37	0.26%	0.32%
Bird	4	6	5.29	0.21%	0.13%
Chicken	18	31.4	23.86	0.97%	0.57%
Turkey	6	45.8	33.64	1.36%	0.19%
Ducks	7	10.6	8.88	0.36%	0.22%
Canada Geese	7	69	48.85	1.98%	0.22%
Dove	13	4.5	4.07	0.16%	0.41%
Medium Mammal	5	42.8	32.55	1.32%	0.16%
Rodent	2	1	n/a	n/a	0.06%
Rat	6	4.2	n/a	n/a	0.19%
Squirrel	2	1.9	1.97	0.08%	0.06%
Sheep/Goat	2	30.8	24.21	0.98%	0.06%
Sheep	3	56.5	41.80	1.69%	0.10%
Cattle	49	2107.4	1085.60	43.95%	1.56%
Pig	53	2107.4	1085.60	43.95%	1.68%
Cat	2	5.5	n/a	n/a	0.06%
Vertebrate	480	749.9	n/a	n/a	15.25%
Total	**3147**	**5757.6**	**2548.69**	**100.00%**	**100.00%**

Table 7 Faunal remains from Feature 45, Lot 77-1

Common Name	NISP	Weight (g)	Biomass	Biomass %	NISP %
Blue crab	1	0.7	n/a	n/a	0.86%
UID Fish	37	4.1	2.88	0.72%	31.90%
Swans, Geese, Ducks	3	18.4	14.67	3.69%	2.59%
Duck	4	7.8	6.72	1.69%	3.45%
Chicken	17	38.3	28.59	7.18%	14.66%
Turkey	3	11.8	9.79	2.46%	2.59%
Cattle	6	235	150.75	37.88%	5.17%
Pig	41	230.4	148.09	37.22%	35.34%
Sheep/Goat	4	48.5	36.43	9.16%	3.45%
UID Vertebrate	465	716.7	n/a	n/a	n/a
Total	**581**	**1311.8**	**397.92**	**100.00%**	**100.00%**

Table 8 Faunal remains from Feature 46, Lot 77-1

Species	NISP	Weight (g)	Biomass	Biomass %	NISP %
Cattle	1	51.7	38.59	97%	14%
UID Fish	4	1.1	0.99	3%	57%
UID Vertebrate	2	6.1	n/a	n/a	29%
Total	**7**	**58.9**	**39.58**	**100%**	**100%**

Table 9 Faunal remains from Feature 49, Lot PL-3

Species	NISP	Weight (g)	Biomass	Biomass %	NISP %
UID Fish	812	108	41.11	6%	65%
UID Bird	1	0.1	n/a	n/a	0%
Chicken	3	3.4	3.16	0%	0%
Duck Family	1	1.2	1.22	0%	0%
Cattle	2	95.8	67.22	10%	0%
Sheep	2	417.8	253.03	36%	0%
Sheep/Goat	8	188.9	123.85	18%	1%
Pig	53	337.3	208.69	30%	4%
Cattle	3	1.4	n/a	n/a	0%
Rat	1	0.8	n/a	n/a	0%
UID Rodent	12	6.8	n/a	n/a	1%
UID Vertebrate	348	263.1	n/a	n/a	28%
Total	**1246**	**1424.6**	**698.29**	**100%**	**100%**

Table 10 Faunal remains from Feature 48, Lot 77-3

Species	NISP	Weight (g)	Biomass	Biomass %	NISP %
Blue Crab	3	2.8	2.12	1%	1%
UID Fish	368	46.7	20.81	14%	83%
Crocodilian	10	11.6	3.29	2%	2%
Box/Water Turtles	1	3.2	1.39	1%	0%
Chicken	8	8.9	7.58	5%	2%
Duck Family	6	10.2	8.58	6%	1%
Cattle	3	85.6	60.75	42%	1%
Pig	2	36.3	28.07	19%	0%
Sheep/Goat	1	16	13.43	9%	0%
Cat	1	0.5	0.59	0%	0%
UID Vertebrate	42	80.6	n/a	n/a	9%
Totals	**443**	**302.4**	**146.60**	**101%**	**100%**

Table 11 Faunal remains from Feature 120, Lot 85-2

Species	NISP	Weight (g)	Biomass	Biomass %	NISP %
UID Fish	19	3.6	2.60	0%	2%
Box/Water Turtles	2	19.8	4.71	1%	0%
UID Bird	1	3.3	3.07	0%	0%
Chicken	15	25.7	19.89	3%	2%
Turkey	10	52.8	38.29	5%	1%
Bobwhite Quail	2	0.6	0.65	0%	0%
Duck Family	46	59.3	42.56	6%	5%
Canada geese	12	31.9	24.21	3%	1%
Sheep	2	17.1	14.26	2%	0%
Sheep/Goat	5	27.8	22.08	3%	1%
Cattle	18	596.9	348.83	49%	2%
Pig	24	284.7	179.16	25%	3%
Cottontails	4	8.2	7.36	1%	0%
Medium UID Mammal	1	4.9	4.63	1%	0%
UID Vertebrate	721	1150.3	n/a	n/a	82%
Grand Total	**882**	**2285.9**	**712.28**	**100%**	**100%**

Table 12 Faunal remains from Feature 125, Lot 85-1

Species	NISP	Weight (g)	Biomass	Biomass %	NISP %
Quahog	1	58	n/a	n/a	0%
Blue Crab	2	1.4	n/a	n/a	0%
UID Fish	510	81.2	32.61	1%	30%
Gar	3	7.6	4.77	0%	0%
Box/Water Turtles	1	1.3	0.76	0%	0%
Cooters	2	4.6	1.77	0%	0%
UID Bird	1	2.71	2.57	0%	0%
Swans, Geese, Ducks	12	28.8	22.06	0%	1%
Duck Family	10	19.6	15.54	0%	1%
Turkey	9	49.4	36.04	1%	1%
Chicken	25	48	35.11	1%	1%
Cattle	158	9510.3	4213.77	65%	9%
Sheep	13	319.5	198.76	3%	1%
Sheep/Goat	63	886.4	497.92	8%	4%
White-tailed Deer	1	1.8	1.88	0%	0%
Pig	106	2552.1	1289.75	20%	6%
Cottontails	1	1.6	1.69	0%	0%
UID Rodent	17	8.5	5.22	0%	1%
Domestic Cat	7	23.6	19.05	0%	0%
Domestic Dog	1	17.3	14.41	0%	0%
Small UID Mammal	2	2.1	2.16	0%	0%
Medium UID Mammal	10	52.9	39.39	1%	1%
UID Vertebrate	755	2727	n/a	n/a	44%
Total	**1710**	**16405.71**	**6435.22**	**100%**	**100%**

skeletal elements than other animal groups. In particular, privy Feature 46 has few such bones. However, it was likely cleaned out, then no longer used and therefore capped. Thus, the faunal remains recovered from that feature form a partial sample, materials left behind after cleanout. Feature 46 was nearly devoid of bones in general, totaling only seven elements within the detail-examined deposit. That said, dismantled privy Feature 12 (see Table 6), which shared the same lot with foundation Feature 45 (seeTable 8), also was low in fish remains. One hundred and thirty-seven fish bones were recovered from Feature 12, making up 36 percent of that collection (NISP). While they represent only 1 percent of the biomass, that statistic is likely a problematic measure for fish (cf. Reitz and Scarry 1985:19) since it is dependent on weight and fish bones are light. There likely needs to be some correction for the dietary importance of fish; it was undoubtedly higher than the 1 percent biomass would indicate. In general, the bone sample from the four features of Lot 77-1 was relatively large but with little diversity and a fairly small number (and weight) of fish elements with the exception, principally, of Feature 13 (see Table 7).

Features 12, 45, and 46 share in common low numbers of fish remains and in that respect stand out from several other features. Feature 120 (see Table 12), a foundation in Lot 85-2, contained a large number of fish bones, as did Feature 48, a privy in Lot 77-3, and privy Feature 49 in Lot PL-3. Each of the latter three features contained approximately 65-80 percent fish bones NISP though their biomass statistics are more modest. They contributed between ca. 40 and 150 grams of flesh to the biomass totals for each feature. Feature 13 (see Table 7) contained the largest number of fish bones from any one feature, over 2,000, and thus the highest fish biomass. Sturgeon are one of the few fish identified species in the collection (Figure 1). Today the fish, due to a combination of overexploitation and pollution, has been nearly extirpated from the Chesapeake Bay and its tributaries (cf. Dollar 2013; Fears 2013). Centuries ago, however, sturgeon were plentiful in the region and a dietary mainstay of Native Americans and Europeans alike. The concentration of fish remains in Feature 120 is interesting in light of Yentsch's (1992) idea that fishing in the Chesapeake region was an industry that primarily employed African-Americans. The fish remains found in Feature 120 may add evidence to the hypothesis that people of African origin lived in that structure.

If fishing was of moderate importance overall, hunting was of low caloric importance. Hunted game animals consist of ducks and geese, turtles, rabbits, a bobwhite quail, and deer. Although it is possible that the rabbits, quail and ducks were domesticated or tamed species, the shotgun damage to some waterfowl bones suggests otherwise. The wild animals likely were killed by professional market hunters who sold acquired game at city markets. Possibly, some of the tenants who lived for a time at the rented properties were in fact market hunters, fishers, or both, but there is no easy means by which to differentiate hunter, consumer, producer, or a combination. It is not clear from the bones and shell parts how turtles, all or most of which are closely related sliders or diamondback terrapins, were acquired but the easiest means would be via trapping.

Softshell Turtle

Feature 12, interestingly, contained a large portion of a softshell turtle (*Apalone spinifera*) carapace (Figure 2). According to the Smithsonian Institution's Environmental Research Center (2021), along with other sources (e.g., Mansueti and Wallace 1960), people attempted, unsuccessfully, to introduce this species to the Chesapeake Bay region at different points over at least the past 150 years. The aquatic turtle is native to the eastern Mississippi River drainage and the Atlantic slopes of the Southeast. What the species is doing in a northern Virginia context is no great mystery: It likely was brought as an exotic food item to the-then important and cosmopolitan port, and probably alive (e.g., in a barrel of water), to be auctioned for a meal. Schweitzer (2009) discussed the importation of various exotic turtles (e.g., green sea turtles from the West Indies) to Colonial Philadelphia, along with the capture and consumption of local species. Diamondback terrapins, a Mid-Atlantic species that may be present in the Alexandria sample, was a particularly popular food turtle (2009:42). Schweitzer's forms

Figure 1 Photograph showing sample of sturgeon scutes from Feature 12 (FS 566)

Figure 2 Photograph showing portions of a softshell turtle carapace from Feature 12 (FS 145).

his argument based on archaeological finds and contemporary cookbooks, advertisements, and period accounts of meals. Amid the Philadelphia archaeological evidence are also remains of the softshell turtle, albeit the author labeled it a local species (2009:44).

<u>*Crocodilian(s)*</u>

The presence of the softshell turtle coincides with remains of another exotic animal native to the Southeast. Within Feature 48 (Table 11) were recovered 10 osteoderms (that is, bony, skin-embedded plates) from, presumably, an alligator, American crocodile, or even a caiman (Figure 3), all from the south bisection of the feature: two from Fill 4 and the remainder from Fill 5. What the animal, or a part of it, was doing in Alexandria requires discussion and guesswork. The most likely explanation is that the osteoderms, were discarded during alligator/crocodile leather processing or even represent the remains of finished alligator leather shoes, boots or a bag of some type. By the early nineteenth century, alligator skins had become a desired material for leather manufacture, as John James Audubon observed in that era (Glasgow 1991:205). The alligator and crocodile hide-tanning industry appears to have begun around 1800, when the earliest-known advertisements for such products appeared. The hides quickly caught on for the manufacture of shoes, saddles, and other leather goods (Alligator Advisory Council 2021). Stevenson (1904:2385) explained that, at the turn of the twentieth century, so-called "hornback" hides (i.e., the backs of these animals, where the osteoderms are located) had at that time recently become popular to make into leather products. Prior to that, in at least the American alligator/crocodile leather industry, the hornback skins normally were discarded as waste. As late as ca. 1900 and the early decades of the twentieth century, the center of the crocodilian (the collective name given to members of that reptile family) hide industry was located in New York City and its environs. Conceivably, the port of Alexandria, a century earlier, participated in that industry, being closer to the animals' ranges. Or, the osteoderms could be the remnants of a hornback leather shoe or bag owned by a tenant who perhaps could not afford a better leather good.

There are at least two other possibilities, however. The first of these is that the osteoderms are what remain of a discarded trophy or curiosity brought to a busy port filled with ships holding the bric-a-brac of their travels. Or, perhaps the osteoderms were gathered for use in period medicine as an apotropaic (Glasgow 1991:59-60). While there is no evidence that osteoderms were used as apotropaic charms—and they are unmodified, crocodilian teeth certainly were, worn as necklaces. Another possibility, however unlikely, is that the osteoderms came attached to a piece of crocodilian meat. Since crocodilians are not local to northern Virginia or to any part of the state, the meat would have had to have been preserved. Glasgow's *Social History of the Alligator* (1991) devotes an entire chapter to the history of the animal's consumption. Although that section problematically assumes that Africans forcibly brought to the New World as slaves regularly ate crocodilian flesh in their home areas, "Blacks, of course, had known the joys of crocodile feasts in Africa…and quickly made the American cousin a part of their diet" (1991:95). Although the Nile crocodile lives throughout the African continent other than the deserts of the north and south, it does not necessarily follow that slaves brought with them a particular predilection for their consumption. Regardless, all ethno-national groups in the English colonies and nascent United States eventually took to that meat (Glasgow 1991:95). Historical records anecdotally point to widespread alligator consumption in the South by the mid-eighteenth century. Both European- and African-derived populations in the south, as well as the region's Native American groups, consumed alligators by that time. Moreover, its flesh was easy to preserve, since the fat, which makes meat more difficult to cure, is not marbled within the muscle but instead forms a band surrounding it. Native Americans preserved the flesh by smoking it; Jacque Le Moyne's sixteenth century drawing depicts individuals drying whole crocodilians, with other animals, on a rack over a smoky fire (Glasgow 1991:92-93). Possibly, preserved meat could have been preserved and shipped from

Figure 3 **Photograph showing ten crocodilian osteoderms from Feature 48, Fills 6 and 7 (FS 565).**

places in which the animals were hunted for taste-curious diners in more distant locales. Glasgow (1991:58-59) also mentions that oil derived from alligator fat quickly became an industrial necessity, although it would seem unlikely that Alexandria, given its distant geographic position from areas inhabited by crocodilians, would have become an alligator fat processing center.

<u>*Shell Remains*</u>

I identified only a single shell during the detailed zooarchaeological analysis. That puzzling statistic, given the context of Alexandria on the Potomac River and within the Chesapeake Bay ecosystem, is an artifact of recovery methods rather than either preservation or dietary preferences. The discard log turned over by Wetlands Solutions, Inc. after their excavation and initial artifact sorting lists large numbers/high weights of clam, oyster, and unidentified shells. Wetlands Solutions personnel only partially quantified the shells: exact numbers of shells were entered solely when there were less than 50. When the number of "oysters" or "shells" was above 50 for any provenience, some (but not all) personnel entered "50+" in the "quantity" column instead of counting the precise number of valves. In one case, however, a "40+" was entered, while in another case "~25" was used. In eight instances, no number was entered at all. Given the way in which shells were haphazardly counted, there is no use in discussing shellfish via valve counts. Shell weight could be used, which some argue to be a valid relative abundance measure (Glassow 2000), but it is not clear that all recovered shell was quantified in any consistent manner. The total reported weight of clam, oyster, and unidentified shell is 1,758.8 kg. Without the ability to examine more than one of the shells, e.g., for season of capture, there is little more to be gleaned from the shell discard information, other than their relative abundance within those contexts selected for detailed examination, but that brings us back to issues of data collection. Table 13 displays their reported abundance according to context. Another problem relates to shell identification prior to discard: despite the fact that the discard log lists clam shells, none appears among the shells discarded from examined contexts. That fact further undermines confidence in

Table 13 Shell Identifications, Counts, and Weights by Feature, as Derived from Discard Log

Feature	Feature Portion	Unit/Block	Stratum	Oyster (g)	Percent of Total
45	NE Quadrant	Quad B	Fill 9	5000.00	10.19%
Feature 45 Total				5000.00	
48	North Bisection		Fill 4	76.00	0.85%
			Fill 5	211.00	
			Fill 6	25.00	
	South Bisection		Fill 4	104.00	
Feature 48 Total				416.00	
120		Block 1B	Fill 3	6900.00	14.07%
Feature 120 Total				6900.00	
125		Block 3	Fill 3	300.00	74.89%
		Block 6	Fill 3	10000.00	
		Block 8	Fill 4	26200.00	
		Block 10	Fill 5	148.70	
		Block 10	Fill 6	80.00	
Feature 125 Total				36728.70	
Total				**49044.70**	**100%**

the records entered into the discard log, since the one quahog (hard shell clam) shell was identified (Table 1), and it is improbable that only one such shell was recovered. Because the contexts RCG&A staff selected for detailed analysis were all intact deposits rather than fill episodes, it follows that the shells originated as primary deposits of food remains rather than having been dumped as fill or industrial (lime) waste, or leached from shell-based mortar. The lack of reliable data relating to mollusc consumption is therefore all the greater a loss. That said, it is possible to briefly examine the distribution of oyster shells. Table 13 demonstrates that three-quarters of the sample was recovered from Feature 125, a large foundation that contained a huge number of bones. The shells may have been used as a fill at the bottom of the foundation, since the structure was built above a portion of the Potomac River that barely was filled in. Alternatively, they may be the remains of barreled oysters. As the shells were not present for zooarchaeological examination, no further information may be gleaned from them.

<u>Waterfowl</u>

The most common wild species, aside from fish as a group, were ducks and geese. Remains of these birds, likely various species of dabbling ducks, *Anas* sp., and Canada geese, *Branta canadensis*, are present in low numbers within most of the features. Only two features, Features 12 and 46, contained none of these specimens. Their absence from Feature 46 undoubtedly a result of that privy's cleanout; only seven bones total were recovered from it. The absence of waterfowl from Feature 12 may be an accident of deposition: they are present in one of the other privies (Feature 13) on that same lot, Lot 77-1. Waterfowl are especially prevalent in Lot 85-2 within foundation Feature 120, both in NISP and biomass contribution. Ducks and geese together contributed ca. 70g of flesh to the diet of those who lived or dined there. They were just as important to residents of Lot 77-1: the waterfowl content of Feature 45, a foundation, and privy Feature 13 taken together is slightly higher than that of Feature 120, totaling approximately 79g. The dietary contribution of waterfowl across all features and the households they represented is similar. Despite the fame the Chesapeake Bay holds for historians of waterfowling, the importance of those birds as a source of nutrition to local residents seems to have been minimal, well below that from domesticated mammals. If not a matter of caloric necessary, their dietary inclusion could reflect a desire for diversity, affordability, or the side benefits of hunting them for their feathers. Whether the waterfowl were purchased at a market, bartered, or hunted by the residents for personal consumption, the method of the birds' capture was the same: Some recovered elements display telltale damage from shotgun pellets, including two specimens from Feature 13 (Figures 4 and 5) and one from Feature 48 (Figure 6). Whichever reasons people consumed waterfowl, Alexandrians of the period consumed waterfowl in amounts wholly unequal to the main thrust of their meat diets (Blanton 2003:195).

Other Avian Species

The other bird species present are doves, turkeys, and bobwhite quail. All these species could represent either wild or domesticated animals, but their rarity across all features suggests that they represent wild game. Turkey bones are present in three lots, but in four features: they were recovered both from foundation Feature 45 and associated privy, Feature 13, on Lot 77-1. They are also present in both Lot 85-1, Feature 125, and Lot 85-2, Feature 120. The latter two features, as discussed elsewhere in the volume, may be related to one another. Nonetheless, the presence of turkey bones in both contexts has no bearing on that interpretation, since the species was commonly raised and consumed across both the European colonies and in Native American settlements. The paucity of turkey bones across the features is a normal feature of eighteenth century Chesapeake sites, and matches up well with faunal analysis results from the Reynolds Tavern site in Annapolis, where they made up just 2 percent of NISP and 42 g biomass based on the bones from two eighteenth century trash pits (Reitz [1989] 2013:Table 3). The only other wild gallinaceous species identified was the native bobwhite quail, a small pheasant-like bird hunted for sport and food, but sometimes raised as a captive fowl. Two quail bones were recovered from Feature 120, presumably the result of a one-time successful hunt or market purchase. Doves are also present in the collection, but limited to Feature 13. Doves and pigeons are difficult to separate osteologically, although this can be done with an extensive reference collection. Since none of the 13 bones showed shot damage, it is possible that these were domesticates rather than the now-extirpated passenger pigeon or another native species.

