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Household Activities and Areas: A Reanalysis of the John and Priscilla Alden First Home Site

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HOUSEHOLD ACTIVITIES AND AREAS: A REANALYSIS OF THE JOHN AND PRISCILLA ALDEN FIRST HOME SITE

A Thesis Presented

by

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ABSTRACT

HOUSEHOLD ACTIVITIES AND AREAS: A REANALYSIS OF THE JOHN AND PRISCILLA ALDEN FIRST HOME SITE

December 2017

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This thesis seeks to further understanding of early colonial life within New England through an examination of the John and Priscilla Alden First Home site in Duxbury, MA, excavated in 1960 by Roland Robbins. It specifically focuses on the composition and spatial distribution of the ceramic assemblage to discuss household activities and the spaces in which they were performed. The findings of the ceramic analysis detail a collection composed primarily of utilitarian vessels that indicate multiple subsistence farming activities including dairying. The spatial study reveals the significant patterning of these artifacts. It is proposed that these denote specific activity areas within the household, such as individual rooms and trash disposal practices. An architectural plan for the First Home site is then hypothesized utilizing these findings.

The results of this thesis accomplish two goals. First, they offer insight on the daily, domestic lives of the Alden family themselves and therefore contribute information

on how these individuals functioned and thrived within the New World. Second, through comparative analyses with additional 17th-century sites within New England, a more detailed view of the early colonial lifestyle with its various cultural materials and behaviors can be created.

ACKNOWLEDGEMENTS

This project would not have been possible without the great amount of help I received from others. I would first like to thank Christa Beranek for her unending patience. Her enthusiasm and insight, along with that of my committee members Doug Bolender and David Landon, was constant and greatly appreciated. Thanks are also given to Melody Henkel and Dennis Piechota for their help with this project. I am also grateful for the support provided by Desiree Mobed and the Alden Kindred, Inc. and for the opportunity to work with this collection. To my friends and family who are always there, I cannot say how much you mean to me.

TABLE OF CONTENTS

LIST OF FIGURES

Figure Page

Figure Page

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Project Overview

In *The Times of Their Lives: Life, Love, and Death in the Plymouth Colony*, James Deetz writes of the "Pilgrim myth" (Deetz 2001:11). This phenomenon has turned the historical landing of the *Mayflower* in 1620 into a romanticized, nationalistic narrative. However, while this 'myth' contains factual elements, it has often obscured the daily, dirty elements of life within 17th-century New England. These ordinary, everyday actions are what truly defined how the colonists survived and became successful within the New World.

When archaeological data is paired with the mythologized tale of the Pilgrims, a more accurate and detailed picture of early colonial life is created. Little evidence in the form of material culture or architectural features survives from 17th-century New England. Therefore, although the Pilgrim myth itself is well-established, researchers are still answering basic questions concerning the livelihoods of these individuals.

This thesis contributes to this growing amount of literature by placing the John and Priscilla Alden First Home site in Duxbury, Massachusetts within the wider colonial experience. It seeks to accomplish two goals: 1) to gain insight into how this one family conducted themselves on a day-to-day basis; and 2) to evaluate the similarities and differences of material culture and household activities between 17th-century New England households. Such analysis counters the common homogenized image of the Pilgrims by shifting focus to individual households: commonalities between collections assist in defining wider cultural trends within and around the Plymouth Colony while differentiations open a discussion on how and why various households diverged from them.

To achieve these goals, this project analyzes the Alden family's materials and behaviors at the First Home site. It specifically utilizes the ceramic assemblage as a proxy for studying household activities. These are the routine yet essential actions which formed the basis of the Alden family's everyday lives. This project poses three questions: 1) what is the composition of the collection in terms of ware type, vessel form, and function; 2) does its spatial distribution across the site indicate how the areas associated with daily activities were delineated within the household; and 3) how does the ceramic collection compare with that of contemporary sites?

The data presented here add to the growing scholarship surrounding the early colonial lifestyle, specifically the relatively few sources addressing the usage of ceramics within 17th-century New England. Overall, the findings offer a heterogeneous view of the colonial lifestyle by providing a better understanding of the mundane materials and actions the Aldens and their contemporaries utilized to become successful within the New World.

Chapter Outline

Chapter 2 of this thesis contains two sections of background information. The first details the history of the Alden family throughout their lives both in Plymouth and Duxbury. The second provides an overview of the First Home Site and includes a discussion of previous excavations and analyses performed upon the collection. Chapter 3 then turns to an examination of ceramic sherds, beginning with a brief background on the usage of ceramics in the early colonial period within New England and then focusing on the assemblage found at the First Home site. This analysis supplements existing literature by offering an additional example of a 17th-century New England ceramic collection as well as detailing the domestic activities the Alden family undertook daily. Chapter 4 then discusses various spatial distribution analyses performed upon the ceramic assemblage. The findings within this chapter indicate an architectural layout for the First Home site and possible spatial divisions of activity areas occurring within. The concluding Chapter 5 then compares the findings of the Alden First Home analyses with multiple contemporary 17th-century sites to provide a wider view of the cultural materials, behaviors, and overall lifestyle present within the Plymouth Colony specifically as well as within broader early colonial New England.

CHAPTER 2

HISTORICAL BACKGROUND

History of the Alden Family

The abundance of primary source literature is the first place to begin telling the story of the Aldens and their contemporaries. Personal diaries, letters, and official correspondences tell a complicated tale that began in the early 1600s. At that time tension between religious and political groups in England was high; the Separatists in particular faced persecution based on their desire to be independent of the Church of England. Some of these individuals ultimately decided to emigrate to Leiden, an area in the western part of the Netherlands. However, after approximately eleven years, their economic situation there remained stressed. Influenced by the positive reports returning from the newly-established Jamestown colony, many therefore decided to reestablish themselves in the New World. This small group, composed of men, women, and children, briefly returned to London in 1620 to charter two ships for the passage. One of these ships, the *Speedwell*, leaked badly and was forced to return to port; it was the *Mayflower* alone, with 102 passengers comprised of the original Separatists and "Adventurers" who invested in the new colony and 20-30 crew members that made the months-long voyage from England to the eventual settlement in Plymouth Bay (Bradford 1970).

Among the passengers was John Alden, a young cooper who joined the venture just before it departed Plymouth Harbor in England. His name appears multiple times in the early records of the Colony. After the original occurrence upon the *Mayflower*'s passenger list, the second instance is in 1620 as one of the signers of the Mayflower Compact. He is documented as the youngest signer at the time, born in approximately 1599, and also the last to survive, dying in 1687, two facts which again contribute to his eventual fame (Sullivan 1997:np). Around the same time this historic document was signed, John married Priscilla Mullins; again the date remains uncertain yet this marriage is believed to be the second one performed in the colony after Edward and Susanna Winslow's (Wentworth 2000:2). Together the couple had eleven children (Pilgrim Hall Museum). Throughout his life, John rose in status within the colony. In 1627, records list eight Undertakers, of which John was one, who bought out the Plymouth Colony's original backers. Later, he served as a land agent between the Plymouth Colony and neighboring Native Americans, as the colony's Treasurer, two terms as one of seven Assistants to the governor, twice as Deputy Governor, and multiple terms as Duxbury's representative within the colony courts (McCarthy 2008:39; Williams 1988:44; Winsor 1849:58).

John and Priscilla are also remembered as characters in their descendant Henry Wadsworth Longfellow's 1858 poem "The Courtship of Miles Standish." This celebrated work tells a romanticized tale of how Alden, courting Priscilla Mullins on behalf of his friend Miles Standish, ends up marrying her himself instead. The fame produced by this work refashioned John and Priscilla as the "Pilgrim Lovers" and made them the poster children of Plymouth postcards, Thanksgiving greeting cards, and other Pilgrim memorabilia (Figure 1). However, this commercialization and romanticization of these two individuals' lives disguises and overrides their real social and material interactions and impacts upon the New World.

Figure 1: Postcard featuring John Alden and Priscilla Mullins, c. 1930-1945, based on George H. Boughton's painting, ca. 1880. (Tichnor Brothers Collection, Boston Public Library, Image 77375.)

John and Priscilla began their married lives in the original Plymouth settlement on modern Burial Hill, formerly termed Fort Hill for the original colonist-era structure that stood at its top. Family residences extended in two parallel rows down this hill along present-day Leyden Street; it is assumed that the Aldens had their own dwelling within this layout. John's name does not appear in Bradford's 1620 listing of approximate house locations, therefore its exact position upon the landscape is unknown at this time (Deetz and Fennell 2007:np); however, based on deed records, later village reconstructions place it near the top of the hill, on the north side of future Leyden Street near Miles Standish's dwelling (Davis 1899:193).

In 1627, the new colonial government issued land grants to families that allowed them to spread out into surrounding areas and generate their own farmsteads. Each family member was allotted 20 acres and drew lots as to its location; John, Priscilla, and their three children who had been born by this time therefore received a plot of 100 acres approximately ten miles north of the original Plymouth settlement in what would eventually become the town of Duxbury (Figure 2). Historical map reconstructions have this area extending from modern St. George Street in Duxbury, down Bow Street, parallel to Harrison Street, and along the Bluefish River (Alden Kindred of America 2015). Their descendants, the Alden Kindred of America, own 5.4 acres of this property today. It is thought that, like their neighbors, the original Aldens spent summers at this first Duxbury home and winters in Plymouth until around 1632 when the former became their full-time residence (Alden 1890:361; Baker 2014:5-6; Wentworth 2000:4). Stratton suggests that this arrangement was a social compromise; as there was no church in Duxbury until at least 1632, by moving between houses, and attending weekly Plymouth services in the early years after the move, these families were able to "better repair to the worship of God," therefore completing their social obligations as members of a religious community, and yet still owning land of their own outside of it (Stratton 1986:48). This land was crucial for sustaining both the growing number of individuals within the colony and raising of livestock that first arrived aboard supply ships in 1624 (Deetz 1977:77; Robbins 1969:8).

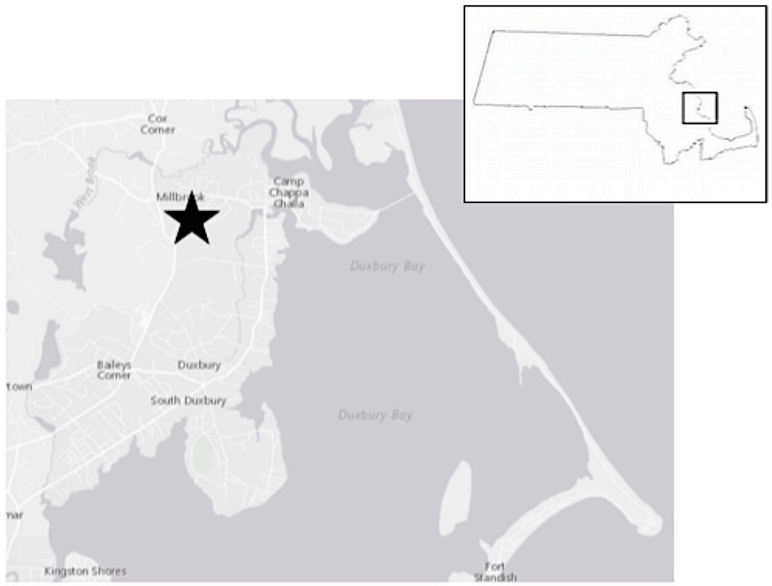

Figure 2: Map of Massachusetts and location of Alden First Home Site in Duxbury. (Created by author.)

There is some scholarly debate about how many homes the Aldens built and occupied in Duxbury. Two sites are known for certain. One, the subject of this thesis, is located on land now owned by the Town of Duxbury at the base of the Duxbury High School athletic fields and was excavated in 1960 by Roland Robbins at the request of the Alden Kindred of America. This structure is believed to have been abandoned at the end of the 17th century when another, larger home was built a quarter of a mile away by Colonel John Alden, John and Priscilla Alden's son, to house the second Alden generation (Baker 2014:10). This second home remains standing 300 years later, is still owned by the Alden descendants, and operates as a museum dedicated to telling this family's extensive history. However, Winsor in his *History of Duxbury* claims that there was perhaps a third Alden house near the Blue Fish River (Winsor 1849:57). Because this third site has not been proven historically or located archaeologically as of yet, this report will refer to the Robbins site as the 1627 or First Home site and the still-standing structure as the Second.

One additional historical document exists that offers a glimpse into the family's lives at these two homes. After John's death in 1687 a probate inventory was taken of the second home. It includes items such as "two old guns," "cooper's tools" including "carpenter's jointers," and "pots, tongs, and one quart kettle" (Deetz and Fennell, 2009). While this source gives insight as to the material items the Aldens utilized on a daily basis, it only includes those that had an estimable value, does not organize them by room, and is brief when compared with other probate inventories of the time. Therefore, this document and those mentioned above leave many questions concerning daily household activities unanswered; archaeological studies were therefore utilized to address them.

The First Home Site Collection

Until 1960, a stone marker a quarter of a mile away from the Second Home erected around 1888 offered the only approximation of the Alden First Home location (Robbins 1969:10). In that year, Russell Edwards of the Alden Kindred of America, Inc. contacted archaeologist Roland Robbins to help determine the exact site. Robbins was well-known in the area for his excavations of the Saugus Iron Works and Henry David Thoreau's cabin at Walden Pond. While Robbins has been criticized for being a self-taught archaeologist, his work at the Alden First Home was overall sound in terms of providing correct artifact identification and recording data for future analyses (Linebaugh 2005; Robbins 1969).

Robbins began by searching for the house foundation with a metal probe. This method uncovered a 10.5x38 foot stone foundation with a stone-lined cellar hole at the western-most end (Robbins 1969:15). Once the house size was established, Robbins generated an excavation plan using a 10’x10’ grid pattern. In this, vertical columns are numbered 1-8 and horizontal rows lettered A-M, resulting in 96 squares. Robbins and his team did not excavate this entire area; Robbins’s idea was that it could be extended if expansive evidence was uncovered. Topsoil was removed from a 60x30’ area which extended approximately ten feet from the house foundations on all sides. With the exception of the squares containing the house foundation volunteers only excavated the topsoil to 5-6 inches below ground surface (Largy and Mulholland 2010:107; Robbins 1969). The house foundation itself lies within squares 55 to 58 with the root cellar almost entirely in square 55 (Figure 3). The area within the house, with the overall designation “F” for “foundation”, was further subdivided into 2.5’x2.5’ squares lettered from F1 to F33 for the house interior and, moving clockwise, FA-FNN around the exterior (Figure 4). For all of these squares artifact provenience records are by horizontal, ie square, origin only. These squares were excavated to an average two feet below ground surface; artifact provenience was recorded by unit only rather than vertical soil level within. The cellar was the only area where artifact horizontal and vertical provenience were noted. This area was excavated in three layers, termed CI, CII, and CIII with the latter being the deepest and reaching a maximum of 7.5’ below ground surface (Figure 5).

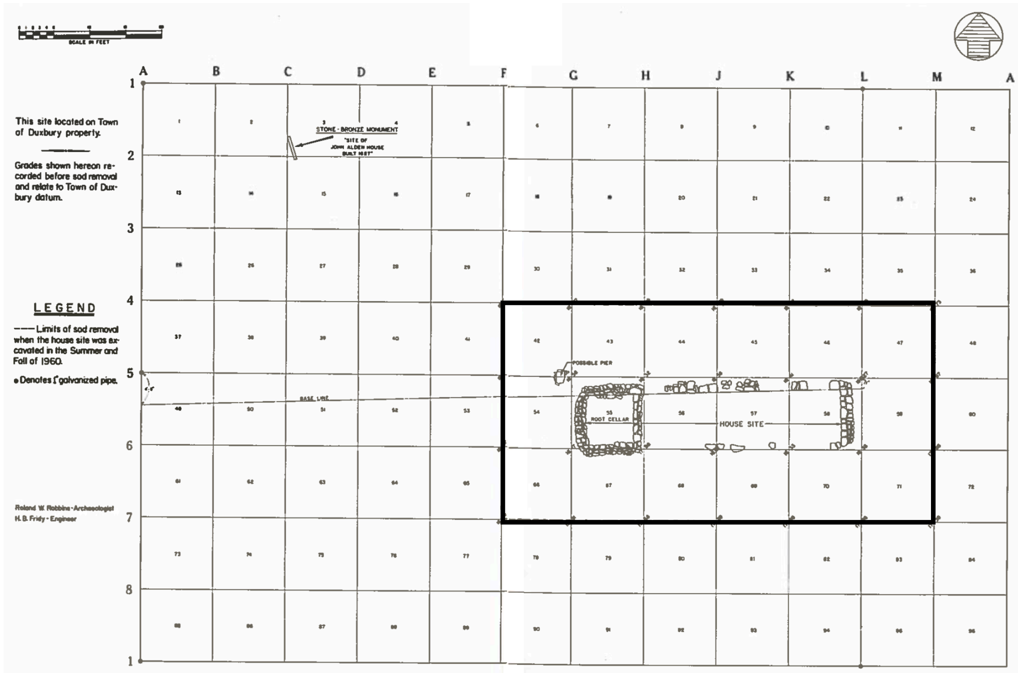

Figure 3: Robbins's overall site grid (Robbins 1969:44-45). Units of sod removal around the house foundation are outlined in black.

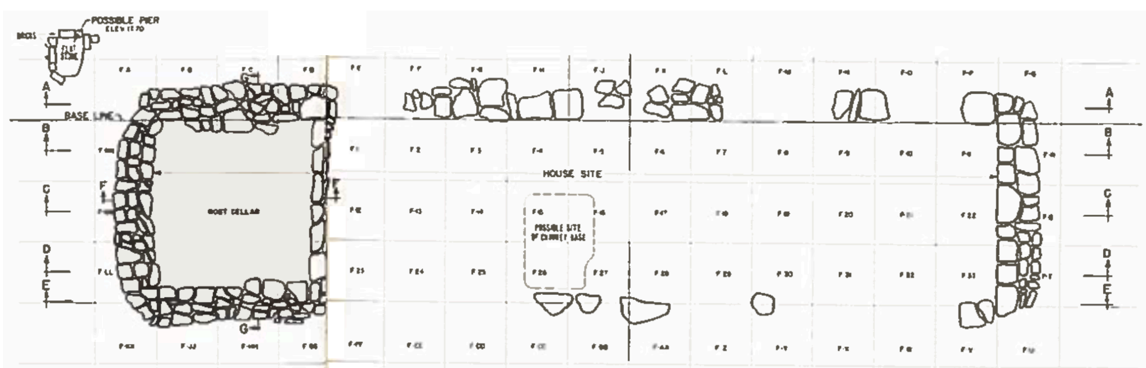

Figure 4: Robbins's map of the house foundation and cellar (Robbins 1969:46-47).