Domesticated Animals

Chicken

In Lot PL-3, Feature 49, and neighboring Lot 77-1, in Features 12 and 13, chicken bones are relatively uncommon, contributing approximately 1 percent of the biomass within each feature. The low numbers of chicken bones is repeated in two of three evaluated features within neighboring Lot 77-1. Two privies on that lot, Features 12 and 13, each contained 1 percent chicken bones, whether measured by biomass or fragment counts (NISP). Within that same lot, however, foundation Feature 45 contained a greater abundance of chicken elements, making up 7 percent of biomass and 15 percent of identifiable bones. In all other features, however, chicken bones made up no more than 1-2 percent of biomass and NISP. The bird's scarcity across the site area is interesting. Chickens are an ideal urban food producer, able to live in a small lot, subsist on insects, kitchen scraps, and/or feed, and produce both food (eggs, meat) and feathers. Eggshell fragments, presumably chicken, were recovered from site 44AX235 as well, but were not quantified due to the negligible weight and the difficulty of determining how many fragments make up how many eggs. Reitz ([1989] 2013) found the same pattern at two contemporary sites in Annapolis, The Calvert House and Reynolds Tavern. While they were more abundant in Annapolis than in this area of Alexandria, chickens still made up no more than 9 percent of the total sample's biomass. Confoundingly, Bedell (2000:242-243) studied the eighteenth-century archaeological record against that of contemporary probate inventories in Delaware. He found that while probates there seldom mentioned chickens, the archaeological record was full of the birds' bones. On the eastern shore of Maryland, probates do commonly mention chickens, but apparently no archaeological data exist there by which to make a similar comparison. Part of the reason that chickens appear in low numbers is certainly taphonomy: bird bones are generally more fragile than those of large mammals, and a small number of bird bones

Figure 4 Photograph showing duck sternum with shotgun pellet holes from Feature 13, Fill 6 (FS 169)

Figure 5 Photograph showing duck sternum broken by a shotgun pellet blast from Feature 13, Fill 7 (FS 179)

Figure 6 **Photograph showing duck maxilla (bill) heavily damaged by pellets from Feature 48, Fill 5 (FS 565)**

was recorded as "UID Bird" (unidentifiable bird). Other bone fragments, in even worse shape, were left as "UID Vertebrate"; some of these may also be bird elements. Nonetheless, even adding the UID Bird and some percentage of the UID Vertebrate sample to those bones identified as chickens does not make the bird as plentiful as one might have expected. Some other explanation, perhaps widespread later disturbance of the features, as in privy cleanouts, may be the explanation for this enigma.

Pigs

Since the beginning of European colonization in North America, and particularly in the southern part of what were first the English colonies, pigs were highly important food producers. They were generally more important in English North America than in England itself, perhaps because of those characteristics possessed by the animal—it bears large litters, matures quickly, and carries a lot edible meat and other products—which have made it the colonizer's animal of choice for millennia (cf. Crabtree 1989:210; Redding 2015). The animal was also an important livestock across the southern United States, especially, but not only, on plantations (but see Reitz 1995). If Alexandria at the end of the eighteenth century was no tenuous frontier settlement, it was also not the plantation south. In many parts of the rural south, e.g., at Monticello (Crader 1990:695), pig bones far outnumber those of other domestic, and wild, species. Yet Alexandria was striving to be a commercial hub, bringing in large numbers of livestock and bushels of grain from Loudoun County and points further west (Hills 1993). Within the sample, pigs consistently were the second-ranked species in terms of biomass, far outranking caprids (sheep and goats) but a distant second to cattle overall, although in some features the two animals are approximately even. Their remains are ubiquitous: they are present in all features other than Feature 12. Their overall second place is despite the fact that pig bones sometimes, as in Features 45 and 49, far outnumbered those of cattle (see Tables 4 and 5).

The distribution and relative abundance of pig skeletal elements is instructive, in that, as shown in Tables 14 and 15, not only are all portions of the carcass present, but that bones of the

Table 14 Numbers of pig elements present in each feature

Element Name	Feature						Total
	13	45	48	49	120	125	
Acetabulum						2	2
Ascending Ramus						1	1
Astragalus	2	2				1	5
Atlas				1			1
Calcaneus	3	1		1	2	1	8
Carpal 2+3	1						1
Carpal, Fourth				1			1
Carpal, Radial				1			1
Femur		3		1	2	11	17
Fibula					6	4	10
Frontal	1	1				1	3
Humerus	1	1		2		19	23
Hyoid					1	1	2
Ilium				1		1	2
Lateral Malleolus	1						1
Mandible		7		2	4	9	22
Maxilla	2	1				3	6
Metacarpal				1			1
Metacarpal, Fifth	2						2
Metacarpal, Fourth				2		1	3
Metacarpal, Second				1			1
Metacarpal, Third	3				1		4
Metapodial	5					1	6
Metatarsal				1			1
Metatarsal, Fifth						1	1
Metatarsal, Fourth					1		1
Metatarsal, Second				2		3	5
Metatarsal,Third				1			1
Nasal					1		1
Occipital			1				1
Orbital						1	1
Pelvis						4	4
Phalanx, First	19			5			24
Phalanx, Second	4			8		1	13
Phalanx, third	1			1			2
Radius	2	1		5		6	14
Rib				1		1	2
Scapula	2	1		1	1	3	8
Tibia		1		1	2	5	9
Tooth Fragment, Misc.		2					2
Tooth, Canine					1	1	2
Tooth, Incisor	1	13		3	1	3	21

Element Name	Feature						Total
	13	45	48	49	120	125	
Tooth, Lower Canine		3				2	5
Tooth, Lower PM1				1			1
Tooth, Lower PM2		1				1	2
Tooth, Premolar		1					1
Tooth, Upper Canine						1	1
Tooth, Upper M2		1					1
Tooth, Upper M3	1						1
Tooth, Upper PM1		1					1
Tooth, Upper PM3						1	1
Ulna			1	2		3	6
Vertebra, Cervical						1	1
Vertebra, Lumbar				1	1	2	4
Vertebra, Thoracic	1			6		8	15
Zygomatic	1					2	3
Total	**53**	**41**	**2**	**53**	**24**	**106**	**279**

Table 15 Element distribution of pigs across the excavation area

Body Area Group	Elements in Group	No. of Bones	Percentage
Head	Skull elements, teeth, mandible, maxilla, hyoid, atlax, axis	80	29%
Axial	Ribs, vertebrae (not including sacrum)	22	8%
Forelimb	Scapula, humerus, radius, ulna	51	18%
Hindlimb	Sacrum, pelvis, femur, patella, tibia, fibula	44	16%
Feet	Carpals, tarsals (including astragalus and calcaneus), metacarpals, metatarsals, phalanges, sesamoids	82	29%
Total		**279**	**100%**

feet and those of the head are the most common. Clearly, the relative abundance of skeletal areas depends upon how one defines those areas: there is no standard definition in zooarchaeology, but in general, those bones below the radius of the front leg, and the tibia of the rear leg, are classified as foot elements (Table 15). Whether one counts the pelvis and sacrum as hindlimb or axial elements is debatable, but since those two elements are firmly attached to one another they ought to form one unit. The vertebral column and ribs make up the axial area, although for pigs, as well as sheep/goats, those elements are generally undercounted due to both extensive breakage and the difficulty of separating caprid axials from those of pigs. Elements of the head are difficult to define: while it is clear that skull portions should be within that category, other elements could be included, namely, the hyoid and the first two vertebrae (the atlas and axis). These are often cut off, or cut through, when the head is separated from the remainder of the carcass. Teeth are also problematic: they don't, as such, represent meat, and, due to their numbers in a living animal, ability to survive in the archaeological record, and easy identifiability, make up significant numbers in most bone collections. For this analysis I counted loose teeth, along with the hyoid and first two vertebrae, with head elements.

Head and foot bones dominate the relative numbers of pig body portions. Two features contained most of the head and foot bones of pigs, both within Lot 77-1: Features 13 and 45. Feature 45 contained 22 loose teeth in addition to a number of mandibles and one maxilla. The two phenomena, mandibles and loose teeth, are no doubt correlated. What is quite interesting about the numerical distribution of pig foot bones is that Feature 13's intact deposits contained within them 24 pig phalanges (toe bones), mainly from the first digit, that is, phalange 1 (Figure 7). Many of the phalanges, including those in Figure 7, as well as that in Figure 8, are damaged in an unusual way. The first phalanges (see Figure 7) are missing their proximal ends, while the second phalange shown in Figure 8 shows both damaged proximal and distal ends. The cause of the damage is not clear. No butchering marks can be seen. It is common for carnivores such as dogs to ingest small bones like phalanges whole, and their digestive acids can erode them in their digestive tracts. However, while the articular ends are damaged or missing, the bone shafts are intact with no signs of the typical pitting and erosion caused by digestion. In addition, it would be strange for carnivore-digested bones to have been deposited in a privy. It seems more likely that some type of blunt tool was used to break away the bones' ends, thereby exposing the marrow cavities. Phalanges contain grease and marrow, albeit that they are not the most highly ranked elements (Binford 1978:33). They may have been useful for soup or grease rendering (lard). Along with foot bones, number of the features contained skull elements, as mentioned previously, including numerous mandibles (Table 14). The mandibles, such as from Feature 49, Fill 3 (Figure 9) and Feature 125 (Block 8, Fill 4) are from both immature (Figure 9) and mature (Figure 10) animals, and are largely intact other than peri- or postmortem damage. The fact that the mandibles are in large part intact, and without clear butchering marks, indicates that, once separated from the skulls, the lower jaws were discarded despite the usable meat on them. Other swine elements did display butchering marks. For example, a humerus from Feature 125 (Block 8, Fill 4) had been broken apart using a wide-bladed knife such as a cleaver (Figure 11). That type of damage was common on pig bones.

Aside from the latter two features, two others contained remarkable pig bone samples. Feature 120 contained four mandibles; Feature 125 held nine. The emphasis on skull elements is interesting and is part of a broader Chesapeake or Colonial-era pattern. Reitz ([1989] 2013) noted an even greater proportion of head and foot bones from the Calvert House and Reynolds Tavern, and pointed out that these were not "meaty cuts," tentatively concluding that the element distribution indicated the deposition of offal while bones from served food had been deposited elsewhere. That hypothesis was written early in the development of American historical archaeology and historic sites zooarchaeology in particular. The zooarchaeology of historic North America has since blossomed (cf. Landon 2005) and older hypotheses have been revisited. In the last several

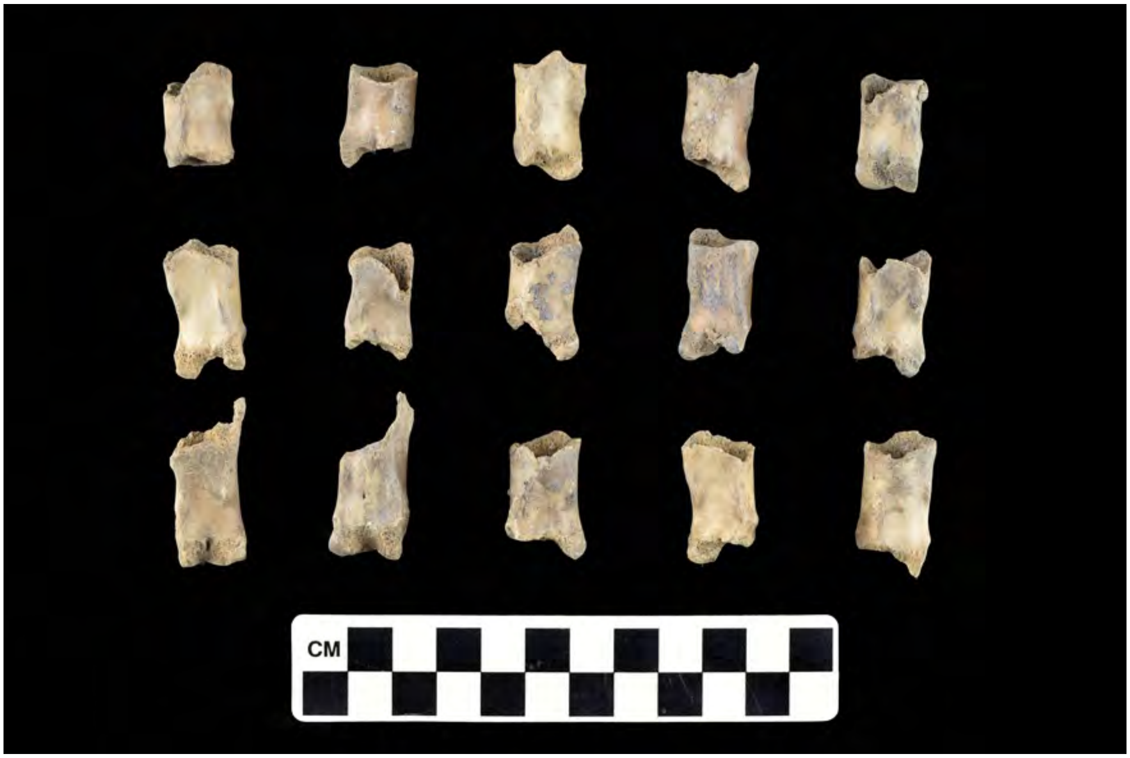

Figure 7 Photograph showing pig first phalanges with the proximal articular end broken away, from Feature 13, Fill 6 (FS 168)

Figure 8 Photograph showing ventral (L) and Dorsal (R) views of a second phalange with damaged proximal and distal ends, from Feature 13, Fill 7 (FS 170)

Figure 9 Photograph showing lateral view of an immature pig mandible from Feature 49, Fill 3 (FS 577)

Figure 10 Photograph showing overhead view of a mature pig mandible from Feature 125, Block 8, Fill 4 (FS 969)

Figure 11 Photograph showing anterior view of a left mature pig humerus exhibiting a chop mark, from Feature 125, Block 8, Fill 4 (FS 969)

decades, many more faunal collections from the English colonies have been examined. On the basis of that and other data, both historians and archaeologists have concluded that heads and feet only many decades later became anything but normal fare. Diaries and other period source materials allowed Klarsky (1986:56-57) to argue that, although the Colonies and the early United States were economically stratified, shopkeepers, artisans, and other professional people ate adequately and similarly to one another. Landon (2005:21) argued that economic levels are not well addressed via faunal remains, while Bowen (1992) laid out a path for the subject matter to be approached in a much more nuanced way, with careful reference to both global and local documentary records.

It is difficult to correlate the deposits of Feature 125 with a specific set of residents, since this foundation originally was meant to support a warehouse never completed. The foundation may have been used as a dump, possibly by those living at in charge of the Feature 120 structure nearby. Later, however, it appears that a superstructure was constructed atop Feature 125, used for a time as a chandlery. The complicated history of the feature means that we do not know what population deposited food and/or butchering waste there, only that whoever did so had access, in the case of pork, to a range of pork cuts. The cuts present include what might have been hams, to judge by the presence of femur and tibia fragments. In fact, portions of both those bones, in addition to humeri, are especially numerous in Feature 125, suggesting the consumption of large meat cuts, as could feed a number of people.

The distribution of pig bones demonstrates that entire carcasses, from heads to feet, were consumed or at least available for consumption. Butchering marks and placement indicate a non-standardized approach to hog slaughtering. The latter observation is surprising, since it would mean that not all livestock slaughtering occurred, as Hill (1993) variously states, at the edges of the city and by professional butchers. Possibly, smaller livestock such as caprids and pigs were still slaughtered for personal consumption within the city limits. Alternatively, it could have been the case that pigs were slaughtered professionally, but local butchers may have lacked the professional equipment—large saws and other tools—and the need for regularized carcass division. Instead, the carcasses could have been divided quickly on an ad hoc basis. Redding (2015:342-343) pointed out that pigs are not very mobile and therefore cannot be driven to distant markets. Therefore, pigs likely were raised locally and driven short distances for local consumption, part of an entirely different foodchain from cattle: Henn (1985:207) states that, even in late nineteenth century Brooklyn, working class residents still kept small livestock on their houselots. The way in which pig skeletons were divided therefore indicates that the meat was not bought salted in a barrel, but rather either home butchered or butchered by someone in a smaller scale operation. Hattori and Kosta (1990) detail the way in which pig bones from the mid-nineteenth century Hoff Store site in San Francisco were butchered to prepare, pack, ship, and sell the meat as salt pork. Regularly sized meat cuts were produced via saw cutting, a damage type not prevalent on pig bones within the RTSouth project area bone collection. Hills (1993), in his thesis about the development of Alexandria's West End, discussed the development of slaughterhouses with stockyards on the city's periphery, but also the influx of various tradespeople within city limits. Among those mentioned (Hills 1993:52) are butchers. Eighteenth century Alexandrians may have had as many as three sources for meat from domesticated mammals: slaughterhouses, in-town butchers, and domestic production.

Overall, within most of the lots and features, pigs were a secondary meat source to cattle. The only outright exception to that observation was for Lot PL-3/Feature 49 (Table 10), where that bone sample contained many more pig than cattle bones. Within Lot 77-1, the samples from two features, Features 13 and 45, contain equal contributions from the two species. The differences between Feature 49 on the one hand and Features 13 and 45 on the other may relate to differences of either taste or availability of beef. Availability could be the case, for instance, if the deposits are not absolutely contemporary with one another, and the city's cattle supply was either interrupted by transportation problems (cf. Hills 1993) or had not yet been established. It seems unlikely that economic position was a factor forcing some residents to purchase more pork: the house lots were all occupied by tenants or, with respect to Lot 85-2, possibly slaves. All people of mainly similar, but low, means. More likely, the differences emanate from taphonomy, the vagaries of deposition, deposit clean-outs, and excavation/recovery. Lot 77-1's features tell a suspiciously different story than the project area's other features: Feature 12 contained no pig bones, while two other features on that lot had unusually high numbers in comparison to other lots' features. Further, privy Feature 13 likely preserves only a portion of the original collection, having been partially dug out and capped. Further, foundation Feature 45 must have been filled only after the structure's abandonment and removal. Finally, much of Feature 13's apparent abundance of pork stems from the phalanges previously discussed. These elements contribute some fat but little flesh. Confoundingly, the biomass method treats bones from all areas of the body equally, as do fragment counts and weights. These methods do not take into account skeletal part meat yield, such that quantification forms an additional obfuscating factor (cf. Landon 2009:83). Nonetheless, pork was a dietary mainstay overall, and second in importance only to beef.

Sheep and Goats

The bones of sheep and goats—most likely sheep—are not terribly common in the detailed analysis sample in comparison to pig and cattle bones. As Landon (2009:86) put it, "[t]he traditional importance of sheep in the British diet did not transfer to the Chesapeake; and cattle and swine became, respectively, the two most important domestic sources of meat." Despite the fact that mutton, and/or possibly chevon, was never favored to the extent that pork and beef were, bones from sheep, and/or goats, were identified within each feature other than Feature 12.

Caprids contributed only a small amount of biomass to each feature's bone sample with the notable exception of Feature 49 on Lot PL-3. Residents of that lot filled their privy—and presumably before that, piled their dining table—

with flesh-bearing sheep/goat bones. Nearly half the biomass in Feature 49, 46 percent, came from sheep/goats. Table 16 shows the range of identified caprine elements. In contrast to the distribution of pig carcass portions, few sheep/goat foot bones were found (Table 17). Only 6 percent of the bones were from the foot region, among them not a single phalange; just four tarsals (including three calcanei, an element often left as offal) were identified. Head elements formed the most abundant skeletal portion, pushed upward the contribution of numerous mandibles, mainly from Feature 125. It is possible that, while flesh and organs (i.e., tongue, brain, eyes) from sheep crania were consumed, the feet were removed by butchers and sold for glue or gelatin manufacture. Other areas of the body, the axial, forelimb, and hindlimb portions, are present in greater numbers and in equivalent percentages to one another. The body part distribution for caprids demonstrates that residents had no particular body part preference and that slaughtering presumably took place close to or in the project area.

In light of this discussion, it is interesting to note the find of an entire sheep cranium in Feature 49 (Fill 3, East Bisection, Level 2) with its mandible as well (Figures 12-14). As the skull and mandible are completely intact and without any butchering marks, it stands to reason that (1) the head must have been discarded rather than processed for food; and (2) the animal must have either died of natural causes or was slaughtered in some way other than a blow to the head. The wear pattern visible on the adult mandibular teeth suggests that the animal died at an age of 1-2 years (cf. Payne 1973), just after maturity. If it did not die of natural causes, the sheep must have been raised for meat rather than wool production, as it was killed too young to have been a valuable fiber producer. In that era little soft tissue from animal heads went to waste (Bowen 1992:278): what could not be filleted for consumption was removed for tallow manufacture by boiling. What was left was fed to pigs and, finally, sold to sugar refiners as a source of animal carbon. In this case, processing stopped well short of at least the latter two stages,

Some sheep, or sheep/goat, elements do bear butchering marks. For example, a sheep humerus (Figures 15-16) was roughly chopped above the distal end in an anterior-posterior direction. As well, a sheep tibia had been hacked with a cleaver-like tool at midshaft. Both the latter-discussed bones were found within Block 8, Fill 4 of Feature 125. Another caprid bone, a partial pelvis—mainly preserving the acetabulum—was found in Feature 48 (Fill 4, South Bisection). It, too, had been trimmed to a desired size or portion through the use of a wide-bladed instrument (Figures 17-18). The butchering method used for reducing sheep carcasses is similar to that used for pigs, done with cleavers rather than saws. Few pig or sheep/goat bones within this faunal sample exhibited saw marks. Only one such element, a pig tibia, had been so butchered. That reinforces the prior hypothesis, that smaller-sized animals were either slaughtered by small-scale butchers or as a domestic activity on home lots.

Most of the ageable sheep/goat postcranial bones (16 of 21) were fused at either the proximal or distal epiphysis, or both, at the time of the animal's death. In addition, tooth eruption and wear visible on sheep/goat mandibles demonstrate that the vast majority of these animals had reached maturity prior to their deaths. While there is a mix of early- and late-fusing bones, the fusion ages matched to the individual elements (Silver 1969) skew toward a young-mature population, suggesting that the meat came mainly from young animals that had reached the apex of their weight gain. They were therefore were ready for market sale, or houselot slaughter, as meat animals. Clearly, urban residents had available to them a steady supply of fresh meat from a variety of meat cuts and species, whether the animals were raised and slaughtered by individual families, or by professional butchers.