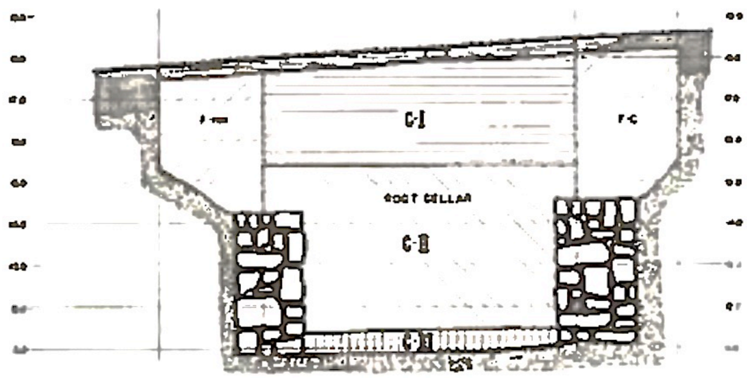

Figure 5: Robbins's cross-section drawing of the cellar layers (Robbins 1969:46).

The 1960 excavation recovered a variety of artifacts, including both Native American lithics and ceramics and European domestic refuse. The former was not surprising; the First Alden home, like the Plymouth settlement on Fort Hill, was built upon land that had been occupied for thousands of years by Native groups, a fact demonstrated through historical documentation and Native artifacts (McCarthy 2007:15). A brief analysis was performed on these artifacts to question this hypothesis, the results of which will be discussed in the following chapter. The rest of the collection is composed of European architectural and domestic refuse including various ceramic wares, nails, window and bottle glass, lead came, clay pipes, and an assortment of metal artifacts such as utensils, tools perhaps relating to John Alden's occupation as a cooper, and pieces of a rare snapchaunce gun. Robbins provides summary tables of these artifacts within his final report (Robbins 1969:50-55). This catalog was supplemented in 1995 when Massachusetts Historical Commission employees undertook a study of Robbins's eight boxes of artifacts, prioritizing the production of an initial artifact inventory and the institution of proper archival storage methods. Then, in 1999, archaeologists at the University of Massachusetts, Amherst created a second, digitized catalog of the collection with specific details for each artifact. Finally, this thesis produced a detailed report on the ceramics within the assemblage.

Overall, Robbins's excavation succeeded in his primary goal of locating the First House, giving a brief description of the artifacts, and offering an approximation for the date of the First House occupation period. The latter remains a primary research topic for scholars. The First House is thought to have been abandoned around the end of the 17th century when the Second Home was erected (McCarthy 2007). The land remained an open area until the mid-1900s when the Duxbury Library and High School were constructed and the land was graded again for the latter's playing fields (Figure 6). Therefore, it was possible that waste from these sites or the Second Alden House was deposited in the abandoned First Home foundations. However, Robbins's analysis of coins found at the site yielded a terminus ante quem date of 1650 whilst pipestem dating suggested a period of 1620 to 1680 (Robbins 1969). Ceramic dates also correspond to this period. As will be discussed in Chapter 3, with the exception of the five intrusive creamware and whiteware sherds found in the surrounding topsoil, the First Home ceramic collection is entirely composed of 17th-century wares, as also noted by Mullins and Crosby (Mulholland 2000:246). This chronology is in direct opposition to the primarily 18th- through 20th-century artifacts discovered at the Second Home (McCarthy 2007; Mulholland 2000). Given these two distinct occupation periods it is unlikely that inhabitants of the Second Home were disposing waste in the abandoned First Home foundations.

Figure 6: The Alden First Home site today. The cellar indent is visible on the right of the image. (Photograph taken by author.)

This artifact data was supplemented by a geophysical analysis. In 2006, the Alden Kindred, seeking National Historic Landmark status for the First Home Site, contacted Daniel Lynch of Soil Sight LLC to conduct a non-invasive survey of the area. The goal of this project was to determine the extent to which the school and library construction disturbed the original site's archaeological integrity. Lynch's methods, which included electromagnetic conductivity and ground-penetrating radar, determined that only the southeastern corner of Robbins's overall site grid was disturbed; in addition, twelve geophysical anomalies, most directly to the north of the foundation, were located which indicated possible additional cultural deposits not uncovered by Robbins's team (Lynch 2006). Lynch's data demonstrated that the First Home site had, incredibly, survived intact after four hundred years and offered additional evidence that the artifact assemblage Robbins excavated does indeed belong to the original Alden occupation period and was not a result of later depositional events.

Despite the numerous analyses mentioned above and multiple others (Beaudry 2003; Chartier 2001; Deetz 2000; Largy and Mulholland 2010; Linebaugh 2005; Wentworth 2000), certain elements of the First Home site have undergone little or no evaluation and therefore questions about the Aldens' daily lives remain open. As Wentworth noted, "almost nothing is known of the family life of the Aldens" in Plymouth or Duxbury (Wentworth 2000:5); *where* they lived was now established but *how* they lived, i.e. the activities they undertook on a daily basis for their own family's survival and as part of the growing colonial community, remained uncertain. This thesis will address the ceramic assemblage, one of the lesser-studied aspects of the collection. Ware types can reveal manufacturing origin and assist in discussing resource access. Vessel form is closely tied to function and can therefore serve as a proxy for daily domestic activities that occurred within the Alden household. A spatial analysis of these artifacts will address a second question concerning site integrity; in-situ activity areas would add evidence to Robbins's and Lynch's (2006) claims that the site is mostly intact despite the large amounts of land development that occurred in the area. As will be seen, the resulting ceramic catalog and digital maps of artifact locations allow a more in-depth discussion of what life was like at the Alden First Home. Comparative analysis will then show how this family's material culture and household actions related to those of their contemporaries.

CHAPTER 3

CERAMIC ANALYSIS

Ceramics can be divided into three broad categories: earthenware, stoneware, and porcelain (Barker and Majewski 2006; Orton and Hughes 1993; Turnbaugh 1985). Earthenwares are fired at the lowest temperature, between 900 and 1050 degrees Celsius. These wares can be further divided into coarse and refined wares. Coarse earthenwares can be made with local clay, which sometimes contains inclusions such as sand or gravel, have a porous paste due to the low firing temperatures, and can be glazed or unglazed on either side. Some types, such as Staffordshire slipwares and tin-glazed wares, are categorized as coarse wares yet were finely decorated. Others, however, were undecorated and made into purely utilitarian forms such as thick-walled cooking or storage vessels. Due to the small amount of effort needed to create this ware its usage spans over hundreds of years and multiple continents. In contrast, refined earthenwares developed in the 18^{th} century, especially through the innovations of Josiah Wedgewood. These vessels usually have a pale paste and are often coated in a lead, and later alkaline, glaze on both sides. Later forms have hand-painted, transfer print, or molded decoration that assists in determining ware type, origin, and manufacturing date. A variety of forms were manufactured, especially table serving vessels.

Stoneware, in contrast, is fired at around 1200 degrees Celsius, making it harder and more non-porous than earthenware. Lead glazes as well as salt glazes were utilized and well as incised or applied decorative techniques. Common forms included mugs, jars, and other hollow vessels.

Porcelain is the third and final category of ceramics. This was the most highly-fired at above 1300 degrees Celsius. This vitrified the paste, making it non-porous and highly breakable. They were coated in a clear feldspathic glaze and were decorated in various ways, the most common method being hand-painted cobalt blue designs underneath the glaze. Again, these designs assist in establishing an approximate manufacturing date range. The most common porcelain forms found in 17^{th}- to 18^{th}-century England and America are teawares such as small cups and saucers (Deetz 1977:70-75; Noël Hume 1969:102-138; Jefferson Patterson Park and Museum 2002a:np).

Utilizing the above knowledge, a single sherd can address multiple lines of archaeological inquiry. First, firing temperature and glazing technique, and therefore ware type, implies how the complete vessel was physically manufactured within the kiln. This typological assignment, when considered with decoration, can indicate both vessel manufacturing date and geographic origin. For example, Chinese porcelain, distinguishable by its fine, thin, blue-tinted paste, was commonly decorated with cobalt blue designs that have been fitted into established typologies. Therefore, by matching a sherd with these examples, archaeologists can infer a site's occupation date and trade routes that might have extended from it. Finally, ceramics can indicate "activity areas" within a site itself. As seen above, a vessel's form can reveal its functional use, whether for storage, food preparation, food consumption, or a variety of other activities. By studying the distribution of specific forms upon a site, archaeologists can hypothesize which actions were performed and where they took place (Barker and Majewski 2006; Orton and Hughes 1993; Quimby 1973).

Ceramics in Colonial New England

While the field of ceramic analysis is vast, at this time few studies specifically explore 17th-century colonial ceramic assemblages within New England.

Binzen (1999), Chace (1974), Deetz (1977, 1998, 2001), Turnbaugh (1983), and others note that such sites share a reliance upon coarse earthenwares. However, rarely do these works go further in addressing vessel form and function. This is due to two factors. First, coarse earthenware sherds, redwares especially, display great visual similarity and are slow to change over time, making exact dating difficult. However, as Deetz, Beaudry (2000), and Randall (2009) have proven, undertaking the challenge of analyzing such wares can provide archaeologists with more information concerning vessel manufacturing technique, form, and usage. By connecting these three elements, these authors were able to utilize sherd qualities to examine cultural behavior. This thesis will perform a similar analysis which will address not only which activities the Alden family performed daily at the First House but also add to the growing literature surrounding ceramics at 17th-century domestic sites within New England.

To date, the Alden, Allerton, Bartlett, Bradford, Harlow, Howland, RM, Standish, and Winslow homesteads, are the most well-known early colonial domestic sites around

Plymouth that have been excavated (Beaudry et al. 2003). These sites offer some comparative evidence about the daily use of ceramics. For this project, excavations from the Jamestown Fort in Virginia (Jamestown Ceramics Research Group 2016) and St. George Fort in the Maine Popham Colony (Brain 2007), also founded by the Jamestown Colony, were also used to identify ware types found on early colonial sites. The Potomac Typological System (POTS) (Beaudry et al. 2000) was the baseline for identifying common vessel forms. In addition, collections from the Leicestershire Museum and the Museum of London also offered useful examples of colonial- and medieval-era pottery ware types that originated in Europe. Together, these sources offer a wider base for comparative analysis when studying early colonial New England sites and became essential when analyzing the First Alden House assemblage.