Cattle

Cattle, according to NISP, are less abundant than pigs in all but two features, namely Feature 48 (where there are just five bones total from the two species), and Feature 125, within which cattle outnumber pigs by approximately 50 bones (Table 4). The trend drawn from biomass is starkly different (Table 5). Cattle contributed vastly greater amounts of flesh to area residents: within all but two features, the estimated weight

Table 16 Identified sheep and/or sheep/goat elements per feature

Common Name	Element	Feature						Total
		13	45	48	49	120	125	
Sheep	Calcaneus					2	1	3
	Frontal						1	1
	Humerus	1					3	4
	Occipital				1			1
	Skull (complete)						1	1
	Radius	1					2	3
	Tibia				1		3	4
	Ulna	1					2	3
Sheep Total		**3**	**0**	**0**	**2**	**2**	**13**	**20**
Sheep/Goat	Ascending Ramus						2	2
	Atlas						1	1
	Axis						1	1
	Femur						2	2
	Frontal						1	1
	Humerus						2	2
	Hyoid				1	1	1	3
	Ilium						3	3
	Ischium						2	2
	Lateral Malleolus		1					1
	Mandible	1			1	1	10	13
	Maxilla						1	1
	Metacarpal		1				2	3
	Metatarsal						2	2
	Orbital						2	2
	Patella					1		1
	Pelvis			1			1	2
	Premaxilla				1			1
	Pubis						1	1
	Radius	1					1	2
	Rib						1	1
	Sacrum						1	1
	Scapula					1	2	3
	Temporal						1	1
	Tibia		1			1	3	5
	Tooth, Incisor				5			5
	Tooth, Lower M1						1	1
	Tooth, Lower M2						1	1
	Tooth, Lower M3						1	1
	Ulna						2	2
	Vertebra, Cervical						1	1
	Vertebra, Lumbar		1				7	8
	Vertebra, Thoracic						5	5
	Zygomatic						2	2
Sheep/Goat Total		**2**	**4**	**1**	**8**	**5**	**63**	**83**
Grand Total		**5**	**4**	**1**	**10**	**7**	**76**	**103**

Table 17 Element distribution of sheep/goats across the excavation area

Body Area Group	Elements in Group	No. of Bones	Percentage
Head	Skull elements, teeth, mandible, maxilla, hyoid, atlax, axis	39	38%
Axial	Ribs, vertebrae (not including sacrum)	15	15%
Forelimb	Scapula, humerus, radius, ulna	19	18%
Hindlimb	Sacrum, pelvis, femur, patella, tibia, fibula	24	23%
Feet	Carpals, tarsals (including astragalus and calcaneus), metacarpals, metatarsals, phalanges, sesamoids	6	6%
Total		**103**	**100%**

Figure 12 Photograph showing overhead view of a complete sheep skull from Feature 49 (FS 577)

Figure 13 Photograph showing complete sheep skull from Feature 49, view from the maxilla (FS 577)

Figure 14 Photograph showing complete sheep mandible from Feature 49. The tooth wear pattern indicates slaughter as a young mature individual (FS 577)

Figure 15 Photograph showing distal sheep humerus chopped off above distal end (FS 969)

Figure 16 Photograph showing distal sheep tibia chopped at midshaft (FS 969)

Figure 17 Photograph showing dorsal aspect of a sheep/goat acetabulum portion of a pelvis. The illium and ischium are missing (FS 565)

Figure 18 Photograph showing ventral aspect of a sheep/goat acetabulum portion of a pelvis, showing butchery scars from removal of the rest of the element (FS 565)

of beef is significantly greater than that of pork. The two exceptions are Feature 45, where cattle biomass is only slightly greater than that of pigs, and the anomalous faunal content of Feature 49, wherein pigs account for more than three times the biomass of cattle. Adding to the overall beef-over-pork dichotomy, two features, Features 12 and 46 (both Lot 77-1 privies) contained cattle bones but not a single pig element. The amount of beef represented by the cattle bones in Feature 125 is astounding (Table 5): Fully 70 percent of the calculated beef biomass from the entire sample came from within that foundation. The foundation contained a very large amount of bone in general, for reasons not completely clear: 61 percent of the faunal remains from this analysis emanated from that feature. The biomass evidence also undercuts a long-held myth discussed previously by Reitz (1995), namely, that beef was a meat that only the wealthy could afford (cf. Crowl and Schwartz 2014:34). The idea behind that belief is that beef could not be preserved easily like pork, and therefore mass consumption of the meat had to await full-scale industrialization of the livestock industry, including huge ranches on the plains, cattle drives to railheads, feed lots, factory-like slaughterhouses, and fast distribution via railroads (Crowl and Schwartz 2014:36-37).

The first question to ask in regard to the cattle remains is, why so much beef and what do the numbers of cattle bones/biomass contributions tell us about the city and its food supply? A number of slaughterhouses operated on the city's perimeter by the nineteenth century's start (Hills 1993:26-27). The City of Alexandria around that time faced logistical problems in bringing agricultural goods from western Virginia. The Potomac River's rapids (Great and Little Falls) were one problem, as were the costs of overland routes and the lack of good roads penetrating to the Shenandoah Valley. Further, neither canal nor road construction was entirely successful in alleviating those obstacles. Nonetheless, the city managed to make itself into an important market destination for the state's farmers, who brought in grain and livestock for local consumption but, more importantly, to be shipped overseas (Hills 1993:26). Although that industry suffered during the Revolutionary War, it rebounded during the subsequent Napoleonic wars.

The number of cattle bones recovered across the project area are a byproduct of Alexandria's brisk trade with the state's interior, a trade developed mainly for grain and aimed at overseas markets. Meat production seems to have been of secondary importance, but nonetheless generated sufficient profit to encourage the development of slaughterhouses and in turn create a livestock fattening industry in Virginia's piedmont. Rural Virginians purchased thousands of head of livestock from areas further into the frontier, and fattened the animals for a year prior to driving them to Alexandria (Hills 1993:26-27, 48). The answer to why there were so many cattle bones in the project area has to do both with the general preference for beef in the Chesapeake region from early Colonial times (Landon 2005:86), and the availability of this meat to the urban population by way of slaughterhouses. In turn, the slaughterhouses and their production of barreled beef undoubtedly account for professionally sawn and similarly sized, portions of meat.

The two features that produced the most cattle bone, Features 13 and 125, show different concentrations of meat cuts (Table 18). Feature 13's make-up of cattle bone favors ribs and forelimbs, along with pelvic cuts. An example of such a cut is a partial femur shaft (Figure 19) from Feature 125, sawn in an anterior-posterior direction, leaving a ca. 6 cm-long part of the mid-shaft. That cut would have formed a small roast. It is easy to imagine that this and other sawn cuts found, such as a slice of cattle bone from Feature 13 (Figure 20) were either purchased as barreled beef, or prepared in that fashion at the slaughterhouse, but bought fresh for immediate local consumption. The butchering marks open a window into carcass reduction. While it is not clear how animals were killed, it is apparent that many parts were used, whether for food or industry. Some mandibles (Figure 21) were cut through with an ax or cleaver, suggesting that parts of the head (e.g., the tongue and/or mandibular muscles) were stripped off for consumption. Slaughterers divided carcasses regularly: they split vertebrae in a cranial-caudal direction (Figure 22) to divide

Table 18 Cattle elements identified per feature

Element	Feature								Total
	12	13	45	46	48	49	120	125	
Astragalus							1	2	3
Atlas		1							1
Axis			1					1	2
Calcaneus		1					2	2	5
Carpal 2+3		2						2	4
Carpal, Fourth		1							1
Carpal, Intermediate		1	1					1	3
Carpal, Radial		1	1					1	3
Carpal, Ulnar		1						1	2
Cranial Fragment, Misc.								1	1
Femur								11	11
Frontal								1	1
Humerus	2	2					1	5	10
Ilium	1	3						2	6
illium								1	1
Ischium			1					1	2
Mandible		1					2	8	11
Metapodial		1							1
Metatarsal	1						2		3
Nasal								1	1
Naviculo-cuboid		1						3	4
Occipital								1	1
Palatine							1		1
Pelvis								8	8
Petrous	1								1
Phalanx, First	2							3	5
Phalanx, Second	2							1	3
Phalanx, third	1							3	4
Premaxilla		1						1	2
Radius		3						6	9
Rib	2	8		1	2			25	38
Sacrum		1						1	2
Scapula		1					1	6	8
Sesamoid								1	1
Sternum								2	2
Tarsal, Fourth								2	2
Temporal		1						1	2
Tibia		4	1			1	2	8	16
Tooth, Incisor		1						6	7
Tooth, Lower M1							1		1
Tooth, Lower M2								3	3
Tooth, Lower PM4								1	1

Element	Feature								Total
	12	13	45	46	48	49	120	125	
Tooth, Molar							1		1
Tooth, Premolar								1	1
Tooth, Upper PM4								1	1
Tooth, Upper Premolar								1	1
Ulna			1					4	5
Vertebra, Caudal							1		1
Vertebra, Cervical		2						4	6
Vertebra, Lumbar		1			1	1	3	10	16
Vertebra, Misc.								2	2
Vertebra, Thoracic		5						10	15
Zygomatic								2	2
Total	**12**	**49**	**6**	**1**	**3**	**2**	**18**	**158**	**249**

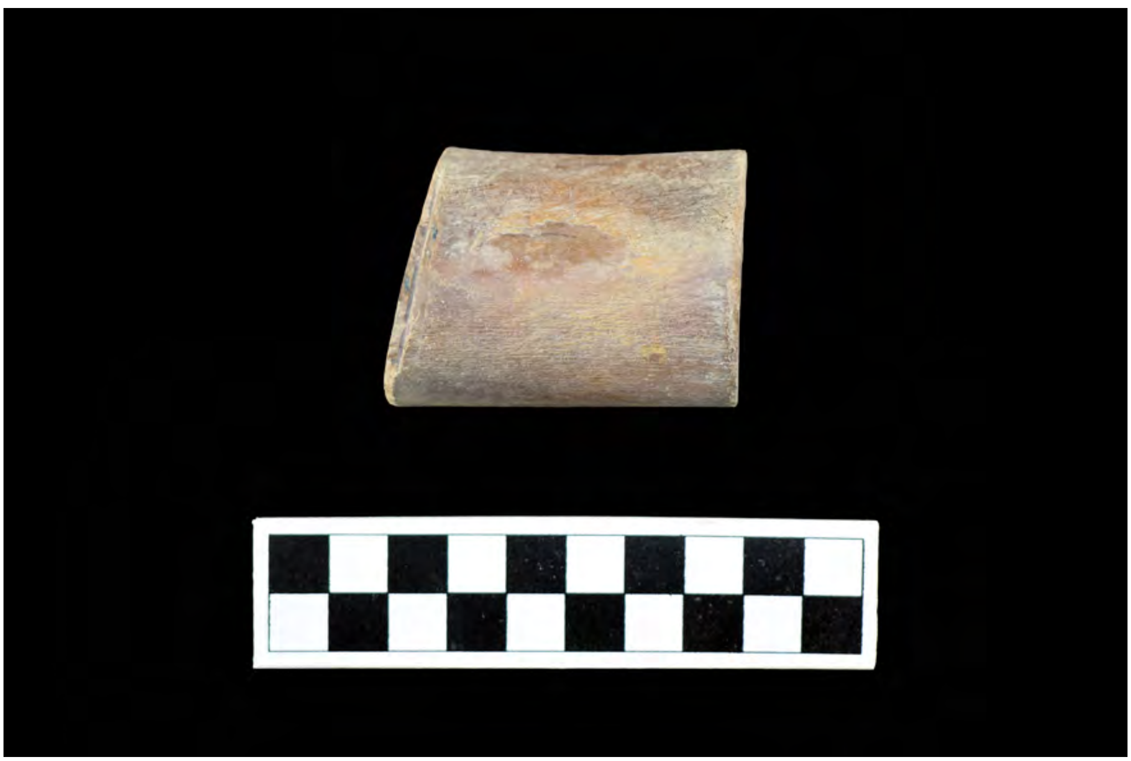

Figure 19 Photograph showing femur midshaft section with the proximal and distal ends sawn away forming a roast, from Feature 125 (FS 966)

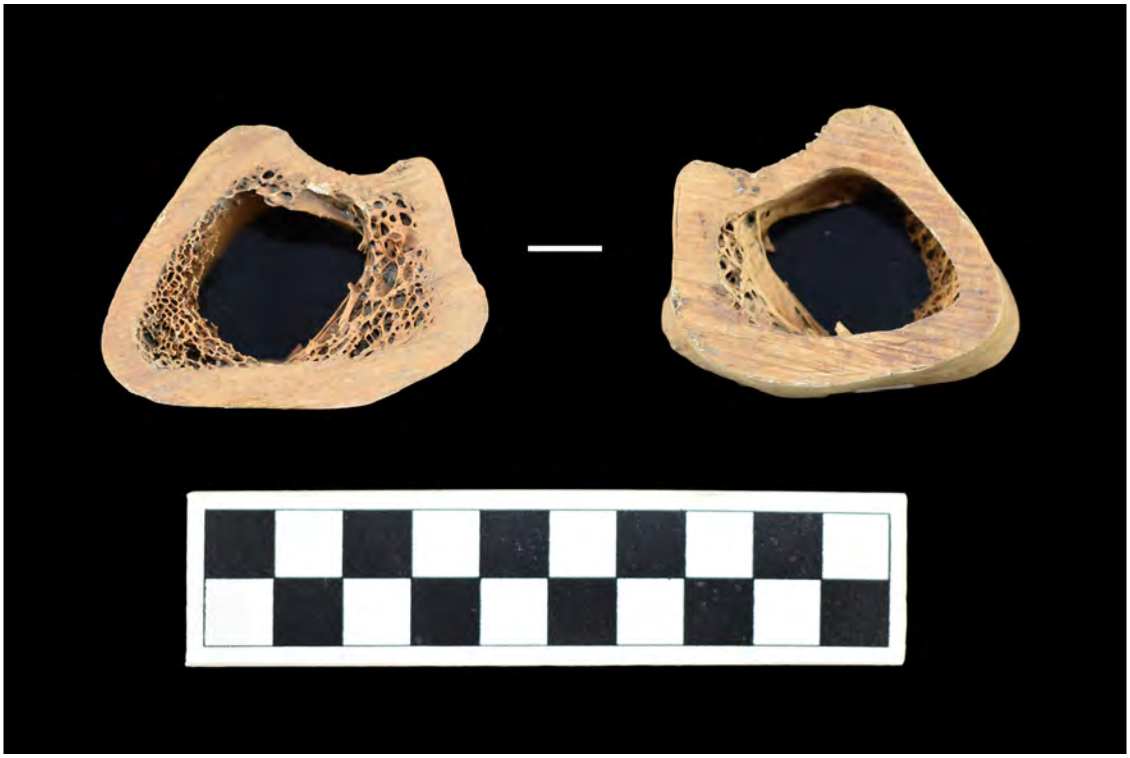

Figure 20 Photograph showing cattle bone slice from Feature 13 showing saw-caused striations, likely a steak (FS 170)

Figure 21 Photograph showing cattle mandible chopped at the nasal (front) and nuchal (rear) parts of the jaw, from Feature 64 (FS 969)

Figure 22 **Photograph showing lumbar vertebra split longitudinally to produce two equal halves, from Feature 13, South Bisection, Fill 6, Level 2 (FS 178)**

cattle bodies into right and left halves for further reduction. Butchers working at the slaughterhouses consistently separated ribs from the sternum, sawing them off about halfway down from their vertebral articulations (Figure 23), resulting in pieces consisting of the proximal end through the upper shaft. They divided cattle ribs further, sawing away the lower sections as separate meat cuts. Some bones not only were sawn but also display cut marks from a knife (Figures 24 and 25), apparently the result of "post-processing" by an in-town butcher, in a domestic kitchen, or at the dining table. The most telling of the cattle elements, in terms of industrialized processing, is the treatment of the scapula. This bone was consistently sawn into similar-sized pieces, cutting diagonally through the scapula blade twice, leaving a chunk of bone with enough meat to form a large roast or stewed piece of meat (Figures 26-28).

The archaeozoological literature of post-Medieval sites contains articles that discuss which bones barreled beef contained: apparently, the practice differed between Europe and the New World. In Europe, barreled cuts were restricted to more "meaty" elements and excluded feet, while in the U.S., the practice was that any anatomical part might be salted and barreled (Klippel 2001:1193; Landon 2005:90). Element distribution may not be a means by which barreled beef may be detected, but the presence of regular, sawn, cuts is. Cattle bones from industrially butchered, it is very possible that salted beef was stored at the Feature 125 warehouse, just as salt pork was at the Hoff Store in San Francisco (Hattori and Kosta 1990). The sawn cattle bones include a single foot element, namely, a metapodial (metacarpus or metatarsus) cut through at its midsection (Table 19). The near lack of butchered foot bones contrasts with Klippel's (2001) conclusion. The detail-analyzed sample from Feature 125 did contain some foot bones, including unmodified phalanges (Table 18). Perhaps these were not the remains of salted beef, but rather meant for another industry such as glue manufacture.

Features 12, 13, and 125 had many cattle foot bones in them and made up a sizeable per-

Figure 23 Photograph showing two ribs truncated by sawing them off approximately 10 cm below the proximal end, from Feature 125 (Block 7, Fill 4) (FS 966)

Figure 24 Photograph showing split cow rib with both saw and cut marks (right and left ends) from Feature 125, Block 7, Fill 4 (FS 969)

Figure 25 Photograph showing sawn dorsal process of a cattle thoracic vertebra with fine striations (cut marks) at the upper (left) extremity of the bone (FS 177)

Figure 26 Photograph showing distal scapula fragment with the blade sawn off behind the glenoid fossa, from Feature 13, North Bisection, Fill 6, Level 1 (FS 168)

Figure 27 Photograph showing blade section of a scapula from Feature 13, South Bisection, Fill 6, Level 1, sawn off proximally and distally (FS 177)

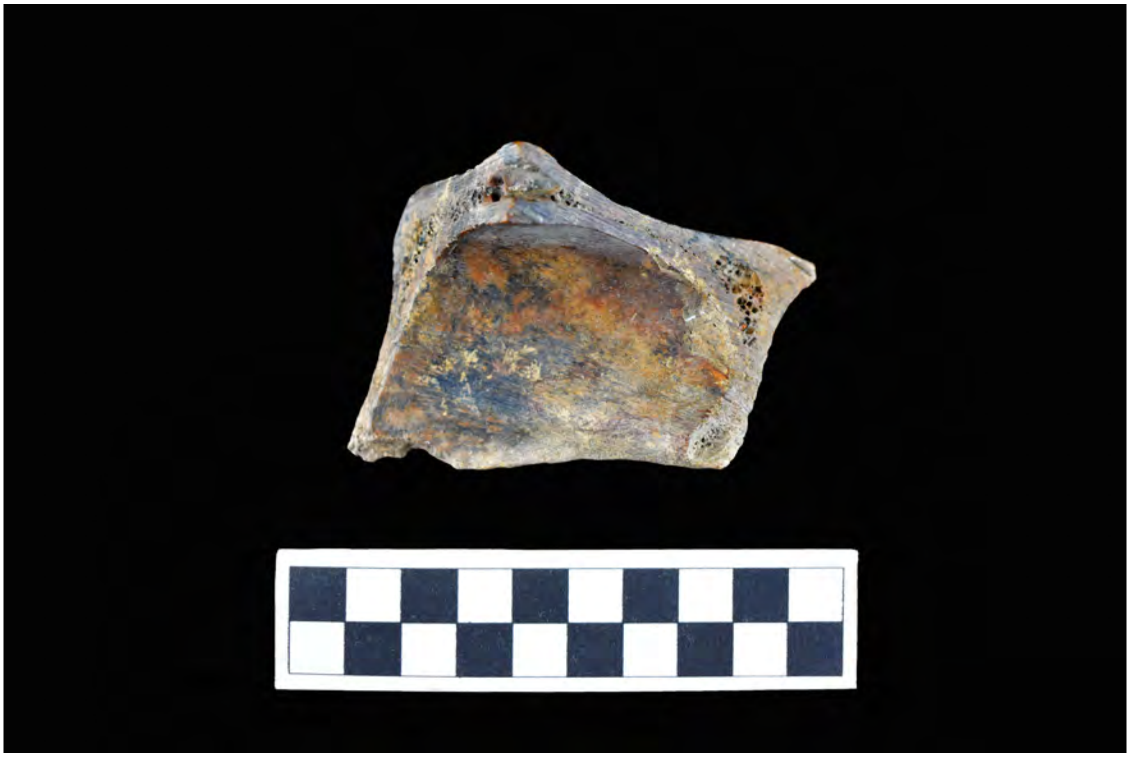

Figure 28 Photograph showing scapula from Feature 125, Block 7, Fill 4. The specimen features a regular proximal saw cut (left) and an odd, diagonal, distal cut (FS 966)

Table 19 Details of butchered cattle bones

Feature	Element	Side	Portion	Size Range	Butchering Method	Description	Total
12	Ilium	Right	Partial	11-15 cm	Hack		1
13	Femur	Left	Mid-section	6-10 cm	Saw		1
	Femur	Right	Mid-section	6-10 cm	Saw		1
	Femur	Right	Mid-section	6-10 cm	Saw		1
	Humerus	Left	Proximal End	11-15 cm	Saw		1
	Ilium	Right	Partial	6-10 cm	Saw		1
	Ilium	Right	Partial	6-10 cm	Saw		1
	Metapodial		Mid-section	6-10 cm	Saw		1
	Radius	Left	Distal End	6-10 cm	Saw		1
	Vertebra, Cervical		Partial	6-10 cm	Hack		1
	Vertebra, Lumbar		Partial	11-15 cm	Saw	sawn through centrum in proximal-distal direction	1
45	Ischium			6-10 cm	Saw	sawn both ends	1
	Tibia	?	Mid-section	6-10 cm	Saw	shaft sawn proximal and distal to make a roast section	1
46	Rib	Left	Proximal End	16-20 cm	Saw		1
48	Rib	Right	Complete	16-20 cm	Saw		1
	Vertebra, Lumbar		Centrum	6-10 cm	Saw		1
120	Calcaneus	Right	Distal End	6-10 cm	Hack		1
	Scapula	Right	Partial	11-15 cm	Saw		1
	Tibia	Right	Partial	11-15 cm	Hack		1
125	Astragalus	Left	Proximal End	0-5 cm	Hack	chopped through bone, leaving small piece of proximal end	1
	Femur	Right	Mid-section	0-5 cm	Saw		1
	Femur	Right	Mid-section	11-15 cm	Saw		1
	Femur	Right	Mid-section	6-10 cm	Saw	sawn roast cut	1
	Humerus	Right	Distal End	16-20 cm	Hack		1
	Humerus	Left	Proximal End	6-10 cm	Saw		1
	Ilium	Left	Partial	11-15 cm	Hack	chopped through anterior-posterior	1
	Ilium	Right	Complete	16-20 cm	Hack	chopped through, anterior-posterior	1
	Mandible	Right	Partial	6-10 cm	Saw		1
	Pelvis	Right	Partial	16-20 cm	Saw		1
	Pelvis	Left	Partial	6-10 cm	Saw		1
	Pelvis	Left	Partial	6-10 cm	Saw	sawn slice through acetabulum and through illium just behind, creating slice of bone	1
	Rib	Right	Proximal End	16-20 cm	Saw	sawn through mid-blade (shaft)	1
	Rib		Mid-section	11-15 cm	Saw		1
	Rib		Mid-section	11-15 cm	Saw		1
	Rib	Left	Proximal End	6-10 cm	Hack	deep chop mark along posterior blade, and further down blade, going all the way through	1
	Scapula	Right	Distal End	6-10 cm	Hack	chopped behind glenoid fossa in an anterior-posterior direction	1
	Scapula	Right	Distal End	11-15 cm	Saw	sawn at 45 deg angle from cranial to caudal margin, proximal direction; and caudal to cranial margin, distal direction; saw cuts met at scapula spine	1
	Scapula	Left	Mid-section	6-10 cm	Saw	sawn at opposing angles to create a triangle of bone	1
	Scapula	Right	Partial	6-10 cm	Saw	sawn in anterior-posterior direction at angles to flat plane of blede, from spinous process through blade, leaving a pointed V shape of the spinous process pointing down	1
	Tibia	Right	Proximal End	11-15 cm	Hack, Saw	sawn through anterior shaft then broken/hacked through remaining 3/4 of shaft	1
	Vertebra, Lumbar		Centrum	6-10 cm	Saw		1
	Vertebra, Lumbar		Partial	6-10 cm	Saw		5
	Vertebra, Lumbar		Complete	6-10 cm	Saw	sawn along L side, anterior-posterior, removing lateral process	1
	Vertebra, Lumbar		Complete	6-10 cm	Saw	sawn through cranial margin, anterior-posterior direction; also along L side, anterior-posterior, removing lateral process	1
	Vertebra, Lumbar		Partial	6-10 cm	Saw	sawn through 1 transverse process in proximal distal direction	1
	Vertebra, Thoracic		Partial	6-10 cm	Saw	sawn through centrum proximal distal direction	1
	Vertebra, Thoracic		Partial	6-10 cm	Saw	sawn through centrum, proximal-distal direction	2
	Vertebra, Thoracic		Partial	11-15 cm	Hack	cut through proximal-distal direction, and anterior-posterior at cranial margin	1
Total							53

centage of all beef bones (Table 20). The distribution of cattle body parts across the site shows that meatier elements (axial, forelimb, hindlimb) made up approximately two-thirds of the bone, whiles skull elements distribute fairly evenly through all features.

Body part distribution patterns shed light on questions of beef procurement and the possibility of barreled beef being packed at and distributed from the slaughterhouses at the edges of the city, and probably stored at the structure represented by Feature 125. Another means to demonstrate that the slaughterhouses were sources of beef is by examining age-at-death profiles. Wapnish and Hesse (1988:88-91) for instance used age data to elucidate producer, consumer, and hybrid economic models. I utilized herd-culling patterns based on long bone fusion ages (Silver 1969) to understand culling strategies. Herd-culling patterns, or mortality profiles, were calculated as the percent of ageable bones fused within a certain age-at-fusion (i.e., maturity) category, a well-established method for understanding the economic decisions behind kill-off profiles (cf. Steele 2005; Zeder 2006).

To generate the mortality patterns, I used long bones despite the handicap that, once a bone is fused, it is not possible to know how old animals were at age at death. Tooth eruption and wear is a more precise method, but teeth within maxillae or mandibles were rare within the faunal collection. The mortality profile (Figure 29), constructed using the limited number of ageable cattle long bones in the sample (n = 48), shows that the highest kill-off rate was after the animals had reached approximately one year of age. Within the analyzed sample, almost no bones fusing at less than one year of age are unfused. Thus, almost all cattle survived past that age. There was instead a young-mature kill-off pattern, one that tapered off in subsequent age groups up to 3-4 years old. A large proportion of animals survived the latter age group as well, which indicates that residents received meat from two main age groups: cattle slaughtered young, but after maturity, and those slaughtered several years after maturity, perhaps sold to the meat market after they had surpassed their usefulness as draft animals. To some extent, this correlates with the documentary record discussed by Hills (1993:26-27), who documented how western Virginia drovers bought livestock herds from Kentucky ranchers, fattened them for a year, and then brought them to Alexandria slaughterhouses to be turned into export (barreled) beef. Based on that limited information, most Alexandria cattle brought to market in that manner would have had to have been mature animals, certainly above two years of age. Therefore, the mortality evidence, in addition to butchering methods, points to an industrialized supply chain for beef, whether for local consumption or storage and, ultimately, export.

Summary and Conclusions

The detailed analysis faunal sample from site 44AX235 reveals a variety of interesting components of Alexandria's turn of the nineteenth century foodways, environment, and beyond. Unsurprisingly, the research uncovered evidence for a thriving fishery, possibly supported by African-American watermen (Yentsch 1992). Unfortunately, which species were taken for the most part currently remains an unanswered question. Other aquatic species, most prominently ducks and geese, formed a part of the diet, demonstrated by skeletal elements showing obvious signs of peri-mortem trauma caused by shotgun pellets. Fish and wild game diversified the meat component of these Alexandrians' diets, which were otherwise dominated by the flesh of domesticated mammals.

The domesticated mammals present a dichotomy in butchering techniques. The fact that pigs and sheep were butchered using non-standardized methods suggests that the chain of supply for meats from those animals was entirely different from the beef supply. Crowl and Schwartz (2014:35) reviewed eighteenth century urban butchering and concluded that, at least for a part of that century, both carcass division and slaughtering took place within city limits and in what we would term a casual manner, at market stalls and behind butchers' shops/residences, with the result that "Blood was allowed to run in the city gutters…" Residential slaughtering would have contributed to the conditions they described. Bowen (1992:276-278), however, presented evidence from Boston, where slaughterhouses and

Table 20 Element distribution of cattle across the excavation area

Body Area Group	Elements in Group	No. of Bones	Percentage
Head	Skull elements, teeth, mandible, maxilla, hyoid, atlax, axis	42	17%
Axial	Ribs, vertebrae (not including sacrum)	80	32%
Forelimb	Scapula, humerus, radius, ulna	32	13%
Hindlimb	Sacrum, pelvis, femur, patella, tibia, fibula	51	20%
Feet	Carpals, tarsals (including astragalus and calcaneus), metacarpals, metatarsals, phalanges, sesamoids	44	18%
Total		**249**	**100%**

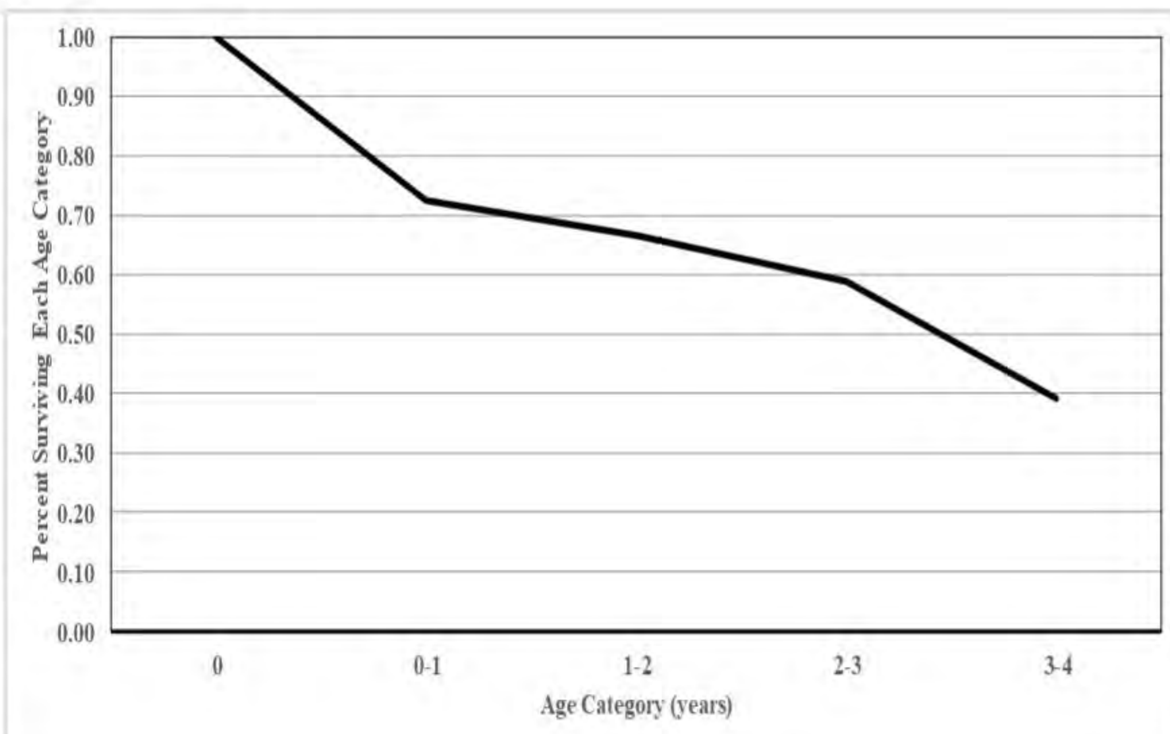

Figure 29 Chart showing cattle mortality patterning based on long bone fusion

butchers alike were banned from all but the outskirts of the city. The faunal evidence from site 44AX235 points to the need to refine the history of urbanism vis-à-vis animal slaughter within cities: while it appears to have been the case that pigs and sheep were slaughtered by either individual residents or small-scale butchers operating within city limits, cattle were slaughtered on a semi-industrial scale at the city's outskirts, utilizing saws to divide carcasses in a regular fashion, producing a standardized product to be sold for local, long-distance, or international consumption. Elements present from all domestic species show that a wide range of meats and organs were consumed. As Bowen documented (1992:276-277), what is appropriate for the table, and what is offal, are concepts that had not yet jelled, by the eighteenth century, into modern form.

Many of the observations and hypotheses discussed here have been presented previously by archaeologists, working on Colonial Chesapeake sites, other early urban centers, or in the greater Southeast. Two facets of the faunal collection, however, stand out as unique to this place. First are the cattle remains and, in specific, the distribution of cattle bones across the site. The cattle bones mainly concentrate within Feature 125. In fact, they occur mainly within the northernmost room of the tripartite building. Many had been sawn into regularly sized pieces, an observation that contrasts with the postmortem treatment of pig and sheep carcasses. The industrialized processing of cattle carcasses accords with the documentary record analyzed by Hills (1993), who elucidated Alexandria's development in part vis-à-vis import to the city of both grain and livestock from Virginia's western regions. The imported foodstuffs were stored in the city's competing warehouses, awaiting shipment. The location and architecture of Feature 125, as detailed in Volume I of this report, demonstrates that it was a dockside warehouse. Artifacts other than faunal remains also point in that direction, including coopering equipment. These provide further evidence, beyond bones, that barreled goods were stored in the structure. Architectural, faunal, documentary, and non-faunal artifactual evidence taken together strongly suggest that one of the purposes of the Feature125 structure was to store salted beef in barrels for sale as food on seaborne voyages or for overseas destinations. Hills (1993) pointed to Alexandria's brisk overseas business as a reason for the city's development as a food production and storage hub. Klippel (2001) studied cattle remains from St. Kitts and demonstrated that beef fed to slaves there had to have been from cattle raised elsewhere, in eastern North America or the United Kingdom. That meat had to have been brought to the island as salted beef (Klippel 2001:1196). Taken together, the latter two lines of evidence show both that salted beef was a sought-after commodity, and that Alexandria could and did supply it.

Just as the cattle remains exemplify Alexandria's brisk ca. 1800 export business and its urbanization/industrialization, other faunal remains demonstrate the city's role in importing goods from far-flung locations: the softshell turtle and the crocodilian(s). Their presence in Alexandria is only a partial mystery. An array of goods flowed into as well as out from the city, and it is no surprise that among them were semi-exotic animal species. Why the animals were imported is the more interesting question. Presumably, the turtle shell, emptied of its occupant, is what remains from a meal. The crocodilian remains present a more difficult puzzle, as discussed previously. A parsimonious explanation is that the osteoderms originated from a (piece of) tanned hide—or waste from its preparation—in which case the bones represent material culture rather than foodways. Whatever the reason for their import was, they are emblematic of animal products that the city pulled in as well as sent out.

Alexandria's push outward of foodstuffs in the form of wheat and preserved, barreled, meat (Hills 1993) shows in the faunal assemblage. Yet, the population's interest in wild, aquatic, species is also apparent in the range of fish and fowl identified. These formed the animal products, together with the aforementioned two exotic species, that the tenants of the project area could both obtain—whether via their own efforts or from markets and watermen—and desired. The native wild birds, mammals, and fish, and exotic species, were brought to Alexandria to meet the demand of a population well versed and interested in the region's animal products. They were supplied by a network of professional hunters and fishers, some of whom specialized in the import of domesticates on the hoof or, even, the occasional exotic specimen.

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Parasitology Report

Robinson Terminal Phase III, Alexandria VA Privy Analysis: Parasitology

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The preservation of parasite eggs is rarely optimal. In oxidized or alkaline environments, recovered eggs are highly altered or eroded. However, in anaerobic, organic-rich deposits, eggs can be ideally preserved. Ten samples from the Robinson Terminal Phase III project, Alexandria were submitted for parasitological analysis. Dietary seeds were recovered from all features, although not from all samples. In parallel, dietary pollen is present in all features. These remains suggest that night soils were recovered in at least one sample for every feature (Table 1).

It is of interest that the chemical makeup of the sediments varied (Table 2). Some reacted very strongly with hydrochloric acid. This is consistent for nightsoil with added lime. Others were predominantly organic, and two contained significant fine silica. This provided us with an opportunity to evaluate the influence of sediment type on egg preservation.

Table 1: Provenience and notes from sample bags sent to the Pathoecology Lab.

Lab #	SS #	Feature	Notes
1	5027	12	Privy: fill 4
2	5028	12	Privy: fill 5
3	5032	13	Privy: fill 6, lvl 1
4	5033	13	Privy: fill 6, lvl 1
5	5009	48	Privy: fill 4
6	5090	48	Privy: fill 5
7	5091	48	Privy: fill 6
8	5094	49	Privy: fill 3, lvl 1
9	5095	49	Privy: fill 3, lvl 2
10	5096	49	Privy: fill 3, lvl 3

MATERIALS AND METHODS

PRELIMINARY PROCESSING

Methods for shaft feature analysis were developed by Reinhard et al. (1988) based on multidisciplinary analysis of sediments from Providence, Rhode Island (Reinhard et al. 1986). Later, Warnock and Reinhard (1992) formalized a method for simultaneous recovery of seeds, parasite eggs and pollen grains from the same samples. Later research by other researchers (Bain 2000) confirmed the utility of the methods described below for latrine sediments. From our lab, this method was refined and applied to numerous historic sites (Fisher et al., 2006). Although other methods have been developed, comparison studies verify that our methods are best for the recovery and quantification parasite eggs, both in trace amounts and large numbers (Dufour et al., 2013; Florenzano et al., 2012; Romera Barbera et al., 2020).

Quantification of microfossils is facilitated by calculated concentrations of objects with added *Lycopodium* spores. By introducing a known number of *Lycopodium* spores into weighed samples, the concentrations of microfossils can be calculated per gram or milliliter of sediment (Fisher et al., 2007). We introduce 1,250 *Lycopodium* spores per ml of sample by adding 3 spore tables containing 12,500 spores into a 30 ml sediment sample. The tablets are dissolved in a few drops of hydrochloric acid in 350 ml beakers labelled with the lab numbers.

When the *Lycopodium* spore tablets are completely dissolved, the 30 ml sediment samples from each archaeological sample are added to the beakers. Preliminary observations are made regarding sediment color, texture, and soil make up. Then 5 drops of 40% hydrochloric acid are added to test whether the samples need to be treated with this acid. If a reaction is noted, the reactive samples are treated with dilute HCl until calcium carbonates are completely dissolved and the microfossils are liberated. Distilled water is added when the reaction between the acid and the carbonates stops.

Once dissolved in acid, the samples are treated with the swirl technique. The contents of the beakers are swirled until all particles are in suspension. The beakers are placed on a flat surface for 30 seconds. After 30 seconds, the fluid from the beakers is poured through 250-micrometer mesh screens into 600 ml beakers labeled with the appropriate lab numbers. This is repeated twice for a total of three swirls. The microfossils in the 600 ml beakers are concentrated by centrifugation. The heavy silicates in the 250 ml beakers are discarded.

Subsequent to the hydrochloric acid and swirl treatment, silica is dissolved in hydrofluoric acid. The sediments are transferred into labeled 500-milliliter polypropylene beakers. Fifty milliliters of 48% hydrofluoric acid are added to each beaker and the sediments are thoroughly mixed in the acid. The samples are left in the hydrofluoric acid for 24 hours and are stirred occasionally during this period. Then the sediments are concentrated by centrifugation in 50-milliliter centrifuge tubes. The sediments in the tubes are then washed many times in distilled water until the supernatant is clear.

When large amounts of fine residue smaller than 1 micrometer are present, a aliquot of 5 mls is measured from the samples. These are screened through a folded 35 micrometer mesh which results in a mesh size of about 15 micrometers. This separates the parasite eggs from masses of fine debris. The fine sediments are collected in a 50ml beaker and the parasite eggs are washed into a 250ml beaker and concentrated by centrifugation in 12 ml tubes.

PARASITOLOGICAL METHODS

For archaeoparasitological analysis, drops of the sediments are transferred to glass microscope slides with Pasteur pipettes. The sediment drops are mixed with glycerin and covered with glass cover slips. The parasite eggs and added *Lycopodium* spores are counted.

Concentrations of parasite eggs are calculated with the following formula:

Egg concentration = (e/m) x l)/ v

E = microfossils counted, m = marker *Lycopodium* spores counted, l = *Lycopodium* spores added, and v = volume of sediment.

Identification of the genera of the parasite eggs is done by morphological analysis.

RESULTS

The preliminary processing results were remarkable. Seeds, especially *Rubus* seeds, were present in most samples and all features. *Rubus* seeds are most indicative of night soils. Some samples produced very strong reactions in hydrochloric acid (HCl) and yielded generally lower microresidues after screening and acid treatments (Table 2).

Table 2: Processing reaction information. 30 ml of sediment were processed for each of the 10 samples. Samples 1, 4 and 6-7 reacted strongly with HCl indicating high calcium carbonate content. For these samples an average of 4.25 ml of microresidues were recovered from the 30 ml processed. It is likely that lime was added to these privies when used. The remaining samples had less carbonate and contained and average of 6.2 ml of microresidues. Sample 2 contains a high proportion of seeds that were recovered in screening. The fourth column shows the number of ml of residue recovered after HCl treatment and screening. The fifth column presents the number of ml remaining after the complete treatment which finished with hydrofluoric acid.

Lab #	# mls in sample	HCl reaction	# mls post HCl and screening	# mls post HF	Comments
1	30	Extreme	16	7	Sandy, alkaline, lime added?
2	30	Moderate	6	4	Organic rich
3	30	Mild	8	6	Organic rich
4	30	Strong	6	5	Alkaline, lime added?
5	30	Mild	7	6	Organic rich
6	30	Extreme	9	2	Alkaline, lime added?
7	30	Extreme	8	3	Alkaline, lime added?
8	30	Mild	9	8	Organic rich
9	30	Mild	8	7	Organic rich
10	30	Mild	10	6	High silica content

To understand the importance of egg preservation, it is important to review the observations of Romera Barbera et al. (2020). They classify several taphonomic conditions for the two most common parasite eggs found in latrines. For A. *lumbricoides* eggs, their classification are: Pristine if the eggs are intact; Decorticated when the outer diagnostic albuminous layer is missing; Uterine when the outer diagnostic albuminous layer is present but the internal chitin shell is absent; and Encrusted when debris particles adhere to > 30% of egg surface; and Folded when the smooth shell surface is bent but not broken. For *T. trichiura* the classifications are: Pristine when no taphonomic changes are observed; Folded if the shell surface is bent but not broken; Crushed if the shell surface is bent and broken; Air Bubble if the egg contains an air pocket; and Encrusted when debris adheres to > 30% of egg surface (Romera Barbera et al., 2020). We classified the eggs from the samples according to this system (Table 3).