The Alden First Home Assemblage

Whilst the University of Massachusetts, Amherst catalog was useful in artifact organization and preliminary analysis, many problems are present within the ceramics section. First, some bags contained a different number of sherds than was recorded. Second, the catalog presented certain qualities such as sherd decoration and color in numerical code which could not be interpreted. Third, many of these identifications proved to be incorrect. For instance, some sherds were catalogued as having a “black glaze” while in fact only the remnants of an unidentifiable glaze were present. In addition, the catalog did not describe where on the sherd such glazes or additional decoration occurred.

Therefore, after the collection was transferred to the UMass Boston Fiske Center laboratory, the first analytical step taken for this thesis was the creation of a more detailed inventory of all recovered sherds using the UMass Amherst records as a baseline. This new catalog includes assigned each sherd, or group of similar sherds, a unique identification number and recorded details such as provenience, ware type, paste color, inclusions, presence and location of glaze, decoration, part of vessel represented (body, rim, or base), and vessel category (flat or hollow) and specific vessel type (mug, jar, milk pan, etc…) if determinable. A notes field records defining or unusual sherd characteristics. The catalog also contains the original UMass Amherst records and lists inconsistencies between it and the new analysis. A separate catalog was created for the Native American sherds utilizing the same criteria. The following section will discuss the results of these analyses in detail.

Sixteen ware types were identified within the Alden collection and appear within the following Table 1. With the exception of the creamware, whiteware, and unidentified sherds, all are likely from the 17th-century occupation period.

Ware Type	Sherd Count	% of Total Sherds	MNV	% of Total Vessels
Earthenware, coarse	**1186**	**98.42**	**44**	**83.02**
Border Ware	2	0.17	1	1.89
Cistercian Ware	12	1.00	4	7.55
Iberian	76	6.31	1	1.89
Native American	20	1.66	2	3.77
North Devon: Variety I	57	4.73	7	13.21
North Devon: Variety II	3	0.25	1	1.89
North Devon: Variety III	2	0.17	1	1.89
Redware	994	82.49	19	35.85

Tin-Glazed	13	1.08	4	7.55
Unidentified	1	0.08	1	1.89
West of England Type D	6	0.50	3	5.66
Earthenware, refined	**5**	**0.41**	**3**	**5.66**
Creamware	3	0.25	1	1.89
Whiteware	2	0.17	2	3.77
Porcelain	**3**	**0.25**	**1**	**1.89**
Chinese	3	0.25	1	1.89
Stoneware	**11**	**0.91**	**5**	**9.43**
Frechen	10	0.83	4	7.55
Rhenish	1	0.08	1	1.89
Grand Total	**1205**	**100.00**	**53**	**100.00**

Table 1: Ware type by sherd count and minimum number of vessels (MNV).

These results display both the simple sherd count and minimum number of vessel (MNV) count per ware type. The MNV method addresses the bias inherent in simple sherd counts in that one vessel can break into multiple pieces and is composed of multiple steps. First, sherds are divided by overall ware type such as those listed above. Then, within each ware type category, they are further sorted based on qualitative or quantitative individual characteristics. Voss and Allen (2010:7) list six criteria which assist in providing a simple estimate of how many different vessels of one type are present within an assemblage: vessel form, vessel manufacture, surface treatment and decoration including glaze type and location, body characteristics such paste color and inclusion type, burning, and vessel completeness listing any cross-mended sherds.

The redware sherds within the First Home collection proved challenging for the MNV analysis. As will be discussed in a later section, the assemblage contains hundreds of non-diagnostic body sherds that displayed similar visual characteristics.

Differentiations in firing temperatures could result in multiple paste colors on a given vessel, therefore paste color was not a reliable method to divide these sherds into individual vessels. While visually-apparent inclusions were present in 157 sherds, these likely occurred naturally in the clay and could be randomly distributed throughout the vessel body. Thus, inclusions were not utilized for the MNV analysis. In addition, many redware sherds were missing entire surfaces. This meant that specific manufacturing method could not be determined and that information concerning surface such as glazes or slips was lacking. When intact surfaces were present, glazes appeared in various stages of decomposition, further complicating identification.

With these challenges, vessel form became the primary method utilized to separate sherds. Forms were determined by sherd curvature and thickness, rim and base characteristics including diameter, and area of vessel represented. In total, 27 redware sherds were identified as being from eight vessel forms as listed in Table 2 in a later section, with at least 19 total redware vessels represented.

An examination of both rim and base characteristics was performed to supplement this count. There are 66 rim sherds within the collection with diameters ranging from 6 to 34 centimeters and representing at least 26 vessels. However, many rims correspond to the identified vessel forms in Table 2 and therefore were not added to the final MNV count. The majority of the rim sherds have lead glazes on at least one surface. The remaining sherds have glazes that had been dulled by post-depositional processes or missing intact surfaces altogether. However, at least two manganese-glazed vessels are represented, with rim diameters of 14 and 16 centimeters. In addition, a vessel with an exterior white slip and a 22-centimeter rim is present. Due to these unique surface treatments, these three vessels were included in the redware MNV count, bringing it to 19 vessels.

An analysis of the redware bases was also performed. Nine bases are within the assemblage, with diameters ranging from 8 to 27 centimeters and possibly representing nine individual vessels. Again, some sherds correspond with identified vessel forms and only lead glazes are present on the intact surfaces. Therefore, no additional vessels were discerned for the final count.

Iberian storage jars also proved difficult to analyze within the MNV analysis. All of the sherds within the collection are body sherds and do not display any diagnostic characteristics. Therefore, the only vessel that could reliably be included was the entire half of a Type I jar reconstructed by the Robbins team.

Table 1 clearly shows that, like their contemporaries, the Alden household relied on coarse earthenwares for daily, household activities. However, it is useful to discuss each specific ware type in turn to further understand questions of origin, form, and use. This information is presented in the following section.

Ware Type Analysis

Native American

Nineteen of the twenty Native ceramics were made from a low-fired and therefore brittle gray paste. They are small, undecorated body sherds with no identifiable vessel forms (Figure 7). However sherd 601, as designated within the new catalog, is highly-fired, elaborately decorated, and incredibly preserved. The paste is dark brown and firm. The sherd interior is unglazed and undecorated. The exterior shows a body with deep, parallel grooves similar to cord-marked examples (Jefferson Patterson Park and Museum 2002b). The rim is also seemingly cord-marked, though with diagonal lines (Figure 8). At this time it is unclear what these qualities signify.

Figure 7: Native American sherds recovered from the Alden First Home site.

Figure 8: Interior and exterior of sherd 601.

Interestingly, all of the Native sherds were found within the First House foundation; however, given that this was where the 1960 excavation was focused, it is not surprising that these difficult-to-distinguish artifacts would have been recovered more often in that area. Robbins hypothesized that these sherds, along with the many lithic chips and tools, were a result of surrounding topsoil being used to fill the site following the deconstruction of the First House (Robbins 1969:25). Therefore, they would have originated with a settlement that was abandoned before the move to Duxbury. However, there is no absolute proof that these artifacts were not contemporary with the Alden occupation; in fact, given that John Alden served as a trade and land agent between the colonists and Native Americans it is entirely possible that there was exchange of cultural materials. Due to this ambiguity, these sherds will not be included further within this analysis.

Stoneware

Frechen Stoneware

Two types of wheel-thrown German stoneware were recovered from the Alden First Home site. The first, Frechen wares, are named after the major export center in western Germany that was active during the 16th and 17th centuries. Frechen stoneware continued until the 18th century, by which time English glass- and stonewares, especially those made by John Dwight in Fulham, overtook them in popularity. This ware has a tan paste with rare inclusions. The exterior is coated first with a brown slip, resulting in a mottled brown and white mottling on the finished vessel exterior, and then a salt glaze. Sometimes this mottling transitions into a gray body. Vessel interiors are unglazed, appear in various shades of brown, tan, or gray, and can display circular potting rings from the wheel-throwing process (Jefferson Patterson Park and Museum 2002a:np). The most common vessel form during the 17th century was the Bartmann bottle or jug, also termed "Bellarmine" or "Graybeards" because of the molded decoration of a bearded man on the vessel necks which became more stylized over time (Straube 2001:np). Various other molded decorations such as royal coat-of-arms or ornamental medallions could also be applied to the vessel body and are often located directly below the bearded man figure (Noël Hume 1969:278; Skerry 2009:43). These vessels were used to store or serve various beverages, commonly wine or beer, which were then poured into individual vessels (Brandon 2006:24). Finds on American sites, like the Rhenish wares below, were the result of English trade directly with Germany or with Dutch merchant middlemen (Gusset 1980:148).

Ten Frechen sherds were found at the Alden First House (Figure 9). The MNV analysis suggests that they compose at least four hollow vessels, all of which were likely Bartmann jugs. It is known that one vessel's exterior can transition from brown to gray; therefore, the MNV analysis relied on interior paste coloring to separate vessels. While these were also known to vary between red, tan, and gray on one jar, these sherds were distinguishable enough to hypothesize unique vessels. Interestingly, one sherd displays the impressed outer rim of a medallion that was characteristic on Bartmann jug bodies (Figure 10).

Figure 9: Frechen stoneware sherds.

Figure 10: Sherd 329 displaying part of a Bartmann jug medallion.

Rhenish Stoneware

Rhenish stonewares also originated in Germany around the 16th century and continued until the 19th. It was first manufactured in Raeren then in the wider Westerwald region. The paste is a pale gray or tan. Vessels are wheel-thrown and covered in a salt glaze. Blue cobalt paint accents various types of incised, applied, and stamped decorations such as bands, floral motifs, and royal ciphers or medallions. Many forms were manufactured; jugs and pitchers were common on early colonial sites while tankards and mugs appeared after 1650 (Jefferson Patterson Park and Museum 2002a:np). All would commonly have been used to consume beer, ale, or other alcoholic beverage (Brandon 2006:78; Gusset 1980:141). The number of Rhenish vessels on American sites declined in the late 1700s (Noël Hume 1969:278-282).

One Rhenish stoneware sherd was recovered from unit FJ, part of the long, northern edge of the stone house foundation. It displays the characteristic cobalt blue painted decoration on a white, stamped body (Figure 11). Due to its decoration pattern and tight curvature it was likely part of a straight-sided tankard or mug.

Figure 11: Rhenish stoneware sherd.

Chinese Porcelain

As mentioned above, porcelain is a highly-fired ware with a white, vitrified paste and a feldspathic glaze. Chinese porcelain is often distinguishable due to a blue tint in the fine, white body. Sherds on American sites originate from either the Ming Dynasty (1364-1644) or the Ch'ing (also spelled Qing) Dynasty (1644-1912) (Noël Hume 1969:263). While underglaze cobalt blue hand-painted designs were ubiquitous throughout both time periods, specific patterns and later-developing polychrome designs and underglaze decorative techniques assist in providing more specific date ranges for vessels. Forms include bowls of varying sizes, plates, teawares and other such thin-walled vessels.

China was the main exporter of these wares in the 17th-century; England, France, and other countries began manufacturing hard-paste porcelain in the 18th century. However, given porcelain's high cost, archaeological examples of these artifacts in North America remain rare until that time (Noël Hume 1969:257). Indeed the first example of porcelain in Plymouth probate inventories does not occur until 1736 (Deetz 1977:86). The owner was a merchant who due to his occupation would have had access to such a valuable commodity.

Given these facts, it is significant that three Chinese porcelain sherds were found in Unit 58 just outside the eastern edge of the Alden house foundation (Figure 12). Two of the sherds mend and together the three compose a cup, likely for wine. The body appears bright white and is hand-painted with an underglaze, cobalt blue trellis design near the vessel rim and an unidentifiable design on the body below. This vessel matches descriptions of known Ch'ing Dynasty wares, which were commonly decorated with trellis patterns, though this identification remains uncertain due to the pervasiveness of the underglaze blue decorative technique (Florida Museum of Natural History 2017:np). Given this and the fact that the sherds were found in the first five to six inches of topsoil, it cannot be said with certainty whether this cup belonged to the Aldens or is a later intrusion.

However, wine cups have been found in Jamestown and other contemporary sites (Curtis 1988; Straube 2001:np). According to Straube, the Jamestown cups were likely from multiple Dutch United East India Company shipments, used for wine or the strong, alcoholic "aqua vitae," and owned by a high-status individual within the colony. This highlights the dual purpose of these cups as drinking vessels and outward displays of personal wealth (Straube 2001:np). Therefore, if this cup was contemporaneous with the Alden occupation, it was perhaps a result of John Alden's prestigious positions within the colonial Plymouth government that he held later in life rather than an item he brought with him as a twenty-year-old venturing cooper aboard the *Mayflower*. There is the additional possibility that the expensive cup belonged to his wife Priscilla, who was known to have received a large inheritance when her parents died and who could have acquired it by various means (Williams 1988:43).

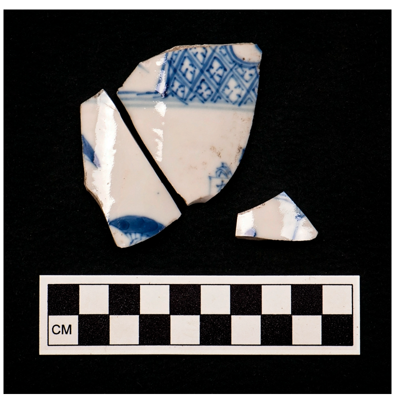

Figure 12: Chinese porcelain wine cup sherds.

Coarse Earthenware

Border Ware

Border Ware is a wheel-thrown, coarse earthenware that was manufactured in the Hampshire and west Surrey areas of southern England from the 16th to 18th century. Two types have been defined. Red Border wares have a paste color ranging from pink to bright red and can be fine or coarse in texture. Most are untempered. Lead glazes range in color from yellow to brown based on the paste composition and usually appear on only one side of a vessel. No vessels of this type were found within the Alden collection.

The second type of Border ware has a paste occurring in various shades of light tan. Sometimes these fabrics contain quartz or mica temper. Again, lead glazes appear on the interior and exterior of vessels. In the 17th century most vessels were tinted green or yellow due to copper being added to the glaze; later vessels appear darker and more olive (Pearce 1992:1).

Both red and tan Border wares were utilized to create numerous forms. Popularity of specific vessel types change over time with the introduction of new forms and industry need. However, the most popular Border Ware forms in the 17th century were flanged dishes, bowls, pipkins, porringers, and chamber pots (Pearce 1992:97). The former dishes appear similar to earlier forms, showing that the continuation of ceramic traditions over time. Notably, most vessels are tablewares or used for cooking; more utilitarian forms, such as storage jars, were created using redware and other coarse ware types. Border Ware vessels were then distributed around England, to the London ports especially, Ireland, and to the American colonies. They occurred until the 18th century when the Staffordshire pottery industries surpass them in popularity (Hawkins 2012; Pearce 1992).

Two tan Border ware sherds are within the Alden collection. Their curvature indicate an undetermined hollow vessel, likely one of the cooking vessels or tablewares mentioned above (Figure 13).

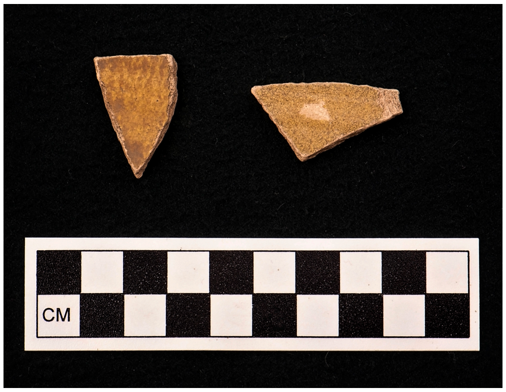

Figure 13: Border ware sherds.

Cistercian Ware

Cistercian wares, named for the Cistercian abbey sites upon which they were often found, originate in the 15-16th centuries in northern England, primarily around Kent and Derbyshire. There are two defined types of Cistercian wares. Type I is distinguishable from plain redwares due to the thickness of the body, the variety of inclusions within the red paste, and the manganese-lead glaze that can occur on either side of the vessel. The glaze is thick and sometimes displays small white spots. In addition, as will be discussed below, specific types of temper were added, grog and quartz sand being common. Multiple forms were created, including drinking vessels, bowls, and milk pans. Type II also has a red paste but is finer and has fewer inclusions than Type I. Multi-handled tygs and other cup types were the most popular forms. Production of both types peaked during the 16th and 17th centuries, after which time these early wares developed into English Black Ware and Buckley-type wares (Leicestershire Fieldworkers; Turnbaugh 2013:11; University of Leicester: Whitehouse 1983:112).

Twelve Cistercian sherds were found within the Alden collection (Figure 14). Multiple sherds display glazed and ridged interiors, indicating large, shallow, hollow vessels similar to known milk pan examples (Beaudry et al. 2000). Overall, sherds were either part of hollow or unidentifiable forms and the MNV analysis suggests the presence of at least four vessels.

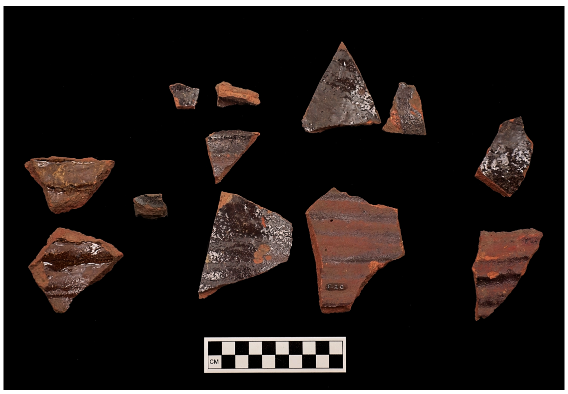

Figure 14: Cistercian ware sherds.

These sherds are remarkable for the amount of inclusions within the paste. Four of these sherds (418,420, 421, and 430) were examined by Dennis Piechota, the archaeological conservator at the Fiske Center for Archaeological Research at the University of Massachusetts Boston, for microscopic analysis. Sherds were examined between a magnification of 6.5X and 45X to determine basic composition. All sherds had multi-mineral inclusions, ranging in type and size, including rock, water-worn quartz sand, fine gravel, coarse to fine sand, voids and soot from carbonized plant remains, and grog. Due to its high amount of inclusions (Figure 15), sherd 418 was selected as a representational sample for a more detailed analysis again conducted by Dennis Piechota.

Utilizing an Accuscope inspection and a Nikon Eclipse 2000 polarizing microscope, he found that the sherd's red clay matrix was mixed with fine white clay, quartz rocks ranging in size, 0.5mm hematite nodules and flint fragments, 0.05mm feldspar, a single 0.1mm charcoal fragment, and the previously-observed quartz and grog of various sizes (Figure 16).