The variation in sediment composition is evident in feature 12. The fill 4 (Lab # 1) sample had a very strong HCl reaction. This may be due to the addition of lime at the time the privy was in use. Also, this sample had a high silica content and even after complete processing, most of the microscopic remains were silica traces. The fill 5 sample (Lab # 2) had a mild reaction and contained the most seeds. Approximately half of the volume of the sediment was composed of food remains. These ranged in size from *Rubus* raspberry seeds to what appear to be cherry pits. Egg condition from both Feature 12 samples was good, but fill 5 exhibited over 220,000 total eggs per ml in comparison to fill 4 which contained just over 16,000 eggs per ml (Table 3). Considering that the fill 5 sample was composed largely of macroscopic seeds, it is likely that the concentration of eggs per ml of microresidues would have been much higher, probably more than 200,000 eggs per ml for each species. The Feature 12 samples are also intriguing because the numbers of whipworm eggs, *T. trichiura,* are roughly equal to the numbers of giant intestinal roundworm, *A. lumbricoides* (Table 4). A typical ascarid female lays about 200,000 eggs per day compared to whipworm females that lay about 10,000 eggs per day. This signals that the people who used Feature 12 were more heavily infected with whipworm than giant intestinal roundworm (Table 4). The recovered eggs are pristine (Romera Barbera et al., 2020).

The two samples from Feature 13 had identical provenience information, fill 6, lvl 1. However, they had very different results. Lab 3 (SS# 5032) had a mild reaction with HCl and a nearly unprecedented concentration of ascarid eggs, 202,500 per gram. This is approximately the daily output of a single giant roundworm. The egg conditions, especially of whipworms, was pristine with preservation of the delicate polar plugs that seal the eggs (Figure 1). Lab 4 (SS# 5033) had a strong reaction with HCl and contained fewer eggs. However, there were pristine eggs in this sample as well. Kumm et al. (2010) classified whipworm egg preservation for application to mummy studies. Their categories were: 1) pristine = polar plugs and larvae intact in an undamaged egg; 2) quasi-pristine = larvae intact w/out polar plugs in an undeformed egg; 3) moderate = empty undeformed egg; 4) poor = empty deformed egg; 5) fractured = egg with a crack or tear; 6) fragmentary = egg broken in two or more pieces. The eggs from Feature 13 were all pristine or quasi-pristine (Figure 1). Thus, most eggs in this sample were perfectly pristine as if they were passed in modern feces (Table 3).

Three samples were submitted from Feature 48, fill 4, 5 and 6 (Lab # 5-7). Sample 4 (Lab # 5) had a mild reaction with HCl and therefore was not high in calcium carbonate. However, the reactions for fills 5 and 6 (Lab # 6-7) were extreme, suggesting the addition of lime at the time of use. The egg recovery for fill 5 and 6 was lower and the eggs were eroded. Preservation was moderate for Fill 4 (Figure 2) but poor for fill 5 and 6.

The three levels from feature 49 were organic rich and had the highest percentage of microresidue (Table 2). The total egg concentrations varied between the samples: 148,750 eggs per ml for lvl 1 (Lab # 8), 15,804 for lvl 2 (Lab # 9) and 52,500 for lvl 3 (Lab # 10). For level three, much of the microresidue was inert mineral fragments.

Table 3: Processing reaction information and egg condition. The egg preservation classification for both *A. lumbricoides* and *T. trichiura* were developed by (Romera Barbara et al., 2020). Kumm presented a classification for *T. trichiura* only.

Lab #	Sample size in mls	% sample microscopic residue	Number total eggs present per ml	Egg condition for both species (Romera Barbara et al., 2020).	Whipworm egg condition (Kumm et al. 2010)
1	30	23	16,250	pristine	moderate
2	30	13	223,750	pristine	moderate
3	30	20	235,000	pristine	pristine
4	30	17	45,000	pristine	pristine
5	30	20	96,250	pristine	moderate
6	30	6	791	folded	poor-moderate
7	30	10	12,824	folded	poor-moderate
8	30	27	148,750	pristine	moderate
9	30	23	15,804	pristine	moderate
10	30	20	52,500	pristine	moderate

Table 4: Egg and *Lycopodium* tracer spore counts and derived concentrations of eggs per ml calculated by dividing the parasite eggs counted by *Lycopodium* spores counted and multiplying this value by the number of *Lycopodium* spores added per ml of sample (1,250).

Direct Counts of Tracer Spores and Parasite Eggs										
Lab #	1	2	3	4	5	6	7	8	9	10
Lycopod.	3	2	1	5	1	49	8	1	14	2
Ascaris	19	169	162	175	55	7	67	98	149	80
Trichuris	20	189	26	45	22	24	15	21	28	4
Calculations of Eggs per Milliliter										
Ascaris	7,917	105,625	202,500	43,750	68,750	179	10,469	122,500	13,304	50,000
Trichuris	8,333	118,125	32,500	11,250	27,500	612	2,355	26,250	2,500	2,500

Table 5: The amount of microscopic reside after hydrochloric acid disaggregation and screening was substantially smaller than the original 30 ml samples. To gain an idea of the numbers of eggs present in the microscopic portion of the samples, we recalculated the number of eggs per ml based on the amount of microscopic sediment. From these data, the egg concentrations for Robinson Terminal Phase III samples exceeds any other site. Most notable is sample 2 which has over one million eggs per ml of microscopic residue.

Lab #	# mls post HCl and screening	*Ascaris*	*Trichuris*
1	16	14,844	15,625
2	6	528,125	590,625
3	8	759,375	121,875
4	6	218,750	56,250
5	7	294,642	117,857
6	9	595	2041
7	8	39,258	8,789
8	9	408,333	87,500
9	8	49,888	9,375
10	10	150,000	7,500

DISCUSSION

Both species encountered at Alexandria accomplish infection when eggs are ingested with water, food or contaminated soil. Infections are most common between the ages of 3 and 15 years. Whipworm is linked to pathology including low stature, diarrhea, and prolapsed rectum in severe cases (Else et al., 2020). Giant roundworm pathology can be extreme in severe infections. However, even in moderate infections can result in symptoms including asthenia (physical weakness), lack of appetite, abdominal pain and/or distension, nausea, diarrhea and weight loss; in addition, impaired physical and mental development can occur in children (Else et al., 2020). Severe infection can contribute to deficiency of vitamins A and C. Both parasites cause a malaise referred to as “failure to thrive”. In addition, our lab has linked whipworm to fatal intestinal obstruction (Rácz et al., 2015) and a case in which whipworm and pinworm proliferated in an individual dying of cancer (Kumm et al., 2010; Piombino-Mascali et al., 2013; Rollins et al., 2021).

The relative concentrations of eggs provide data to base a discussion of the pathology risk experienced by the different users of the excavated Alexandria features. It is worth comparing the Alexandria data to those collected from Albany, NY (Fisher et al., 2006; Trigg et al., 2017). All of these analyses were done at our lab using the methods presented herein. The Albany analysis was based on 60 latrine night soil samples and represents the largest data set ever recorded from a single site. Of those samples, only 2 had egg concentrations exceeding 200,000 eggs per ml and 6 exceeding 50,000 eggs per ml. From the perspective of archaeoparasitology, 200,000 eggs per ml represents severe risk of infection and 50,000 represents high risk of infection (Fisher et al., 2006).

For the Alexandria analysis, at least one sample from all four features contained an excess of 50,000 eggs per ml. For features 12 and 13, egg counts exceeded 200,000 eggs per gram. The data indicate that parasite infection was unavoidable for the people who used the privies. The numbers of eggs signal that they experienced pathology, probably to a greater degree. It appears that the infections were uncontrolled.

Although death is a rare outcome of infection, quality of life is adversely impacted. Certainly, people who are infected with giant intestinal roundworm become aware of their condition when the worms are passed or when motile worms exit the anus. Adults are about one foot long and a quarter inch around. Smaller motile worms sometimes exit the nose or mouth. These situations are disconcerting psychologically but are not pathological in a physiological sense. However real pathology happens with moderate to severe infections (Else et al., 2020). In chronic infections, both parasites cause long-term nutritional deficiency which in turn affects cognitive development. With the giant roundworm, *A. lumbricoides*, high worm burden causes appendicitis, intestinal obstruction, and invasion of the bile duct from the duodenum. *T. trichiura* infections provoke *Trichuris* dysentery, rectal prolapse and stunted growth. It is very probable that people in Alexandria using the privies were at high risk of developing some or all of these symptoms.

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Figure 1: *Trichuris trichura* eggs from Lab 4 (SS# 5033), Feature 13, fill 6, lvl 1. 13. The preservation of these eggs is perfect or nearly perfect. Eggs 1, 3 & 4 have the polar plug intact (arrows). These plugs have a solid core and are held in place with a mucoid substance. They are ephemeral points for the larva to exit. Therefore, finding them intact in archaeological deposits is rare. In egg two, one plug is gone and the other on the left side is compressed inward. Larvae are visible in all eggs.

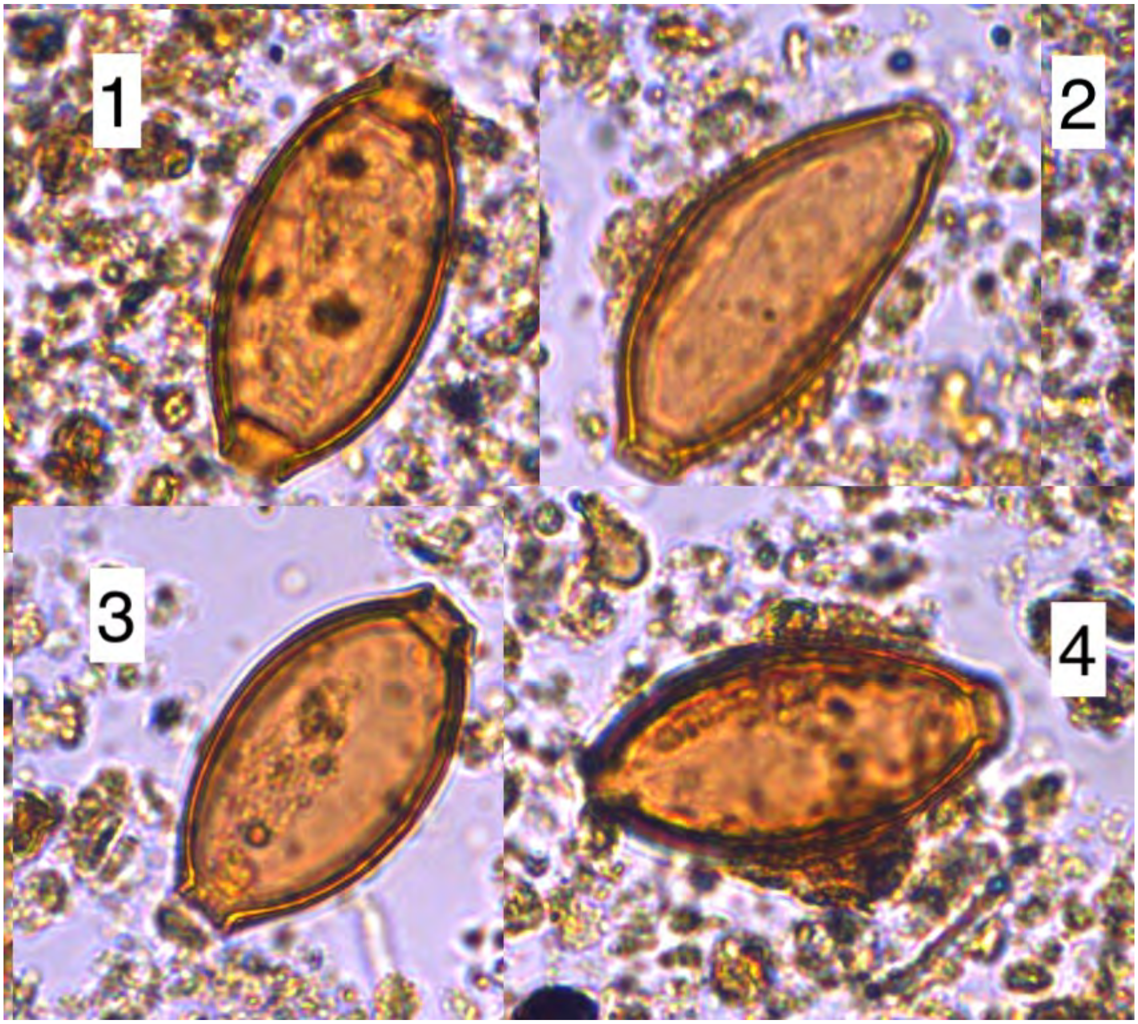

Figure 2: More typical preservation of *T. trichura* eggs from Feature 12. The form of the eggs is intact, but the plugs are missing. There may be larval remains in 1 and 3, but 2 and 4 are empty.

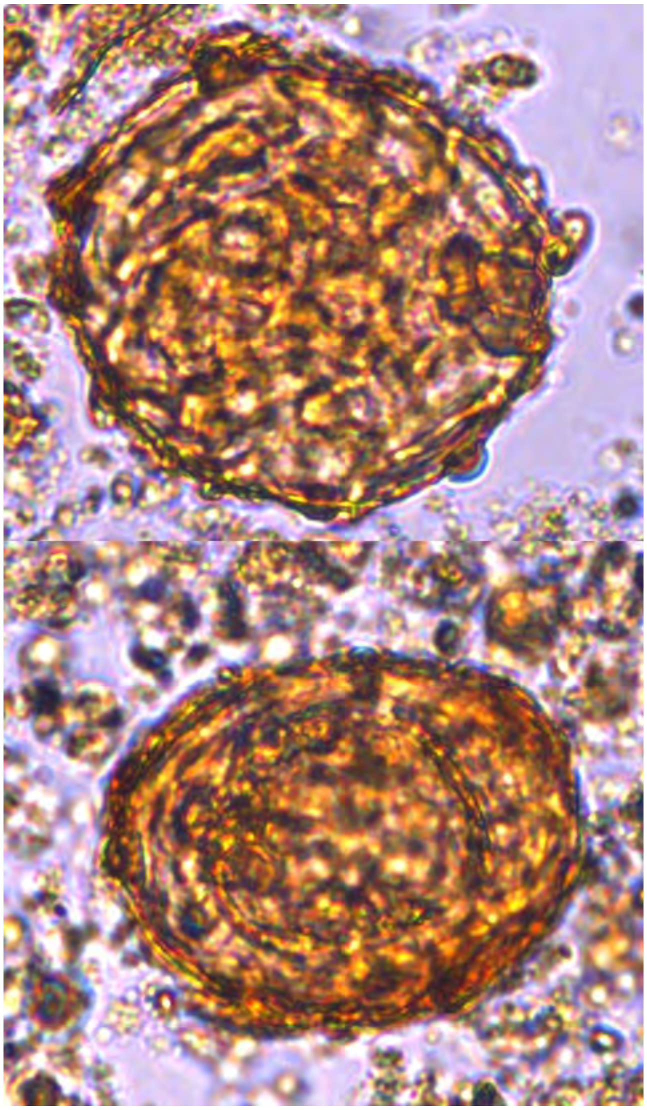

Figure 3: *Ascaris lumbricoides* eggs from Feature 12. These are typical of the eggs found in the privies.

Photogrammetry Report

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Dear Justin

ALEXANDRIA PHOTOGRAMMETRIC PROCESSING

The remit of OA was to generate 3D models from datasets (comprising photographic collections and control files) using photogrammetric software (Agisoft Metashape). This process uses the overlap between multiple photographs to generate a point cloud by a process of automated triangulation. The key aspect is that there needs to be adequate overlap between the individual photographs to ensure that the process can be adequately resolved. It is not simply a case of taking lots of photographs but a requirement that there are sufficient detailed and generalised photographs to ensure the generation of a robust model. In addition, there is a need for multiple survey control points visible within the overlap of the photographs to ensure that the model is accurate and georeferenced.

On receipt of the datasets, it was evident that the photographic collections and control files were produced according to varying methodological approaches. While some methods were conducive to photogrammetric processing others less so, and this has meant that some models were easy to generate (and produced good quality models), while others were more difficult and some not possible to process at all. The secret of a good model is in the data capture not the processing, although subtle processing techniques can go some way to off-set the implications of poor data capture.

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Of the 14 features proposed for photogrammetric processing, 11 were successfully completed, and (Table 1) and of these 23 models were created, reflecting that some features had multiple models from different stages of the excavations. Each of these models were output as orthophotographs, hillshade views and also as a 3d model within SketchFab; links to SketchFab models are provided in Table 2. For each model there is also a password which ensures that at the moment there is only private access to the models.

The three features that could not be processed were: 91, 123 and 125. The control file for Feature 91 was corrupted and it was not possible to extract the survey data. For Features 123 and 125 they only had one or two control points each and there is a minimum requirement of 4 to get a workable georeferenced model. A similar issue was experienced with Features 4, 44 and 155-Bulkhead where there were insufficient control points. Although it was possible to create models for Features 4 and 44, this was at the expense of accuracy, but for Feature 155-Bulkhead there were no control points, and it was not possible to create a model.

Feature	**Identification**	**Location**
4	Foundation	N. Union Street, Lot 77-3
5 and 45	Foundations	N. Union Street, Lot 77-1
18	Foundation with brick floor	N. Union Street, Lot 77-2
23	Foundation	N. Union Street, Lot 77-4
44	Foundation (Hooe Warehouse)	Duke Street
151	Foundation*	Potomac Strand
155	Ship 2	Waterfront
159	Ship 3	Waterfront
165	Wharf Structure	Waterfront
200	Ship 1	Waterfront

Table 1: Completed Features

Feature	**Link**	**Password**
4 (Beginning of Excavation)	https://sketchfab.com/3d-models/feature-4-round-1-alexandria-c88d149acd7b48a68b547f0208d82fe7	F4R1
4 (End of Excavation)	https://sketchfab.com/3d-models/feature-4-round-2-alexandria-16cc903968d544f0802c17348eb64648	F4R2
5 and 45	https://sketchfab.com/3d-models/feature5-and-feature45-alexandria-0a6ea331c446418b96743d120f7a653a	F5F45
18 (Floor, Round 1), Cropped	https://sketchfab.com/3d-models/f18-r1-ortho-dem-3d-model-2585f153d3f14046ac6b959bdb83ac21	F18Floor
18 (Floor, Round 1)	https://sketchfab.com/3d-models/feature18-foundation-brick-floor-alexandria-58d7e6673800492881ccdb4c497c7baa	F18Floor1
18 (SubFloor, Round 2)	https://sketchfab.com/3d-models/feature18-below-floor-alexandria-fc51a84397a34f808d8aa7995120547d	F18Floor2
23	https://sketchfab.com/3d-models/f23-3d-model-a48c8e34812946ccaf6254c68582c968	Feature23
44	https://skfb.ly/6Uz96	N/A
151	https://sketchfab.com/3d-models/3d-model-of-feature-151-alexandria-	F151

	ed6ec73a4fb44083b29e352976d82c46	
155 (Ship 2 Frame)	https://sketchfab.com/3d-models/hull-of-ship-2-feature-155-alexandria-usa-00302c3589ad48fd9aefa03734c6f578	Alexandria
155 (Ship 2 Futtocks)	https://sketchfab.com/3d-models/futtocks-of-ship-2-feature155-alexandria-usa-5a2c6acf53c042cb8f9c7809ee71e3d9	Futtocks
155 (Ship 2 Keel)	https://sketchfab.com/3d-models/keel-of-ship-2-feature155-alexandria-usa-7a82abf2f7de4e99ab8fae6fae875f43	Keel
159 (Ship 3 Frame)	https://sketchfab.com/3d-models/frame-of-ship-3-feature159-alexandria-c1cc66c20b814e82a0cdfee3f3666307	Frame159
159 (Ship 3 Frame), Cropped	https://sketchfab.com/3d-models/cropped-frame-of-ship-3-feature159-alexandria-c8e0e1aafa4b4a5b9723ec10777533c9	CFrame159
159 (Ship 3 Hull), Cropped	https://sketchfab.com/3d-models/cropped-hull-of-ship-3-feature159-alexandria-5dfd78f9d9e644c787062336010929af	CHull159
159 (Ship 3 Ceiling), Cropped	https://sketchfab.com/3d-models/ceiling-planks-of-ship-3-feature159-alexandria-679a27bb590c45b890e8a64b7528d968	Feature159
159 (Ship 3 Ceiling Planks) Round 1	https://sketchfab.com/3d-models/ceiling-planks-of-ship-3-feature159-alexandria-9b3ebaf9b45d482081b14ce742786a6d	Ceiling1
159 (Ship 3 Keel)	https://sketchfab.com/3d-models/keel-of-ship-3-feature159-alexandria-5440e10cc1684a04ac8e560e2598cd09	Keel159
165 (Coffer Dam)	https://sketchfab.com/3d-models/3d-model-of-feature-165-alexandria-95b7ed1edf5a42f5b228d4c0eb8ad784	F165
200 (Ship 1)	https://sketchfab.com/3d-models/frame-of-feature200-ship1-alexandria-fd9ebd22205d4ac1af176c6529ae6d0f	F200Frame
200 (Ship 1, Round 1)	https://sketchfab.com/3d-models/feature-200-ship1-round1-alexandria-a3bc59ac725f4a7e9406bbd318404292	F200R1
200 (Ship 1, Round 2)	https://sketchfab.com/3d-models/frame-of-feature200-ship1-alexandria-fd9ebd22205d4ac1af176c6529ae6d0f	F200Frame
200 (Ship 1, Round 2)	https://sketchfab.com/3d-models/keel-of-ship-1-feature-200-alexandria-2952b4919cd949ac913f169acfed3e47	F200Keel

Table 2: Completed Photogrammetric Models and the Sketch Fab Links

Comments on the Models

Model for Feature 4 and 45: this model is not particularly good, and reflects that the photographs are badly conditioned, that is there are too many detail photographs and not enough general photographs to tie together the detailed ones. Because the model is poorly conditioned the texture on top of the mesh cannot maintain a high resolution, such as has been applied to other models.