The latter, crushed pieces of a previously-fired clay vessel added to a secondary vessel to reduce cracking during firing, is present within sherds 420 and 421 as well and demonstrates purposeful action on the part of the potter. In addition, the homogeneity of quartz within sherd 418 indicates that this mineral was utilized as a temper as well rather than chance inclusion and that the clay was well-mixed during the wedging process.

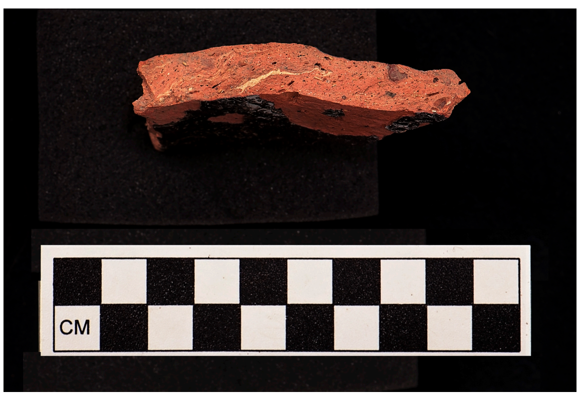

Figure 15: Sherd 418 paste.

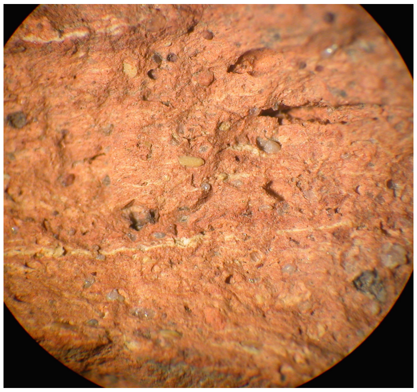

Figure 16: Photomicrograph of sherd 418 paste.

Due to their heterogeneity within the paste, the plant voids, quartz sand, rock, and gravel were likely mixed into the clay through natural processes. However, they would have also served to reduce cracking and strengthen vessel walls. Therefore, two circumstances concerning potter intentionality are possible. First, potters might have gathered clay from a given area with no consideration of its properties, resulting in stronger vessels by chance. Second, they might have observed that vessels created with clay from that source survived more frequently than others, and therefore traveled to that area specifically for the improved resources. In either case, this analysis provides valuable insight into the manufacturing process of this ware.

Iberian/Spanish Ware

The paste color of this ware ranges widely from light brown to tan to dark red and often exhibits a gray core in profile from a reducing atmosphere within the kiln. In texture the paste is softer and slightly coarser than other earthenwares, feeling similar to sand-paper. Vessels can have a white slip or an olive to dark green glaze on the exterior or interior. Such surface treatment offers an indication of vessel use. These vessels were primarily large storage jars for liquids such as wine, vinegar, or olive oil; unglazed vessels could contain heavy oils that did not seep into the paste or dried goods including condiments, vegetables, beans, or chickpeas. Interestingly, on some Spanish sites, jars are also utilized as architectural elements as lighter substitutes for stone or brick (Beaman 1998:93; Goggin 1970; Kelso et al. 1997:np).

Goggin (1970) offers the first proposed typology for these vessels. He distinguishes three periods, Early (16th century), Middle (1580-1780), and Late (1780-1850 onwards), based on paste color, vessel thickness, vessel dimensions including those of the mouth and handles, and surface treatment. Middle-period vessels were the most prevalent. Goggin further divides this category into three types. Type I was the most common, oblong in shape, and usually used for wine or water; Type II was small, globular, and often used for olive oil; Type III was also smaller than Type I, incredibly elongated, even "carrot-shaped", and sometimes used as a container for honey (Goggin 1970; Jamestown Ceramics Research Group 2016:np; Kelso et al. 1997:np). Such vessels have been recovered from 17th-century sites all along the American east coast from Jamestown to Plymouth, and are documented in historical records, especially as containers for olive oil. They also occur in at sites within northwest Europe, as well as colonial Spanish sites around the world.

The Alden assemblage includes 76 storage jar sherds. All have the characteristic pink-tan paste and are unglazed on both sides. Robbins and his team mended many of these pieces and were able to reconstruct an entire half of one jar from twenty-six sherds

(Figure 17). This vessel fits the above Type I classification due to its elongated rather than globular body and rounded bottom. Though the rest of the Iberian sherds are body pieces rather than diagnostic rims or bases, based on sherd curvature they are likely of this type as well though may be part of additional vessels.

Figure 17: Interior and exterior of a partially-reconstructed Iberian storage jar.

North Devon

North Devon wares are another wheel-thrown vessel type that originates in England. They are typically divided into three types: gravel-temper, gravel-free, and sgraffito. No examples of sgraffito wares were recovered from the Alden site and therefore will not be discussed within this thesis.

Gravel-tempered wares were produced from the 17th to 19th centuries, with most American examples dating from the former (Barker and Majewski 2006:213; Noël Hume 1970:133). The paste varies from tan to pink and has a characteristic gray core from a reducing environment in the firing kiln. Like with many of the other coarse earthenwares from this period, a lead glaze was applied to either sides of the vessel. These are often various shades of green, though can also appear yellow or brown, especially when the glaze pools. Common forms include entire ovens, pipkins, dishes, and storage jars, especially baluster jars (Jefferson Patterson Park and Museum 2002a:np). No sherds within the Alden collection were of this type.

It is believed that gravel-free wares were manufactured slightly earlier than the gravel-tempered type. Brain (2007) divides gravel-free wares found at the early 17th-century Popham Colony in Maine into three varieties. Due to its contemporaneity with the Alden site, this typology was the primary tool used to further separate the early North Devon sherds found at the Alden First Home into more specific categories.

Variety I sherds have, like gravel-tempered wares, a characteristic pinkish paste with a gray core from a reducing atmosphere during firing. Examples from the Popham Colony have a lead glaze on the interior of the vessel only, which varies from yellow to olive. Sometimes the paste includes small sand inclusions. While Brain identifies baluster jars as the most typical form, recovered rims and bases indicate the presence of tableware forms. Fifty-seven sherds of this type were found at the Alden First Home site. Most have thin bodies, indicating that they were tablewares rather than baluster jars. Some sherds vary from Brain's examples in two ways. First, 42 sherds have a green lead glaze on both their interior and exterior. Many others are missing either their exterior or interior surfaces and therefore it cannot be determined whether they differ from Brain's examples. In addition, 12 sherds contain small inclusions of calcium carbonate. However, these variations were so slight and the overall similarity between the Popham and Alden sherds was so significant that Brain's typology terms were still applied. Overall, the

Alden sherds compose at least seven distinguishable vessels (Figure 18). Most sherds represent hollow vessels, one of which is a base similar in curvature to cup, jug, or drinking pot examples.

Figure 18: North Devon Variety I sherds. A large milk pan rim is displayed on the upper right.

Brain's Type II differs from Type I in having a uniform, dark gray paste. Again lead glazes appear on vessel interiors, though it is thicker than that upon Variety I examples and appears dark green-black. The paste is thick and coarse. Brain identifies baluster jars as the only identifiable form present at the Popham Colony (Brain 2007:109). Three Type II sherds were identified at the Alden site (Figure 19). The MNV analysis indicates that they are from at least one large, hollow vessel—possibly Brain's baluster jar. They contain calcium carbonite inclusions.

Figure 19: North Devon Variety II sherds.

One sherd of this variety (566) is particularly interesting (Figure 20). Its interior is glazed, and the glaze extends over a minor amount of the exterior rim. This indicates the vessel’s pure utilitarian purpose, also indicated by the thick body; the potter was only concerned with coating the minimal amount of the vessel required to make it functional for containing liquids. This sherd is also remarkable in that its exterior displays two fingerprints. Again, this possibly indicates the utilitarian use of the vessel. The potter was not concerned about the appearance of the final vessel; function was designated more important than visual aesthetic.

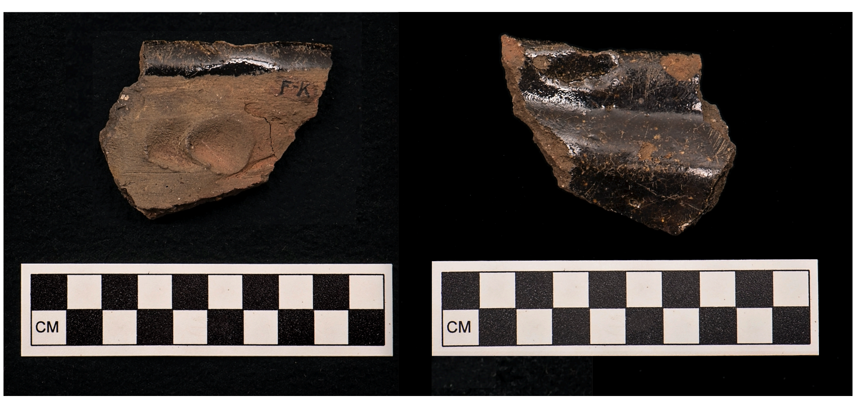

Figure 20: Interior and exterior of sherd 566.

Variety III resembles Variety I vessels because of their red paste with a reduced, gray center. However, these vessels are coarser due to larger amounts of calcium carbonate and sand inclusions. Indeed Brain believes these wares to be an early precursor to gravel-tempered wares. Again, lead glazes were applied, yet are found on both sides of the vessels. These appear in various shades of yellow, green, and olive, and appear dark olive-brown where the glaze pools. Common forms include the ever-present baluster jar, bowls of differing sizes, pipkins, and chafing dishes (Brain 2007). Two Alden sherds were designated as this type and compose at the minimum one hollow vessel, again possibly a baluster jar (Figure 21).

Figure 21: North Devon Variety III sherds.

West of England

Brain (2007) also distinguishes an unspecified "West of England" category, which he then divides into four types designated A, B, C, and D. Six sherds from the Alden site were similar to Type D examples; the other types are not present. These sherds are similar in thickness and glaze color to the North Devon sherds. However, the paste color is a much brighter red and does not have a reduced core or standard temper, though one sherd contains two small pieces of gravel.

While unable to estimate specific vessel form from the Popham Colony examples, Brain hypothesizes that open, hollow vessels such as bowls were most common. This corresponds to the known manufacturing trends of the closely-related North Devon sherds and indeed four of the six Alden sherds are identifiable as part of hollow vessels. The MNV analysis hypothesizes that at least three West of England vessels are represented within the Alden collection (Figure 22).

Figure 22: West of England Type D sherds.

Redware

This broad term describes a coarse earthenware with a light orange to dark maroon paste from the high amounts of iron oxide contained in the clay (Sulya 2015:35). Yet, depending on clay composition and vessel placement in the kiln during the low-temperature firing process, the paste color of a fired vessel body can vary. Numerous inclusion types and sizes are possible. Sand, gravel, and mineral compounds such as calcium carbonate or mica are common. Vessels were molded by hand or thrown on a wheel. They were often coated with a lead-based glaze, especially on the interior surface, to reduce the clay's porosity and make the vessel more functional as a container for liquid. Sometimes these glazes contained small amounts of copper or manganese. These elements caused the finished vessel to appear green or black rather than the various shades of brown that resulted from a clear, all-lead glaze upon the red clay body.

Overall, redwares sherds appear incredibly similar and are ubiquitous over time from medieval to modern eras, thereby making specific analysis challenging. Multiple scholars have lamented the lack of academic work upon these vessels and have attempted to develop methods to study them. Some utilize probate and sale records to trace these vessels' presence over time and contemporary terms used to describe their form (Chace 1974; Deetz 2000; Gibble 2005; Turnbaugh 1983). There is one major problem in such an approach: because redwares were so inexpensive to manufacture, easily broken, and therefore often replaced, these documents rarely list them as valued items (Turnbaugh 1983:1). Therefore, archaeological analysis becomes another method to study these this ware type.

Multiple studies within colonial New England show that redwares were especially important for dairying activities, as seen with the high quantities of milk pans and pitchers found over multiple domestic sites of this period (Deetz 1977; Randall 2009). Indeed Deetz goes on to state that dairying was the only area where ceramics dominated during colonial and medieval, claiming that food preparation and storage vessels were primarily made of pewter and wood.

However, later studies have successfully identified specific ceramic vessel forms that *were* used for food preparation, consumption, and storage. The Potomac Typological System (Beaudry et al. 2000) identifies broad form categories based upon vessel shape and function. The illustrated forms include Deetz's milk pans and butter pots but also pipkins and chafing dishes used for cooking, storage jars, candlesticks, and chamber pots among others. This study proved that colonial ceramics served multiple functions and became invaluable when assessing the redware sherds recovered from the Alden First Home site.

Redware composes 82% of the identified sherds within this collection. This fact suggests that the Alden site fits squarely into the afore-mentioned trend noted by Deetz concerning the popularity of coarse earthenwares on early colonial sites. However, this majority also meant that assessment of this collection was challenging. The primary research goal was to gather all information possible from these sherds. Sherds were separated within the catalog based on inclusions, glaze color, presence, and location, diagnostic features such as decoration or body modification, and possible form.

Due to the volume of sherds, a simple visual analysis served to determine inclusion type. One hundred fifty-seven of the total 994 redware sherds were distinguished by containing various combinations of five elements: calcium carbonate, gravel, mica, sand, and quartz. Most were likely natural inclusions in the clay rather than purposeful temper. Three sherds (7, 103, and 110) contained inclusions that could not be identified and therefore were taken to Dennis Piechota for microscopic analysis. This secondary method revealed a variety of elements within each sherd.

Sherd 7 contained a large amount of quartz sand and off-white rock fragments, also potentially quartz. Small, thin, evenly-spaced voids appeared throughout the paste (Figure 23); these did not contain soot or have a surrounding reaction zone and were therefore were not likely a result of plant remains being burned out. Instead, they might have resulted from the loss of a specific type of poorly-adhering grain particle, the specific composition of which could not be determined without further analysis. Finally, this sherd also contained a curious orange clay accretion on its surface which rubified the surrounding area. This indicates post-depositional contact with another clay vessel.

Figure 23: Sherd 7 inclusions.

Sherd 103 contained multi-mineral inclusions, ranging in size from coarse to medium grains (Figure 24). Water-worn sand and mica were the most common. Like the above Cistercian wares, this sherd also contained a small piece of grog, though this was grey in color rather than red due to reduction. An unidentified, fine-grained, opaque, orange mineral was also present.

Figure 24: Sherd 103 inclusions.

Sherd 110 was also composed of a variety of inclusions, from occasional coarse sand grains down to fine silt and clay (Figure 25). Small, fine, reduced clay nodules were present throughout. These are potentially a result of bacterial activity within the soil, resulting in clumps made of hematite or manganese and iron oxides.

Figure 25: Sherd 110 inclusions.

This secondary analysis proved that redwares should not be dismissed in academic literature based on visual similarity. Under a microscope, striking differentiations are revealed. The three sherds above give information on both natural and pottery-making processes, including individual potter intentionality, thereby complicating the interpretation of this seemingly-simple ware. While other sherds within this collection may provide additional data, further analysis was not undertaken for this thesis and remains an opportunity for future scholars.

Glaze presence and location also assisted in separating the redware vessels within this collection as seen in the above MNV analysis. Forty-six percent of the sherds were glazed on one or both vessel sides, with the rest either purposefully left unglazed or missing a surface and therefore were deemed indeterminate. Nine sherds were covered in a black lead-manganese glaze, while 258, about half of the glazed vessels, had a clear lead glaze. The remainder had glazes dulled by post-depositional processes, thereby making the specific compositions unidentifiable. However, the presence of at least two types of glazes points to specific decisions by the potter, as does glaze location. Hollow vessels were often glazed on the interior only. This fact is demonstrated by two sherds within this collection (7 and 174) that have glazes extending over a minimal part of the exterior rim; the potters understood this to be the minimal amount of glaze required to make the vessels functional as container for liquid.

Sherd curvature was the final property considered within this study and served as an approximation of vessel form. Sherds were designated as flatware, hollowware, or indeterminate. While most of the redware collection belonged to the latter category, the few classifiable sherds do offer an approximation of what kinds of vessels the Aldens owned and which activities they might have performed with them. A more detailed form analysis was performed on all ware types and will be discussed in the following section.

Tin-Glazed

These wares are also termed delftware, faience, or majolica depending on whether they were manufactured in the Netherlands, France, Spain, or England. They are characterized by the distinct layer formed by a tin-lead glaze atop a light tan or pink paste. Temper is rare. Frequently decorations are hand-painted and occur in blue or polychrome designs. The themes vary widely from geometric shapes to floral patterns, and were intended to imitate the aesthetic of expensive Chinese porcelain. The presence of specific designs is utilized to establish manufacturing date ranges for specific vessels. Common forms of tin-glazed vessels include tablewares, especially flanged dishes and plates and small medicine jars. Teawares were also manufactured yet were less common due to the weak glaze adhesion on the small, thin vessel bodies (Jamestown Ceramics Research Group 2016:np; Jefferson Patterson Park and Museum 2002a:np).

Thirteen tin-glazed sherds were recovered from the Alden site. All have a light tan paste. Many are unidentifiable body sherds with little glaze remaining; this is a common problem of these wares due to the glaze's fragility. Therefore, their country of origin and manufacturing date range cannot be determined at this time. However, it is known that direct trade was established between the Plymouth Colony and New Amsterdam. Many Separatist individuals within the former had also spent time in Holland before departing in the *Mayflower* for America; it is therefore likely that these sherds, and the others within the collection, were either Dutch or British (Wilcoxen 1987:31). Two sherds within the assemblage are from flat vessels and many still display typical hand-painted decoration. One sherd (343) is particularly striking due to its size and preservation. It displays a blue and green handpainted design, almost cloud-like, upon a white background (Figure 26). It is similar to a charger, or large, flat dish, within the Museum of London collection that was manufactured in England (identification number 18712). Such dishes were decorative rather than functional and were either stood upright or hung by a small ring on the vessel exterior (Deetz 1977:71; Museum of London 2016:np). However, this is a mere hypothesis; the Alden vessel lacks a specific design, therefore exact identification remains difficult to define.

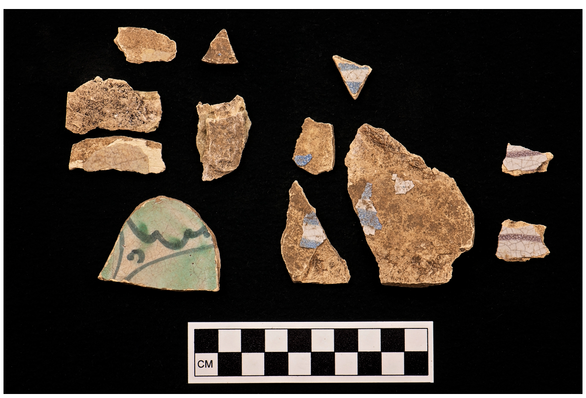

Figure 26: Tin-glazed sherds. Sherd 343 appears in the bottom left.