Model for Feature 18: the model has had a corner cropped out, not of the foundation but of the excavation area, as the photography was inconsistent and resulted in a partially distorted image. The missing corner shows a pile of spoil, and this is left in its distorted form in the uncropped model.

Model for Feature 44: No control file is available for this model and therefore, the model is not georeferenced and not scaled. Without a control file / georeferencing the DEM file cannot be generated and therefore there is no hillshade available.

Yours faithfully

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Pollen and Phytolith Report

ANALYSIS OF POLLEN AND PHYTOLITHS FROM THE ROBINSON TERMINAL PRIVY SEDIMENT SAMPLES.

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Eleven paired sediment samples representing pollen and phytolith samples were submitted for analysis. These samples were collected from five late eighteenth to early nineteenth century privies.

These sediments were collected in 2017 and 2018, and were curated for future study. R.C. Goodwin and Associates assembled these samples for a detailed study of microbotanical materials, macrobotanical findings, and parasites. Samples were assembled from sediments representing use-layers of these privy features, in an effort to establish prehistoric dietary patterns, paleoenvironmental assessments, and disposal/fill patterns evident through the privy soils.

Samples examined represent privies, most of which were filled around AD 1810 to 1815. These privies included both wood- and brick-lined structures, and barrel-type features. In all of these features, basal sediment deposits were composed of outhouse “night soils” or actual fecal deposits representative of the use of these privies. Proveniences of the samples are provided in Table 1.

Table 1. Proveniences of the Robinson Terminal Privy Samples.

Lab	Sample	Feature	Type	Provenience
1	5027	12	Privy	W. Bisection, Fill 4
2	5028	12	Privy	W. Bisection, Fill 5
3	5032	13	Privy	S. Bisection, Fill 6, Lvl. 1
4	5033	13	Privy	S. Bisection, Fill 6, Lvl. 2
5	5089	48	Privy	S. Bisection, Fill 4
6	5090	48	Privy	S. Bisection, Fill 5
7	5091	48	Privy	S. Bisection, Fill 6
8	5094	49	Privy	W. Bisection, Fill 3, Lvl. 1
9	5095	49	Privy	W. Bisection, Fill 3, Lvl. 2
10	5096	49	Privy	W. Bisection, Fill 3, Lvl. 3
11	5140	93	Barrel	W. Bisection, Fill 3

Phytolith Analysis

Theoretical Background

Phytoliths are biogenically produced opal structures formed within and between plant cells. Many, but not all, plants produce phytoliths, and these biosilicates are frequently recognizable and diagnostic; thus, they are a valuable tool in paleoenvironmental and archaeological reconstructions. Phytoliths are small, and diagnostic forms generally fall in the range of 8 to 100 microns. Because phytoliths are composed of silica, their recovery from soils necessitates they be extracted in a manner separate from pollen, as chemicals used to extract pollen are destructive to phytoliths. Similarly, all organic traces, including pollen, must be removed from the sediments to successfully extract phytoliths.

Many plants produce phytoliths, but they are particularly well-represented in the Monocot group; palms, sedges, and grasses are prolific phytolith producers. The reason plants produce phytoliths is not fully understood, but some factors in their production include the prevention of herbivory, particularly from insects, and to mitigate the effects of wilting in grasses. Phytoliths are formed when dissolved silica in ground water is taken up by plants and is precipitated within and sometimes between plant cells. Fortunately, these phytoliths can take on diagnostic shapes and sizes allowing for their identification (Piperno 1988).

Phytolith analysis is a perfect complement to pollen studies for a number of reasons. First, phytolith production and recognition is often well represented in groups that have limited diagnosticity in pollen studies. For example, all grasses produce pollen, but nearly all grass pollen grains are morphologically identical, with the exception of maize and domesticated cereal grains. The identification of grasses from pollen, therefore, is generally limited to the family level. However, all grasses produce phytoliths, and more than 10 different types of phytoliths have been observed in a single grass species. These forms can often be broken down into grass tribes or subfamilies based on their morphological characteristics. As these tribes of grasses each favor distinctive environmental conditions, the presence of a specific grass phytolith type might signal specific environmental conditions.

North American grass tribes include the Festucoideae (Pooideae), mostly cool climate C3 grasses; the Chloridoideae, mostly warm and dry-favoring C4 bunch grasses; the Panicoideae, warm and moist favoring subtropical C4 grasses; and the Bambusoideae (bamboos); other grass phytolith subdivisions are also recognized. Similar types of subdivisions are recognized in the sedge family and among the palms, whereas these groups' pollen grains are often of limited value for identification and interpretation. Fortunately for archaeologists, phytoliths are also well-represented among cultigens. Maize, beans, and squash, along with many other domesticates, are all known to produce diagnostic phytolith forms. For example, beans can produce distinctive hook-shaped silicified hairs (Bozarth 1990), while beans are virtually invisible in the pollen record. Since beans are cleistogamous (self-pollinating), they produce very few pollen grains which tend to remain with the flower; further, domesticated bean pollen grains are moderately fragile, and they are largely non-diagnostic.

Phytoliths, however, have some important limitations. First, most plants do not produce diagnostic phytoliths; thus, the range of types encountered in archaeological sediments is limited. Further, preservation of phytoliths is imperfectly understood. Phytoliths often exhibit poor or variable preservation in calcareous environments, although they often have been recovered in perfect condition from shell middens. Conditions leading to phytolith dissolution are also not well known. Still, in silica-rich settings, phytoliths can usually be extracted from most sediment types, particularly when the phytolith-sized silt fraction is well-represented.

Phytoliths also can be composed of calcium-based materials, particularly calcium oxalate. These phytoliths are common in many succulents, including all members of the cactus family, along with agave and yucca, as well as the Araceae family. Calcium oxalate phytolith shapes are governed by chemistry; thus, these forms take on crystalline shapes and usually have limited taxonomic value. Additionally, calcium oxalate phytoliths tend to break apart and ultimately dissolve in many environmental settings, so the likelihood of these forms being recovered is frequently low. Nevertheless, the potential for species identification exists under certain circumstances. For example, a 7000 year old fragment of dried cactus pad from a cave in west Texas was identified to the species level through the types and proportions of calcium oxalate phytoliths present in the ancient pad (Jones and Bryant Jr. 1992), and many genera of cacti appear to produce distinctive calcium oxalate phytoliths. Thus, in dry caves, where edaphic alterations have been minimal, the potential for calcium oxalate phytolith recovery is high.

Most phytolith studies have centered upon their occurrence in either tropical environments or grasslands, where their value is most apparent (Piperno 1988). In contrast, there are limitations on phytolith studies in historical age deposits. First, the number of useful phytolith-producing plants in the region is not known, but appears to be moderately low. Significant phytolith producers in the project area include grasses and sedges, many of which are of limited taxonomic value in terms of identification potential. Further, while many other locally available plants are likely to produce diagnostic phytoliths, baseline studies for this region are limited; thus, the number of known phytolith types in the region is not high. While finding any identifiable phytoliths in a sample is noteworthy and useful, assessment of differential preservation must also be addressed. Did one particularly durable phytolith type survive at the expense of other, more fragile types? Despite these challenges, phytolith analysis has a tremendous potential for providing information on past environmental conditions and human/plant interactions. The combined strengths of pollen and phytolith studies conducted in tandem will greatly augment our knowledge of the past in ways unobtainable from the use of just one of these techniques.

Phytolith Types

Phytolith types do not necessarily follow taxonomic lines, and one form may be found in several different plants. Nonetheless, patterns are present, particularly among the grasses, allowing for the discussion of these types.

Festuceae

Festucoid or Pooid (Pooideae) grasses are generally cooler climate grasses in the C3 carbon pathway group. These types are abundant in North America and throughout the temperate world, becoming less frequent as the climate becomes hotter and drier. For the most part, the only occurrence of Festucoid grasses in the tropics is at higher elevations (Twiss 1992). The introduced Old World domesticated cereal grains wheat (*Triticum*), barley (*Hordeum*), rye (*Secale*), and oats (*Avena*), and some millets are all members of the Festucoid tribe. Common phytolith types in this category include a variety of short cells, elongate plates, and irregular echinate rods or plates (Festucoid irregular) that are particularly well-represented in wheat, but might also be found in some other Festucoid grass.

Paniceae

Panicoid grasses are C4 grasses favoring warmer and moister climates; maize (*Zea maize*), sorghum (*Sorghum bicolor*), and sugar cane (*Saccharum officinarum*) are important domesticated members of this group. Common Panicoid phytoliths include distinctive bilobate forms possessing a recognizable three-dimensional morphology, and cross forms. Panicoid grass phytoliths were noted in all samples in moderate to large quantities. Maize phytoliths and pollen grains were absent from the Robinson Terminal phytolith assemblages.

Chlorideae

The Chloridoid grasses are C4 bunch grasses or short grasses, generally favoring warmer and drier climates; the Chloridoid types found in the Robinson Terminal samples may represent saltgrass (*Distichlis*) or cordgrass (*Spartina*), both commonly encountered along the margins of Chesapeake Bay and the Potomac River. Chloridoid grasses are notable for producing saddle-shaped forms absent or rare in other grass tribes.

Other Poaceae Types

Poaceae bulliform or “keystone” type cells are produced in many grasses and are rarely distinctive. Non-diagnostic grass hair cells, non-specific bilobates, and elongated crenate forms also fall within this category. As these types are abundant in most grasses, attributions below the family level are not possible.

Cyperaceae

All members of the sedge family produce phytoliths, many of which forms are distinctive to the family, or even genus level. Phytoliths are produced in all parts of the plant, including the roots, stems, and leaves, and types produced in the inflorescences are often most diagnostic. Sedges prefer moist meadow, stream side, and wetland environments.

Commelinaceae

Some members of the spiderwort or dayflower family produce distinctive phytoliths within their seeds, allowing for identifications to the family level. Members of this family are often cultivated for their ornamental flowers and leaves, and include *Tradescantia* (spiderwort), and *Commelina* (dayflower).

Cucurbita

Domesticated squash (*Cucurbita spp.*) produce distinctive large scalloped spheres in their pericarp and stems. These forms are produced in wild squash as well, but in non-domesticated forms, the phytoliths are significantly smaller. Gourd (*Lagenaria siceraria*) phytoliths are similar to squash types, but the bodies are often irregularly shaped rather than consistently spherical.

Wood and Bark Forms

Small spheres and spinulose types are frequently produced in tree wood and bark, as are rare silicified tracheid cells. Members of the Fabaceae, Pinaceae, and other families are known to produce these phytolith types, though they cannot safely be assigned to any taxon as their positive sources are not known. Echinate irregular forms likely originate in juniper wood or bark, though these forms may also have originated in other taxa. Ultimately, a detailed study of woods from North America will resolve the sources of these important phytoliths.

Other phytolith forms of limited interpretive value are produced by many plants, or in some cases, by unknown plants. These types include bulliform cells, elongated echinate forms, rods, and hollow, segmented, and solid hairs; also of note are amorphous bodies, and keratiform types. Dicot plates likely derive from dicot leaves, though this phytolith type is produced by many plants. One additional phytolith type noted in the assemblages includes a distinctive echinate rondel form, present in such large numbers in one sample, it may possibly represent an economic type.

Calcium Oxalate Forms

The oxidizing environment of the privy samples resulted in the loss of nearly all calcium oxalate phytoliths, though a single dodecahedral-shaped crystal was noted. These types have been noted in the wood and bark of *Prosopis* (mesquite) and other members of the Fabaceae family including black locust (*Robinia*). These phytoliths differ from silica forms in their chemical composition, and they are usually only infrequently preserved in site sediments.

Methods

The phytolith samples from the Robinson Terminal project were processed in the ACS laboratory using a technique favored at ACS (Jones 2013). First, a 3-5 gram sample of sediment was placed in a beaker where they were washed with 10 percent hydrochloric acid to remove unwanted carbonates. The samples were next screened through 150-micron mesh, effectively removing all unwanted larger materials, washed in 10 percent potassium hydroxide to remove alkaline-soluble humates, and were rinsed clean. Repeated short spins removed colloidal material smaller than 3 microns. Next, the samples were oxidized in 35 percent hydrogen peroxide (Jones 2013), resulting in the removal of organics—a step necessary before phytoliths can be isolated from all other silicates. Finally the phytoliths were isolated from the remaining silts through a heavy density separation using sodium polytungstate (Sp. G. 2.35). Phytoliths were removed by pipette, rinsed thoroughly, and dehydrated in absolute alcohol for curation in 1 dram vials. A slide was prepared at ACS using Meltmount mounting media, and the phytoliths were identified on a Leitz Optiphot binocular microscope at 400X and 625X magnification. Identifications were confirmed using published keys and the ACS reference collection.

Phytolith residue samples were fractionated in the ACS laboratory into coarse (25–150 micron), and fine (3–25 micron) samples. There is little overlap between phytolith category groups within these size fractions. Separation into fractions facilitates counting through a standardization of phytolith size in the visual search image. Coarse samples tend to contain large amounts of bulliform cells as well as rods, plates, and grass elongates. The fine fraction usually contains short cells from grasses, sedges, and spheroids common in some tree barks. Most diagnostic forms come from the fine fraction; thus, more effort is expended counting these forms. Although there is no standard agreement among researchers on how many phytoliths should be counted for each sample, the current analysis was based on counting at least 100 coarse-sized phytoliths, and at least 200 fine-sized phytoliths per sample, a standard substantially more rigorous than most current methodologies. Percentage occurrence was calculated within their size division; thus, for this sample, two separate counts and sets of percentages were obtained. As phytolith categories within the size fractions are usually mutually exclusive, the data can be interpreted collectively. Results of the phytolith analysis of the Robinson Terminal samples are presented in Table 2.

Table 2. Phytolith Percentages from the Robinson Terminal Privy Samples.

Feature	**12**	**12**	**13**	**13**	**48**	**48**	**48**	**49**	**49**	**49**	**93**
Sample Number	**5027**	**5028**	**5032**	**5033**	**5089**	**5090**	**5091**	**5094**	**5095**	**5096**	**5140**
Sample/Taxon	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Coarse Fraction											
Bulliform	66	71	63	81	69	84	79	83	76	80	72
Rod	25	21	23	13	24	11	14	14	15	13	22
Bulliform Poaceae		2			1	4	1			1	
Poaceae Hair	8	3	12	5	5		5	3	8	6	5
Dicot plate		1							1		1
Tracheid	1	2	2	1	1	1	1				
TOTS	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Fine Fraction											
Festucoid Short Cells	9	15.5	8	12	7.5	10.5	11.5	1.5	7	10.5	4
Festucoid Irregular	3	2.5		1	3	2	0.5		2.5	4.5	1
Panicoid Crosses		1	0.5	0.5		0.5				1	2
Panicoid Bilobate	7	7	5.5	11	7	5	8.5	0.5	6	11.5	8
Chloridoid	9.5	8.5	10	3.5	11.5	10.5	13.5	2.5	13.5	7.5	6
Crenate	5.5	8	10.5	11.5	16.5	10	8	1	11	13.5	12
Bilobate	20	12	12.5	7	12	12.5	11	2.5	10.5	6.5	9.5
Sedge									0.5		
Commelinaceae						1					
Cucurbita						0.5	1.5			0.5	
Echinate elongate									0.5		
Solid Hair	0.5	0.5	0.5	2.5			0.5	0.5	1	0.5	0.5
Hollow Hair		0.5	0.5				0.5				
Hooked Hair	1	0.5		0.5					0.5	1	
Segmented Hair									1		
Keratiform									0.5		
Juniperus-type bark	1.5	2	2	1	4	1.5	2	1	3.5	3	6
Spindle Bark	2.5	0.5	1.5	1	1	0.5		1	1	4	2

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Sample Number	**5027**	**5028**	**5032**	**5033**	**5089**	**5090**	**5091**	**5094**	**5095**	**5096**	**5140**
Sample/Taxon	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Blocky Bark	3.5	5.5	5	11	6	14	10	4	8	6.5	8
Sub-spherical Bark	37	36	43.5	36.5	31	31.5	32.5	15.5	33	28	41
Echinate Rondel				1				70		1.5	
Sabal type palm					0.5						
TOTS	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total Phytoliths	200	200	200	200	200	200	200	200	200	200	200
Fabaceae Cube		1									

Phytoliths in the Robinson Terminal samples were preserved in excellent condition, and full counts for all samples and size fractions were obtained. As expected, samples were well represented by grass types, as well as types largely derived from wood and barks of various species.

Pollen Analysis

Theoretical Background

The foundation of palynological analysis lies in the observation that proportions of various pollen types contained within a sediment sample vary proportionally with the increasing or decreasing abundance of the source plants in the surrounding area, and with the relative proximity of those plants to the sampling locus. However, the relationship between plant and pollen is not straightforward. While there is not a direct one-to-one relationship between pollen in a sediment sample and past vegetation, through an understanding of pollen production, dispersion, and preservation, patterns can be established.

Anemophilous (wind pollinated) plants produce the most pollen, typically between 10,000 and 70,000 pollen grains per anther (Bryant and Holloway 1983), while zoophilous plants generally produce far fewer pollen grains and rely on some animal (bats, birds) or insect (for example bees, moths, butterflies, flies) to transport the pollen from the anther of one flower to the stigma of another. An evolutionary outcome of this more efficient means of pollination method is decreased pollen production to approximately 1,000 or fewer grains per anther (Bryant and Holloway 1983). Furthermore, pollinators rapidly deplete the pollen content of a zoophilous flower (Harder and Thomson 1989; Young and Stanton 1990), leaving little potential for such pollen to become incorporated into the pollen record. On the other hand, some ostensibly zoophilous plants, such as willow and knotweed, are facultatively anemophilous, producing more pollen than is typical and therefore standing a far greater chance of being observed in the pollen record of a sediment sample.

Pollen of anemophilous and facultatively anemophilous taxa also can be transported and deposited hundreds of meters, and, particularly in the case of the anemophilous taxa, sometimes even hundreds of kilometers from their source (Faegri and Iversen 1989). Therefore, anemophilous pollen is both much more abundant and much more widely dispersed than zoophilous pollen. The result is that anemophilous plants are much better represented in the pollen record of archaeological sediment samples. If those plants are also common members of the vegetation community, their pollen will tend to dominate palynological assemblages. Consequently, three pollen types—Cheno-Am, Asteraceae (Compositae), and Poaceae (Gramineae)—dominate most North American samples, typically accounting for 80 percent or more of the pollen assemblage (Anderson and Koehler 2003; Hevly et al. 1965; Martin 1963; Orvis 1998; Schoenwetter and Doerschlag 1971; Solomon et al. 1982). As a result, common eastern woodland zoophilous perennials such as ash, walnut and other trees tend to be poorly represented in the pollen record (e.g., Hevly et al. 1965), despite their abundance on the landscape.

In cultural settings, pollen samples are also affected by human activity. Often this activity directly affects the local source vegetation, enhancing and expanding suitable habitats for some plants, while degrading and reducing suitable habitats for others. Impacts on the vegetation associated with clearing the land for cultivation or construction, the introduction and use of irrigation or other forms of disturbance, and the cultivation or encouragement of selected native taxa are prime examples. Furthermore, amounts of local pollen can be augmented and nonlocal pollen introduced through the collection of comestibles, fuel wood, or construction materials; and, during historic and recent times, by the planting of non-local taxa for aesthetic reasons. Thus, components of the pollen record can be interpreted culturally. Consequently, some fossil pollen grains are, in a sense, artifacts, and can be used to examine certain aspects of behavior such as subsistence.

Preservation also affects the pollen record. If preservation is so poor that pollen is absent, then interpretation is straightforward though negative. Of greater concern is whether differential preservation—the prospect that one pollen taxon may be better or less well-preserved than other pollen taxa deposited as members of the same suite of grains—might lead to erroneous interpretation (Delcourt and Delcourt 1980). Pollen preservation is often of particular concern in archaeological palynology, as preservation in terrestrial deposits is seldom as good as in lacustrine deposits (Dimbleby 1985; Faegri and Iversen 1989). Further, and all else being equal, the older a terrestrial sample is, the more degraded its pollen (Dimbleby 1985).

Preservation factors can be grouped as 1) mechanical, 2) biological, and 3) chemical. Bryant and Holloway (1983) methodically review each, so only a few comments are presented here:

1) Mechanical degradation can begin during transportation and sedimentation stages, and can continue following deposition on a surface; soil disturbance by farmers may further enhance it. Other physical factors as well as temperature and moisture can act to alter a pollen grain (Bryant and Holloway 1983). Pollen walls are reported to be especially susceptible to alternating episodes of wetting and drying (Holloway 1989), such as might be expected to occur at most open-air archaeological sites.

2) The vast majority of pollen is consumed by macroscopic and microscopic herbivores; after deposition, bacteria and various fungi can cause extensive pollen destruction. These biological degraders dissolve and penetrate the spore wall and, as several attacks occur simultaneously, several areas of the exine may become weakened, allowing further decomposition of the grain by physical or chemical means (Goldstein 1960). Ultimately, the entire grain is destroyed. To compound matters, some fungi are selective in their pollen preferences (Bryant and Holloway 1983), which may lead to differential preservation problems.

3) Corrosion of the pollen wall also arises from chemical processes (Birks and Birks 1980). Chemical oxidation of pollen grains is an important factor in many types of sediment, with pollen being best preserved in a reducing acidic environment (but see also Martin 1963). Greater amounts of sporopollenin in the pollen wall also enhance the grain's ability to withstand oxidation (Havinga 1964) (Havinga 1984).

Methodology

The Palynology Laboratory at Texas A&M University processed the pollen samples. First, a 10 ml subsample was collected and tracer spores (*Lycopodium*) were added, allowing for the calculation of pollen concentrations in the sediment samples. Concentration values are valuable to the analyst as they allow for the calculation of the number of ancient grains per unit volume (or weight). In well-dated sequences, the values can allow for the calculation of sedimentation rates, document differential preservation, and document that pollen was not inadvertently lost or destroyed during processing. As the tracer spores were added at the beginning of treatment of the sediment sample, these spores were subjected to the same treatment as the fossil grains. Carbonates were removed by soaking the sample in 10 percent hydrochloric acid. The sample was screened and swirled, effectively removing larger and heavier materials, and immersed in 50 percent hydrofluoric acid for 12 or more hours to remove unwanted silicates. After the sample was neutralized, it was washed in 2 percent potassium hydroxide to remove humates, followed by an acetolysis treatment (Erdtman 1960) in a solution of nine parts acetic anhydride to one part sulfuric acid to remove unwanted organic materials. After this step, the sample was rinsed repeatedly in water to remove water-soluble humates and was further cleaned by a heavy density separation using sodium polytungstate (Sp. G. 2.00). The lighter organic materials, mostly pollen and charcoal, were collected, dehydrated in absolute ethanol, and curated in vials with glycerine.

Pollen analysis was conducted at the ACS laboratory. Pollen extracts were mounted on slides in glycerol and stained with safranin (as warranted) to aid in identification. A Nikon E200 compound microscope was used to view the slides at 400X magnification to obtain 200+ grain counts. Pollen grain abundances and taxa (or types) observed were recorded until: a) at least 200 pollen grains had been counted, or b) calculation of pollen concentration after 100 or more tracer spores were counted yielding values of 1,000 pollen grains per ml of sediment (grains/ml) or less. These standards were chosen: a) because calculation using Bayesian probability intervals with a flat prior and resolution of $\pi = 0.0005$ indicates that where a taxon is absent in a count of 200 grains (i.e., $x = 0$, $n = 200$) there is a 95 percent probability that the taxon in question comprises 1.5 percent or less of the population, b) to maximize efficient use of time, and c) because such values indicate that it is less likely the sample contains a pollen concentration sufficient for analysis (Hall 1981). For each sample, the remainder of the slide was scanned at 200X magnification to identify pollen of domesticates or other economically significant taxa. Aggregates or anther fragments, when identified during counting, were noted as they are not efficiently transported by wind, thus indicating a source in the immediate sampling area (Fish 1995:661), or their introduction into the site sediments by humans (Gish 1991).

Pollen grain identification was facilitated through the use of the ACS pollen reference collection, as well as standard pollen references (e.g., Kapp et al. 2000). Pollen was identified to the finest taxonomic level possible. Those grains that were too degraded to be taxonomically identified were assigned to the indeterminate category but were still tabulated within the 200+ grain counts, as such values are of aid in assessing preservation levels and potential biases in the sample.

Pollen percentages were calculated from the 200+ grain count; concentrations (grains/gram) were calculated using the following formula:

$$\text{Concentration} = \frac{\text{Tracer spores added}}{\text{Tracers counted}} \times \frac{\text{Pollen grains counted}}{\text{Sample weight}}$$

Taxa

Prior to any discussion or interpretation of pollen data, it is important to understand factors affecting the preservation, production, and dispersion of the specific pollen taxa discussed in this analysis. Pollen for this project has been divided into two identifiable groups: nonarboreal and arboreal. Nonarboreal types refer to herbs, forbs, and grasses, while arboreal types are generally produced by plants that have a woody stem. In some cases, plants identified to the family level, such as Fabaceae or Rosaceae, could well represent arboreal taxa, though they are usually classified as nonarboreal. In all cases, these ambiguous categories are represented in the current sample by one or only a few grains.

Nonarboreal Taxa

Asteraceae

Pollen from members of the Asteraceae (aster family or Compositae) family can usually be separated into subfamilies based on the diagnostic morphology of the grains. In these samples, members of this family that are readily recognized are *Cirsium* (thistle), *Artemisia* (sagebrush type), and both high- and low-spine Asteraceae types. Asteraceae grains from other parts of the world can be subdivided into additional categories as well.

Insect-pollinated members of this group, though usually poorly represented in archaeological samples, are moderately common in some pollen samples. The high-spine Asteraceae group encompasses many genera including *Aster* (aster) and *Helianthus* (sunflower). *Cirsium* is another insect pollinated plant. Produced in low numbers and poorly dispersed, these grains are usually uncommon in most archaeological samples. *Centaurea* type (bachelor's buttons) Asteraceae can also be recognized in well preserved samples. *Artemisia* grains, likewise are readily identifiable, and may represent economic or ornamental types.

Grains from low-spine Asteraceae are wind-pollinated, are produced in very large numbers, and are dispersed over large areas. Two of the most important members of this group, *Ambrosia* (ragweed) and *Solidago* (goldenrod), can often be separated into these categories. These grains also tend to be overrepresented in poorly preserved suites of grains, as their morphology makes them readily recognizable even when the grains are highly degraded. Further, these taxa are important indicators of disturbance throughout much of their range (Ogden III 1966; Wright Jr. 1971). Clearing for settlement and agriculture creates an environment favored by members of this group; these factors account for elevated percentage occurrences of low-spine Asteraceae grains near archaeological sites during historic and prehistoric times.

Cheno-Am

Cheno-Am pollen, representing plants in the Chenopodiaceae family and in the genus *Amaranthus* in the Amaranthaceae family, are among the most commonly encountered grains in North America. This category is comprised of a broad group of plants, including those sometimes used as food such as amaranth (*Amaranthus* sp.) and goosefoot (*Chenopodium* sp.), as well as a variety of weedy herbaceous plants encouraged by soil disturbance found near sites and agricultural fields (Cummings 1990; Fish 1994). In the site area, prominent members of the Cheno-Am group might include either *Chenopodium* or *Amaranthus*, as well as several genera of ornamental plants. Cheno-Am pollen is often abundant in archaeological samples for several reasons. First, the grains are produced in enormous quantities and are widely dispersed over great distances by the wind. Second, the grains are extremely durable, surviving in poorly preserved sediments long after most grains have deteriorated. Finally, Cheno-Am grains are easily recognized even when degraded.

Poaceae

All grasses are wind-pollinated, producing copious amounts of distinctive pollen; thus, these grains generally make up a significant proportion of most pollen counts. However, the morphology of grass pollen does not allow for identification below the family level, with the exception of cultivated Old World grains (Cerealea, including wheat [*Triticum*], barley [*Hordeum*], rye [*Secale*], oats [*Avena*]), and corn or maize (*Zea mays*), where the domestication process of these taxa has led to a significant enlargement of the pollen grains. Other grass genera, unfortunately, cannot usually be identified based on their pollen. Grass pollen could also be introduced into the record from grasses growing and flowering within the confines of the site, or may have been cultivated as a lawn.

Potential Economic Herbs

Several pollen types encountered in the samples represent potentially important or economically significant species. Among these potential economics are Apiaceae (parsley or umbel family), Brassicaceae (mustard family), *Fagopyrum* (buckwheat), *Rubus* (blackberry, raspberry), and clovers including *Medicago* (alfalfa), *Trifolium repens* (red or white clover) and *Trifolium* (general clover group). Many of these taxa are insect-pollinated, thus they produce low numbers of poorly dispersed grains, and would not be expected at more than a couple of grains per sample.

Potential Ornamental Plants

Three non-arboreal plants were identified in the assemblages that may represent the cultivation of ornamental plants, including *Anemone* (anemone), *Impatiens* (touch-me-not), and Rosaceae (Rose family). *Rubus* (blackberry, raspberry, wineberry, dewberry) are usually well represented in privies by their stony seeds. A few pollen grains adhere to the fruit and are unintentionally consumed. All of these plants have wild relatives known from the region, and may represent uncultivated plants.

Other Herbs

A number of the Robinson Terminal pollen types likely represent background pollen taxa, including Cyperaceae (sedges), Fabaceae (legume or bean family), *Plantago* (plantain), Polygonaceae (knotweed family), *Rhus* (sumac or poison ivy), and *Typha* (cattail).

Arboreal Taxa

Some of the pollen identified in the Robinson Terminal privy samples come from arboreal or woody taxa representative of regional and local environments. Many eastern woodland trees are wind-pollinated; thus, they tend to produce large amounts of readily dispersed pollen grains. Their grains can travel great distances, and some of the pollen grains found in the site sediments are likely to have originated some distance from the site area.

Carya

Pollen from hickory is large and heavy, and the grains tend to remain near the woodlands from which they originated. Hickory is a major component of the eastern woodland forest, and the trees tend to produce large quantities of readily identifiable pollen grains.

Castanea

Chestnut, likewise, was a common element of the eastern woodlands before an introduced blight decimated the populations of this important food tree. Chestnut pollen is produced in summer, though only in moderate numbers. The grain's small size allowed the pollen to often travel large distances.

Juniperus or TCT

The category TCT consists of pollen grains in the Taxodiaceae (bald cypress family), Cupressaceae (cypress family), and the genus *Thuja* (arborvitae). Grains from this group are difficult to identify even when perfectly preserved; thus, palynologists group these cryptic grains into one large category. In the Robinson Terminal privy samples, most grains identified as TCT likely originated from juniper (*Juniperus*). All of the members of this group produce copious amounts of readily dispersed pollen, and TCT pollen is among the most common pollen types throughout most of North America.

Morus

Mulberry grains are difficult to identify below the genus level, and the pollen may represent native or introduced species. The grains are small and difficult to recognize, though they are produced in enormous quantities and are readily dispersed by the wind. These grains are rapidly lost from most samples due to their fragile nature.

Nyssa

Black gum or tupelo would likely have been abundant in the site area. Grains from these trees are heavy and are produced in low quantities as they are dispersed solely by insects. The trees favor bottomlands, stream sides, and marshy locations. Grains present in the Robinson Terminal samples represent *Nyssa sylvatica*, a widespread species found throughout the eastern United States.

Pinus

Pine pollen also is among the most commonly encountered of grains in North American sediment samples, as pine pollen is abundant, widely dispersed, readily recognizable even when highly degraded, and it is often very durable. Pine pollen is composed of a body and two bladders, which are easily detached. Even small fragments of pine pollen are recognizable because of their characteristic bladder reticulations; thus, a counting protocol for bisaccate grains (pine, spruce, fir, and hemlock) addresses the identification of fragments of grains. Pine pollen possesses buoyant bladders that aid in the grains' dispersal, and so they tend to travel great distances. Pine pollen can often be separated into subgenera based on micromorphological features; however, these features can usually be seen only on perfectly preserved grains.

Quercus

Oak pollen is produced in large quantities and is durable and distinctive; thus, it is commonly encountered in archaeological sediments. Oaks are widespread in the Northern Hemisphere, occurring in a variety of habitats. As these grains can travel great distances, the presence of a few grains might be expected in archaeological samples, even if the site is located some distance from oak habitat. Oaks have long been a primary food source for both humans and animals throughout much of their native range, and acorns provided an important part of the diet of the prehistoric inhabitants throughout North America (Elias 1980; Moerman 1998; Yanofsky 1936).

Salix

Willow pollen is fairly common in samples collected throughout the range of this tree. Willows prefer wetland or stream side settings, and their grains are largely disseminated by insects, though they also take advantage of winds to spread their pollen.

Other Arboreal Elements

Several additional genera of arboreal elements were noted, representing both wind- and insect-pollinated types. Wind-pollinated types noted in the samples include *Alnus* (alder), *Fraxinus* (ash), *Juglans* (walnut), *Myrica* (wax myrtle), and *Platanus* (sycamore). The generally low percentage occurrence of the pollen from these trees might argue they were not particularly common in the site area.

Insect-pollinated trees in the samples might include *Celtis* (hackberry), *Ilex* (holly or winterberry), *Liriodendron* (tulip poplar), Rhamnaceae (buckthorn family), and *Robinia* (black locust).

Indeterminate

In nearly all pollen samples, a number of grains were noted that were distorted, folded, eroded, crumpled, or in some other way unidentifiable. These poorly preserved grains were placed into the category indeterminate. Statistical calculations were made in consideration of this group. These types are important, as they represent a portion of the entire pollen sample, and if this group were removed it would distort the percentage occurrence values of other taxa.

Pollen Preservation

Pollen preservation in the Robinson Terminal samples ranged from fair to excellent, and only a single sample (From Feature 93) failed to provide a full pollen count. Concentration values for the pollen samples ranged from 1,933 to 20,349 grains per gram of sediment, values considered to be moderate to high, reflecting a slight degree of oxidizing conditions present at the site. The single sample from Feature 93 contained very few identifiable grains, and had a concentration value well below minimal values at 84 grains per gram of sediment. Likely, the sediments represented by this sample had been exposed to cyclic wetting and drying, resulting in oxidizing conditions favorable for pollen-destroying organisms.

Pollen types encountered in the site samples are listed in Table 3, and percentages are presented in Table 4. Most samples were dominated by members of the Asteraceae family, Cheno-Ams, grasses, and oaks, all taxa that are produced in large numbers, are widely dispersed, and are readily recognizable even when degraded. Pollen sample findings are discussed individually by feature.

Table 3. Taxa Identified in the Robinson Terminal Pollen Samples.

Pollen Taxon	Common Name
Ambrosia-type	Ragweed type
Solidago-type	Goldenrod type
High spine Asteraceae	Sunflower group
Cirsium-type	Thistle type
Centaurea	Batchelor's buttons
Artemisia	Sage, tarragon
Anemone	Anemon, windflower
Apiaceae	Parsley family
Brassicaceae	Mustard family
Cheno-Am	Goosefoot, pigweed
Cyperaceae	Sedge family
Fabaceae	Legume or bean family
Fagopyrum	Buckwheat
Impatiens	Touch-me-not
Medicago	Alfalfa
Plantago	Plantain
Poaceae	Grass family
Polygonaceae	Knotweed family
Rhus	Sumac, poison ivy
Rosaceae	Rose family
Rubus	Blackberry, raspberry
Trifolium	Clover
Trifolium repens	Red, white clover
Typha	Cattail
Cerealea	Domesticated grain
Alnus	Alder
Carya	Hickory
Castanea	Chestnut
Celtis	Hackberry
Fraxinus	Ash
Ilex	Holly
Juglans	Walnut
Juniperus	Juniper
Liriodendron	Tulip poplar
Morus	Mulberry
Myrica	Wax myrtle
Nyssa	Tupelo, black gum
Pinus	Pine
Platanus	Sycamore

Table 3. Taxa Identified in the Robinson Terminal Pollen Samples.

Pollen Taxon	Common Name
Quercus	Oak
Rhamnaceae	Buckthorn family
Robinia	Black locust
Salix	Willow
Indeterminate	Too poorly preserved to identify

Table 4. Pollen Taxa Identified in the Robinson Terminal Privy Samples.

Feature	**12**	**12**	**13**	**13**	**48**	**48**	**48**	**49**	**49**	**49**	**93**
Sample Number	**5027**	**5028**	**5032**	**5033**	**5089**	**5090**	**5091**	**5094**	**5095**	**5096**	**5140**
Sample/Taxon	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Ambrosia-type	8	7.5	11	8	23	10.5	16	23	18.5	19	
Solidago-type	2	4.5	7	2.5	3.5	5	3	2.5	5	8.5	*
High spine Asteraceae	1.5	1.5	1.5	1		1.5		1.5	0.5	2	
Cirsium-type	0.5		0.5				0.5				
Centaurea								0.5			
Artemisia									0.5		
Anemone		0.5	0.5								
Apiaceae			1		1		0.5			0.5	
Brassicaceae	18.5	23	11.5	7.5	10	53.5	27	10	16	11.5	
Cheno-Am	3		3	3	5	3.5	10.5	2	4.5	9	
Cyperaceae	0.5	0.5	1		0.5	0.5	1	1	0.5		
Fabaceae	8.5	3.5	1.5	3	3	1	3	4	6	4.5	
Fagopyrum	2.5	1.5							1		
Impatiens			0.5								
Medicago	20	30	15	19	11.5	3.5	7	11.5	6.5	3.5	
Plantago			1		3	0.5	2				
Poaceae	2.5	1	12.5	10.5	9	4.5	6	5	12.5	11	
Polygonaceae				1.5						1.5	
Rhus		4	2	2.5	0.5					0.5	
Rosaceae	6.5	3	2	2.5	4	1	3	3	1	5	
Rubus	7	2.5	3.5	20	1	1	2	8	2	1.5	
Trifolium	2.5	1.5									
Trifolium repens									2.5	1.5	
Typha			0.5								
Cerealea	2.5	2.5	3		1.5	4.5	1	0.5	1		
Alnus		2									
Carya			1.5		0.5	0.5	1			0.5	
Castanea			0.5		0.5		1.5	2.5	1.5	1.5	

Table 4. Pollen Taxa Identified in the Robinson Terminal Privy Samples.

Feature	**12**	**12**	**13**	**13**	**48**	**48**	**48**	**49**	**49**	**49**	**93**
Sample Number	**5027**	**5028**	**5032**	**5033**	**5089**	**5090**	**5091**	**5094**	**5095**	**5096**	**5140**
Sample/Taxon	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Celtis								0.5	0.5		
Fraxinus	0.5										
Ilex	1										
Juglans			0.5								
Juniperus			0.5	0.5	2			3	1	0.5	
Liriodendron		0.5		0.5							
Morus			1.5	2	5	1	1				
Myrica			1								
Nyssa		3.5	1	3	8				2.5	2	
Pinus	3.5	1.5	2.5	2	2.5		5	4	1	2.5	
Platanus		0.5						0.5			
Quercus	3.5		5.5	1.5		3.5	4	7	7	6	
Rhamnaceae			0.5	0.5							
Robinia	0.5							0.5	0.5		
Salix			2	3				3.5	1		
Indeterminate	5	5	4.5	6	5	4.5	5	6	7	7.5	
Total Pollen Sum	100	100	100	100	100	100	100	100	100	100	0
Total grains counted	200	200	200	200	200	200	200	200	200	200	1
Tracer spores	80	82	20	19	24	67	200	22	21	161	23
Concentration value	4,833	4,715	19,332	20,349	16,110	5,771	1,933	17,565	18,411	2,401	84

Results and Interpretations

Feature 12

Feature 12 is a small, one-seater wood-lined privy identified on Parcel 77.1. The privy appears to have been used at the end of the eighteenth century, and was filled in the early years of the nineteenth century, possibly around 1810. Two pollen/phytolith sediment samples were examined from the deposits, representing use soils from Fill 4 (Sample 5027), and the underlying Fill 5 (Sample 5028) deposit. Phytoliths were both well preserved in this feature, and both samples exhibited generally very good pollen preservation.

The basal sample from Feature 12 was collected from Fill 5 (Sample 5028). Pollen grains recovered from these sediments were very well preserved, and the sample had a concentration value of 4,715 grains per gram of sediment. Dominant pollen types included *Ambrosia* type (ragweed type) and *Solidago* type (goldenrod type) Asteraceae. Other dominant pollen types represent introduced Old World plants, including 23 percent Brassicaceae (mustard family), and 30 percent *Medicago* (alfalfa or medic) grains. Other introduced or otherwise notable grains included *Fagopyrum* (buckwheat), *Rhus* (sumac), Rosaceae (probably from the genus *Prunus*), *Rubus* (blackberry), *Trifolium* (clover), and Cerealea (Old World domesticated grass) grains.

Brassicaceae pollen likely represents a cultivar in the *Brassica oleracea* group that includes broccoli, cauliflower, cabbage, Brussels sprouts, kale, kohlrabi, and others. The deliberate ingestion of flowers (containing pollen) would have occurred with both broccoli and cauliflower, the likely source of these grains. Buckwheat pollen in the sample reflects the ingestion of this important Old World domesticate, though whether this plant represents human or animal consumption is not known. *Rhus* may be a background type, though it may represent the use of sumac as a beverage or flavoring. Rosaceae grains most likely represent *Prunus* (plum, cherry, apricot, peach), a few grains of which might be expected to remain on the fruit's residual flower. Likewise, *Rubus* pollen likely remained attached to the fruits in low numbers. *Rubus* seeds were likely to have been abundant in the privies, reflecting the use of blackberries, raspberries, wineberries, or any number of introduced or native members of this widespread genus. A single grain from *Anemone* (anemone) likely represents an ornamental plant growing in the privy area.

The presence of a high percentage of clover (*Trifolium*) and fodder-type pollen grains is enigmatic, as these grains are produced in low numbers and are poorly dispersed. *Medicago* (alfalfa) is essentially self-pollinating, as it produces very few grains contained within a closed flower; to amass more than a few grains in a sample would require that alfalfa flowers were consumed. High numbers of alfalfa, clover, and Cerealea grains may indicate that horse manure was discarded in the privy.

Phytoliths from the Fill 5 sample were very well preserved. Coarse fraction phytoliths were represented by typical background, non-diagnostic forms. The fine fraction contained elevated numbers of Festucoid short cells (15.5 percent) and Festucoid irregular cells (2.5 percent). The short cells are found in most Festucoid grasses, but the irregular cells are particularly common in wheat and other domesticated Old World grains, supporting the idea that horse or animal manure was discarded in the privy, ultimately making up some of the sediment bulk in Fill 5. A single silicified hooked hair was noted in this sample, and may represent a phytolith from domesticated bean (*Phaseolus* spp.). These phytoliths occur in bean pods, and though generally considered to be a fragile phytolith type, might be expected in sediments exhibiting exceptional preservation. A single dodecahedral phytolith was also noted in this sample. This type has been observed in members of the Fabaceae family, and are particularly common in arboreal members of this family, including *Robinia* (black locust) bark.

The pollen and phytolith samples from Fill 4 (Sample 5027), collected immediately above Fill Level 5, were generally similar in composition to the sample from the lower stratum. Preservation in this sample was very good, and the sample had a concentration value of 4,833 grains per gram of sediment. Ragweed pollen (*Ambrosia*) was high, representing background pollen. Other common taxa in the sample reflect cultivated or economically significant types, including Brassicaceae (18.5 percent), Fabaceae (8.5 percent), *Medicago* (20 percent), Rosaceae (6.5 percent), and *Rubus* (7 percent). Pollen from *Fagopyrum*, *Trifolium*, and Cerealea were each represented by a 2.5 percent occurrence. These pollen types were all well represented in the Fill 5 sample, and likely reflect the same use/activities as shown there.

Phytoliths in Fill 4 were also similar to those found in Fill 5. Elevated numbers of Festucoid grass phytoliths, probably reflecting the consumption of wheat as fodder, were also common in this sample. Hooked hair phytoliths, possibly representing domesticated beans, were represented by two phytoliths in this sample.

Feature 13

Feature 13 is a round brick-lined privy, approximately contemporaneous with Privy Feature 12, and is also located on Parcel 77.1, near Feature 12. The Feature 13 privy vault was approximately 6 feet in diameter. This feature appears to have been used in the latest eighteenth century, and was likely to have been filled around 1815. Two pollen/phytolith samples were examined from the basal use layer on Fill 6, represented by Sample 5032 from Fill Zone 6, Level 1, and Sample 5033 from Fill Zone 6, Level 2.

Sample 5033 represents the basal sample from the privy use-zone fill. Pollen preservation in this sample was excellent and the sample had a concentration value of 20,349 grains per gram of sediment. Major pollen types present included *Ambrosia*-type Asteraceae and Poaceae. Notable economy types included

Brassicaceae (7.5 percent), alfalfa (19 percent), Rosaceae (2.5 percent), and *Rubus* present at 20 percent. The high percentage occurrence of all of these taxa indicate an economic usage of these plants.

Phytoliths from this sample are less telling, though strong correlations exist between the pollen and the phytoliths. Coarse fraction phytoliths consisted of typical taxa from grasses and unidentified plants. The fine fraction, as with Feature 12, showed an elevated number of Festucoid grass types, possibly reflective of domesticated Old World grasses (wheat, barley, oats or rye). The Festucoid types may be associated with fodder and horse manure, and their disposal within this privy. A single hooked cell phytolith was noted in this sample, possibly reflecting the disposal of cultivated bean pods in this feature. One echinate rondel cell was noted in Sample 5033; though its origin is not known, the presence of this phytolith may be indicative of an as-of-yet unstudied economic plant.

Sample 5032 from Level 1 of Fill Zone 6 exhibited equally superb pollen preservation, with a concentration value of 19,332 grains per gram of sediment. The high concentration values from this privy may be due to the retention of water in the lower strata of this feature, allowing for the preservation of organic materials, including pollen, in the sediments. *Ambrosia* and *Solidago*-type Asteraceae and Poaceae grains were common in the sample, representing natural background pollen types. Economically important pollen taxa were represented by Brassicaceae (11.5 percent), alfalfa (15 percent), Rosaceae (2 percent), *Rubus* (3.5 percent), Cerealea (2 percent), and Apiaceae (1 percent). The presence of single grains of *Anemone* and *Impatiens* (touch-me-not) might reflect the cultivation of ornamental plants in the privy area. The high percentage of alfalfa pollen, along with grass and Cerealea pollen, again suggest the disposal of animal waste in the privy. Both samples from Feature 13 contained a single grain of Rhamnaceae (buckthorn family), a generally rare and poorly dispersed pollen type in the eastern states, suggesting that a buckthorn tree (*Rhamnus* spp.) may have once been located near this privy.

Phytoliths in Sample 5032 exhibited excellent preservation, though the sample assemblage was largely unremarkable. Coarse fraction phytoliths were represented by typical non-diagnostic types and generalized grasses. Fine fraction phytoliths were dominated by common grasses, including Festucoid, Panicoid, and Chloridoid types. Bark phytoliths were well represented in the sample. These types are produced in bark and wood or various trees and shrubs, though identification to the generic level is difficult or impossible. These phytoliths may represent the disposal of ash or ground sweepings in the privy.

Feature 48

Feature 48 is a barrel privy located on Parcel 77.4. Artifacts encountered during the excavation of this feature indicate the privy was used in the late eighteenth century to earliest nineteenth century, and was filled in sometime after 1810–1815. It is unclear if the barrel privy had ever been cleaned out for re-use. Three sediment samples were examined for pollen and phytolith content, with samples collected from Fill Level 4 (Sample 5089), Fill Level 5 (Sample 5090), and Fill Level 6 (Sample 5091). These strata are somewhat inter-fingered or otherwise overlapping, and represent the use layers of the privy feature.

The basal fill layer from Fill Zone 6 (Sample 5091) contained pollen preserved in fair to good condition; pollen concentration in this sample was low at 1,933 grains per gram, hinting that there may have been some degradation and loss to the pollen assemblage. Dominant ambient pollen types in the sample included *Ambrosia* type, Cheno-Ams, and Poaceae. Economic types, largely representing food items, were abundant in this sample, and included Brassicaceae (27 percent), Apiaceae (0.5 percent), alfalfa (7 percent), Rosaceae (3 percent), *Rubus* (2 percent), and Cerealea (1 percent). The elevated numbers of alfalfa, Cerealea, and grass grains may represent the disposal of manure in the privy. Interestingly, clover pollen was absent from all samples from this feature. Phytoliths from Fill Zone 6 were very well preserved. The coarse fraction sample contained typical phytoliths present in unremarkable quantities. The fine fraction was made up largely of grass phytoliths representing Festucoid, Panicoid, and Chloridoid types. Three *Cucurbita* (domesticated squash) rind phytoliths were present in the sample assemblage indicating that squash was likely to have been a part of the early nineteenth century diet of the privy users.

The sample from Fill Unit 5 (Sample 5090) contained generally well preserved pollen grains, and had a concentration value of 5,771 grains per gram of sediment. Major non-economic pollen types included *Ambrosia* and *Solidago*-type Asteraceae, and Poaceae grains. Economic pollen types were abundant; particularly common were Brassicaceae grains (53.5 percent), alfalfa (3.5 percent), Rosaceae and *Rubus* each with a 1 percent occurrence, and Cerealea grains (4.5 percent). The abundant Brassicaceae grains in this sample almost certainly represent broccoli or cauliflower, among the few flowers that are deliberately consumed by people. Again, the elevated numbers of alfalfa, Cerealea type, and grasses may represent the disposal of horse or animal manure in the privy.

Phytoliths in the Unit 5 sample were very well preserved. The coarse fraction was again unremarkable in composition and percentage. The fine fraction was dominated by typical grasses and bark forms. Commelinaceae (dayflower, spiderwort) seed phytoliths were represented by a 1 percent occurrence. This plant is a popular ornamental, and may have been planted near the privy area. Also noted was a single domesticated squash phytolith. This type occurs in the rind or stems of the squash, and represents a part of the plant likely to have been discarded. The large size of the squash phytoliths indicates these types represent domesticated rather than wild squash forms, and probably indicate that squash was a part of the early nineteenth century diet at the site.

The pollen sample from Fill Unit 4 contained exceptionally well-preserved pollen, represented by a high concentration value of 16,110 grains per gram of sediment. Common background pollen types included *Ambrosia*, Cheno-Am, and Poaceae grains. A large variety of economically significant taxa were noted, including Brassicaceae (10 percent), Apiaceae (1 percent), alfalfa (11.5 percent), Rosaceae (4 percent), *Rubus* (1 percent), Cerealea (1.5 percent), and *Morus* (mulberry) represented by a 5 percent occurrence. Pollen from *Nyssa sylvatica* (tupelo) was well represented in the sample, with an 8 percent occurrence. These poorly dispersed grains are large and heavy, and are produced in low numbers; thus, this high percentage occurrence suggests that a tupelo tree was likely present very near the property in the past. A mulberry tree was also likely to have been present in the site area. Phytoliths in the Fill Unit 4 sample were very well preserved, though they were present in typical quantities, offering few insights into locally common or economically notable taxa. A single *Sabal*-type (palmetto) phytolith was noted in the sample. This plant is not known from the site area, and would be unlikely grow in the vicinity even with protection from winter-time conditions. More likely, this phytolith represents a geological specimen weathered from the local Miocene-age sediments of the area. During Miocene times, the climate of the region was more subtropical and palms would have been common.

Feature 49

Feature 49 is a wood-lined privy. Artifactual evidence suggests the feature was used and abandoned in the early part of the nineteenth century. Three sediments samples were collected from Fill Zone 3, representing Level 1 (Sample 5094), Level 2 (Sample 5095), and Level 3 (Sample 5096). Fill Zone 3 represents the basal unit of privy fill.

The lowermost stratigraphic unit composed of what is thought to be primary fill is represented by Level 3 of Fill Zone 3. These earliest deposits contained fair to well-preserved pollen, and the sample had a concentration value of 2,401 grains per gram of sediment. Well-represented ambient pollen types in the assemblage include *Ambrosia* and *Solidago*-type Asteraceae, Cheno-Ams, and Poaceae. Fabaceae grains of an unknown origin were also well represented in the sample, with a 4.5 percent occurrence. Economically important taxa included Apiaceae (0.5 percent), Brassicaceae (11.5 percent), alfalfa (3.5 percent), Rosaceae (5 percent), *Rubus* (1.5 percent), and *Trifolium repens* (red or white clover type) at 1.5 percent. Higher numbers of fodder-type grains (alfalfa, clover, and grass) hint at the disposal of animal manure in this feature. The phytolith assemblage from this sample offers few clues from the coarse fraction; in the fine fraction, elevated percentages of both Festucoid and Panicoid grasses are present, supporting the idea that wheat was being fed to animals on the property, as indicated by elevated numbers of Festucoid irregular forms. A single domesticated squash rind phytolith was noted, along with two possible domesticated bean pod hooked-cell phytoliths. Finally, though of unknown origin, echinate rondels were represented by three phytoliths in this sample.

Stratum Level 2 is found immediately above Level 3 of Fill Zone 3; pollen preservation was excellent in this sample, with a pollen concentration value of 18,411 grains per gram of sediment. Common background pollen types in the Level 2 assemblage include *Ambrosia* and *Solidago*-type Asteraceae, Cheno-Ams, and grasses. Fabaceae grains of unknown origin are also well represented in the sample with a 6 percent occurrence. As all members of the Fabaceae family are insect-pollinated and their pollen grains are produced in low numbers, these relatively high percentage occurrences in this feature likely signal an economic usage of some member of this family. Pollen types representing economically important plants include Brassicaceae (16 percent), buckwheat (1 percent), alfalfa (6.5 percent), Rosaceae (1 percent), *Rubus* (2 percent), red or white clover (2.5 percent), and Cerealea (1 percent). *Celtis* (hackberry) pollen was represented by a single grain in this sample; hackberry pollen is poorly dispersed and rare; thus, its presence may signal the presence of a nearby hackberry tree. A single *Artemisia* grain may represent either a cultivated food plant (tarragon [*Artemisia dracunculus*]) or any number of ornamental species. Native species are also known from the region.

Phytoliths from this sample were very well preserved, though, again, the coarse fraction contained only typical forms present in typical quantities. Grass and bark-type phytoliths dominated the Level 2 assemblage. A single echinate elongate form was noted in this sample, and is likely a representative of an echinate rondel, an unknown type noted in other samples from this privy. A single possibly domesticated bean hooked hair cell was also noted. This sample also contained two segmented hair cells; this type has been noted in a few members of the Asteraceae family, but are also common in leaves and stems of domesticated squash (*Cucurbita* spp.), suggesting that squash plants may have been cultivated and ultimately disposed of in the outhouse fill.

The uppermost division of Fill Zone 3 in privy Feature 49 contained very well preserved pollen and phytoliths, and had a pollen concentration value of 17,565 grains per gram of sediment. Common background pollen types included *Ambrosia*-type Asteraceae, Cheno-Ams, and Poaceae. Fabaceae pollen, unidentified below the family level, was also very common, and likely represents an economically significant taxon. Economically notable types in the sample include Brassicaceae (10 percent occurrence), alfalfa (11.5 percent), Rosaceae (3 percent), *Rubus* (8 percent), and Cerealea (0.5 percent). The presence of a single *Centaurea* (bachelor's buttons) pollen grain almost certainly represents the cultivation of this ornamental flower. Native to the Old World, this plant was likely introduced into North America at an early date. A single hackberry pollen grain found in this sample further supports the idea that a hackberry tree was once present near the privy feature, as suggested by this pollen type's occurrence in the Level 2 sample.

Feature 93

Feature 93 is a short-term use barrel privy, likely filled in during the early to mid-nineteenth century. A single sample from the basal use fill zone was collected, represented by Sample 5140. This feature likely represents a very short period of use, as the barrel privy was small in size. Pollen was not preserved in the sample, with the exception of a single eroded *Solidago*-type pollen grain. It is likely that pollen in the single sample from Feature 93 was lost through degradation resulting from extreme oxidizing conditions. Water moving through the shallow sediments might result in the creation of conditions favoring bacteria or fungi, known to destroy pollen in sediments. Phytoliths in the sample from Feature 93 were generally very well preserved though present in typical quantities, and little can be gleaned from the assemblage. The fine fraction was dominated by grasses and bark types. Juniper-type bark forms consisting or irregular echinate types are common in juniper and cedar bark and wood, though they are likely to occur in other woods or barks. This phytolith type was somewhat elevated in this sample, hinting that juniper or *Chamaecyparis* (Atlantic white cedar) were once growing near this privy location.

Discussion

Feature 12

The microbotanical materials identified in the Feature 12 samples reveals that the wood-lined privy, used during the late eighteenth century, and filled in by 1810–1815, was likely to have been found in a weedy area of the property, and anemone flowers may have been planted near the structure. The fill records evidence of human diet, including probable consumption of broccoli or cauliflower, buckwheat, Rosaceae (probably *Prunus* or *Malus/Pyrus* [apple or pear]), and blackberry/raspberry. The presence of hooked hair type phytoliths in both Feature 12 privy samples suggests that domesticated bean pods were also discarded in the privy. Evidence of the disposal of manure is likely represented by high numbers of alfalfa grains, along with grains from clover and domesticated Old World grains representing animal fodder. An examination of the phytoliths from the Feature 12 samples reveals somewhat elevated numbers of Festucoid grasses, also possibly representing fodder, though grass pollen grains are relatively low in both samples. Collectively, these clover and grass types suggest the deliberate disposal of manure in the feature.

Feature 13

Feature 13 is a brick-lined privy, approximately contemporaneous with Feature 12, representing use in the late eighteenth century, and filled in the earliest decade of the nineteenth century; Feature 13 is found on the same property as Feature 12. Again, this feature was likely found in a weedy area of the yard, and anemone flowers and touch-me-nots may have been cultivated near the privy area as ornamentals. Pollen from the ordinarily rare Rhamnaceae family may represent the cultivation of a buckthorn tree in the yard near the privy feature. Evidence of the use of economic plants is represented by pollen from the parsley family, broccoli or cauliflower, Rosaceae, and *Rubus*, the latter present in the feature's basal deposits at a very high 20 percent occurrence. The presence of a hooked hair type phytolith in this feature hints that domesticated bean pods were discarded in the privy. High percentages of grass, alfalfa, and Cerealea grains hints again at the disposal of manure in the privy feature.

Feature 48

Three samples from Feature 48, a barrel privy dating to the late eighteenth to early nineteenth centuries, with a fill episode occurring around 1810–1815, were examined for pollen and phytolith content. Background weed pollen levels were fairly high, likely reflecting unkempt growth in the privy area; the presence of two Commelinaceae phytoliths might suggest that this ornamental plant was cultivated nearby. These phytoliths are produced in the seeds of these plants, and are thought to be diagnostic to the family level. Ornamental members of this family include dayflower, *Tradescantia*, spiderwort, and others. All of the Feature 48 samples contained *Morus* (mulberry) pollen, hinting that a mulberry tree was once present near the privy in the past.

Pollen representing economically notable taxa include Apiaceae, broccoli or cauliflower, Rosaceae (probably *Prunus* or *Malus/Pyrus* types), and *Rubus*. Phytoliths derived from the rind or pericarp of domesticated squash (*Cucurbita*) were noted in two samples from this privy, indicating that unwanted squash rids were likely to have been discarded in the feature. Elevated numbers of grass, Cerealea, and alfalfa suggest that manure was also discarded in the privy fill.

Feature 49

Feature 49 is a wood-lined privy, thought to have been used and filled in during the early part of the nineteenth century. High percentages of weedy pollen types were present, suggesting that in the past, the area of the privy was likely to have been unmaintained. Ornamental flowers or shrubs that may have been cultivated in the area include bachelor's buttons, sagebrush or tarragon, and hackberry. Cultivated plants represented in the privy fill include Apiaceae, broccoli or cauliflower, and buckwheat. As in the fill from the other privies examined in this project, elevated numbers of the ordinarily rare Fabaceae family were present in all of the samples. These grains may represent cultivated economic or ornamental members of this family, or the deliberate disposal of the inflorescences of an abundant local weed. These potentially important grains, however, are unidentifiable below the family level. Other important taxa are likely to be represented by pollen from the Rosaceae family (probably mostly *Prunus* or *Malus/Pyrus* types), and by grains from *Rubus*. *Trifolium repens*, representing either white or red clover, was found in two of the samples from Feature 49. These plants were introduced from the Old World and may represent animal feed, though the plant was also used to build nitrogen levels in agricultural fields. Elevated numbers of grass, alfalfa, and Cerealea grains also indicate that manure was discarded in the privy.

Phytoliths in Feature 49 indicate that squash rinds were discarded in the feature, as a single domesticated squash phytolith was noted in the feature's basal sample. The presence of a single segmented hair phytolith also likely signals that squash leaves were discarded in the feature, as well. The past disposal of domesticated bean pods is reflected in the presence of domesticated hooked hair type bean phytoliths, noted in two samples. Most interesting is the presence of unidentified echinate rondel forms, present in all of the sediment samples from this feature; in one sample, this type made up 70 percent of the phytolith assemblage.

Feature 93

Feature 93 is a short-term use small barrel privy. Pollen was completely oxidized in the sediment, likely due to the feature's shallow depth and perhaps by the presence of well-drained sediments in the fill. Phytoliths in Feature 93 were well preserved, but economic types were lacking. Elevated numbers of juniper bark type phytoliths were noted in the sample, representing what was likely to have been juniper or *Chamaecyparis* phytoliths, possibly growing in the privy area.

Overall Patterns in Use and Fill

All sediment samples examined from all features represent the period of privy use, and thus it is likely that pollen grains and phytoliths extracted from these strata are representative of plants that were consumed and subsequently discarded into the fill, or were otherwise deliberately placed into the fill for disposal. Cultivated or otherwise economically significant plants are recognized by the ubiquity of the specific pollen grains or phytoliths, and many are represented by exotic flora of Old World origin. Included in these samples are unidentified members of the Apiaceae family, likely used as spices or as herbs; members of the Brassicaceae family, likely representing broccoli or cauliflower, among the few flowers deliberately consumed by humans and thus are generally well represented in privy samples; Rosaceae grains, probably all derived from *Prunus* (peach, apricot, cherry, plum) or *Malus/Pyrus* (apple pear) fruits; and *Rubus* (blackberry or raspberry types), where a limited number of pollen grains persist on the compound fruit. Beans are essentially invisible in the pollen record, though their pods may sometimes be identified by their distinctive hooked elongate cells. Squash can likewise be identified by their large diagnostic round scalloped phytoliths found in the rind and stems of the plants. Buckwheat, an introduced member of the Polygonaceae, contains edible seeds (groats) and was widely consumed throughout the New World where it was introduced in Colonial times.

An interesting observation in the Robinson Terminal samples is the presence of animal fodder remains in the privy deposits. Notable quantities of grass pollen, along with pollen from alfalfa, clovers, and domesticated cereal grains, likely signal the collection and disposal of animal manure within the privy fill. As any given homestead likely produces significant quantities of animal manure, these deposits may signal only occasional clearing of manure, perhaps from high profile areas.

Important in the interpretation of diet and health of the past privy users are those pollen and phytoliths absent from the assemblages. Maize (*Zea mays*), for example, was completely lacking in all pollen and phytolith samples. Maize produces an ample quantity of poorly dispersed pollen grains; thus, some maize might be expected in most samples when the grain was a part of the diet. Likewise, maize phytoliths are abundantly produced throughout the plant; the absence of any trace of this New World domesticate indicates that maize was not valued in the privy user's households. The deliberate avoidance of maize in the diet and animal maintenance may signal an ethnic avoidance of this important crop.

Summary

Eleven paired pollen and phytolith samples from fill layers of five privies were examined. These samples largely date to the late eighteenth or earliest nineteenth centuries, and are thought to be representative of late Colonial diet at the Alexandria, Virginia homesteads. Pollen preservation was generally excellent, though one sample exhibited extreme oxidation and did not contain pollen. Phytoliths were preserved in excellent condition, and all samples yielded full phytolith counts.

Pollen and phytoliths found in the privy samples representing economic plants include the parsley family, broccoli or cauliflower, buckwheat, members of the Rosaceae family, blackberry type, domesticated beans, domesticated squash, alfalfa, and clovers. Potential ornamental flowers include anemone, touch-me-not, bachelor's buttons, and spiderwort. High numbers of ordinarily rare bean family pollen grains were present in most samples and may represent an unidentified, but important cultigen. The presence of pollen from hackberry and mulberry both hint at the past presence of these trees in the privy area.

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