Unidentified

Along with the potentially Native American sherd 601 discussed above, sherd 456 is the second piece of coarse earthenware within the Alden collection that is unidentifiable at this time. This sherd was likely burned, making identification difficult. It is a small piece of a fine, thin vessel with a glaze on both sides, and therefore likely a European ware (Figure 27). The interior appears dark maroon and shiny while the exterior is dark red and seems smoothed. However, these might be a result of the burning process. The sherd has a tight curvature and was likely part of a hollow vessel.

Figure 27: Sherd 456 interior and exterior.

Later Wares

Creamware

This ware has a light tan paste and a clear lead glaze. It spans from approximately 1760 to 1820 and was the first development in the 18th-century effort to create refined earthenwares with a whiter appearance (Noël Hume 1972; Samford 2014). This manufacturing date implies that the three recovered sherds are a later intrusion upon the original Alden First Home site (Figure 28). This is not surprising given the amount of land movement that has occurred on and around the site especially in the last 50 years. This development will be discussed fully in Chapter 4. While ground-penetrating radar studies performed by Soil Sight LLC in 2006 at the Alden Kindred's request indicate that the original foundation is relatively intact, it is known that the cellar hole was filled in sometime after the original occupation period and might have been used as a refuse disposal area over time. In addition, in 1960 the area surrounding the site was bulldozed to create Duxbury High School's athletic fields; additional disturbance might have occurred during the building of the neighboring Performing Arts Center and library. Therefore intrusive types are to be expected and are luckily few in number.

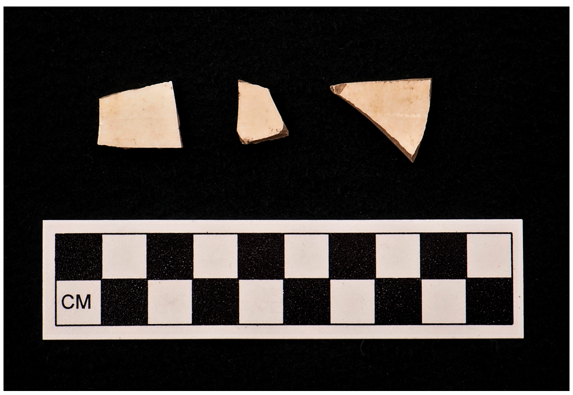

Figure 28: Creamware sherds.

Whiteware

Whiteware was a continuation of the 18th-century trend towards hard-paste, white-bodied vessels. Recent scholarly works have debated the usefulness of this term, stating that it was not utilized in historic records and that the distinction between it and pearlware is on a continuum rather than being a defined break. However, this thesis will utilize the traditional definition of this ware as a refined earthenware with a light tan paste and clear lead glaze that developed around 1820 and continues to be used in modern times (Aultman et al. 2013:40).

Two pieces of whiteware were recovered in Units 66 and 70, both just south of the house foundation. One sherd is undecorated on either side, making exact dating difficult. The other sherd belongs to a second vessel. It is a thin rim that displays a cobalt blue decoration, likely from a transfer print, on its interior (Figure 29). Transfer printing did not develop until 1783 and whiteware until approximately 1820, therefore indicating that both sherds post-date the Alden occupation period by a matter of 200 years or more (Jefferson Patterson Park and Museum 2002a:np).

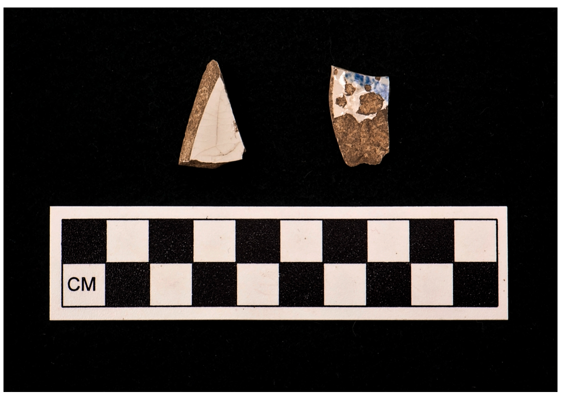

Figure 29: Whiteware sherds.

Vessel Form Analysis

Table 1 above provides the number of sherds and MNV per ware type. The next line of inquiry, therefore, pertained to the type of vessels present within this collection. Within the catalog, two fields designated this information. "Vessel Category" was a broad category; sherds were designated as flateware, hollowware, or indeterminate based on curvature. When possible, "Vessel Type" recorded specific forms (jar, jug, milk pan, etc.) within these classes. These forms were estimated using the POTS system based on sherd curvature, rim or base diameter, and the presence of diagnostic qualities as described above. The majority of sherds, especially redwares, were indeterminate, or could only be assigned to the broad categories of flat or hollow. In total, nine redware sherds were from flat vessels while 218 constituted hollow vessels. This is interesting given Deetz's hypothesis about hollow dairying vessels constituting the majority of vessels on early colonial sites. However, 143 sherds contained enough diagnostic information to be assigned to a total of 12 specific vessel forms. The results are contained in the following Table 2. Sherds within the unidentified form column may or may not correspond with identified vessel forms. The unidentifiable redware vessel count was generated by adding the two manganese-glazed and one slipware vessels listed above in Table 2 to the remaining unidentifiable body sherds representing at least one vessel.

Ware Type	Bowl	Candle-stick	Charger	Cup	Jar	Jug	Lid	Milk Pan	Mug	Pan	Pitcher	Pot/ Butter Pot	Uniden-tifiable Form	Grand Total
Border Ware													1 (2)	1 (2)
Chinese				1 (3)										1 (3)
Cistercian Ware								2 (2)				1 (2)	1 (8)	4 (12)
Creamware													1 (3)	1 (3)
Frechen						4 (10)								4 (10)
Iberian					1 (76)									1 (76)
Native American													2 (20)	2 (20)
North Devon: Variety I								1 (1)					6 (56)	7 (57)
North Devon: Variety II													1 (3)	1 (3)
North Devon: Variety III													1 (2)	1 (2)
Redware	1 (2)	2 (2)					1 (1)	1 (1)	1 (8)	2 (3)	1 (5)	6 (25)	4 (947)	19 (994)
Rhenish									1 (1)					1 (1)
Tin-Glazed			1 (1)										3 (12)	4 (12)
Unidentified													1 (1)	1 (1)
West of England Type D													3 (6)	3 (6)

Whiteware													2 (2)	2 (2)
Grand Total	1 (2)	2 (2)	1 (1)	1 (3)	1 (76)	4 (10)	1 (1)	4 (4)	2 (9)	2 (3)	1 (5)	7 (27)	26 (1062)	53 (1205)
% of Total Forms	1.89	3.77	1.89	1.89	1.89	7.55	1.89	7.55	3.77	3.77	1.89	13.21	49.06	100.00

Table 2: Count of identified forms by ware type. Number of sherds per ware type and form are contained in parentheses.

To further analyze household activities, the above forms were also assigned to specific, functional categories utilizing the POTS designations in Table 3 (Beaudry et al. 2000:22).

Beverage Consumption	**MNV**	**Sherd Count**
Cup	1	3
Jug	4	10
Mug	2	9
Pitcher	1	5
Total Count	8	27
% of Total	15.09	2.24
Food Processing: Cooking		
Bowl	1	2
Lid	1	1
Pan	2	3
Total Count	4	6
% of Total	7.55	0.50
Food Processing: Dairying		
Milk Pan	4	4
Pot/Butter Pot	7	27
Total Count	11	31
% of Total	20.75	2.57
Food Processing: Storage		
Jar	1	76
Total Count	1	76
% of Total	1.89	6.31
Other		

Candlestick	2	2
Charger	1	1
Total Count	3	3
% of Total	5.66	0.25
Unidentified		
Total Count	26	1062
% of Total	49.06	88.13
Grand Total	53	1205

Table 3: Vessel form and function (Beaudry et al. 2000:22).

It is clear that storage and dairying, as Deetz and Randall predicted, were the most highly-represented domestic activities. However, the high count of Iberian storage jars within both tables must be discussed. As mentioned above, these jars were large and could break into many or few pieces. Therefore, when analyzing these results, the MNV analysis must be considered; having only one determinable vessel counteracts the supposed statistical importance of Iberian jars shown within this table, lowering it considerably. However, the mere presence of these vessels is important. For the Aldens and their contemporaries, these large containers of essential goods would have been invaluable as they raised multiple children and faced harsh New England winters.

The high number of Frechen jugs and pot/butter pot sherds shown within Tables 2 and 3 could also be a result of large vessels breaking into many pieces. However, because the latter vessels and the dairying activities they represent were known to be central within early colonial life high counts could therefore also be an indication of true significance. Given this fact, it is curious that only four milk pan sherds were recovered.

However, this may be due to the diagnostic characteristics used to identify them, namely thick, coarse rims and ridged bodies. It is possible that more sherds, especially those within the unidentified redware grouping, also represented milk pans but lacked these highly-recognizable qualities.

Despite these statistical problems, it remains clear that dairying was an important part of daily, domestic activities at the Alden site and will therefore now be discussed in detail. Though the colonists had goats in the early years at Plymouth, the first cattle were not shipped from England until 1624. In 1627, the growing number of animals was divided between twelve groups, often composed of families, who held them as communal property. The Aldens themselves shared four heifers with the Howland family and six other individuals. Such divisions would have made caring for these animals easier and as well as enforcing the sense of mutual dependency and social responsibility between colonists (Randall 2006:81; Stratton 1986:422).

In the 17th century, women were the primary performers of these processes; it is likely that at the First Home it was Priscilla and her daughters who undertook this work. Cows were milked multiple times a day and the milk poured into shallow, thick-rimmed ceramic pans to cool. When making cheese, the cream was skimmed from the milk pan, the milk heated, the curds and whey separated, and the curds cut, pressed, and cooled in ceramic colanders. To make butter, the cream from the milk pan was stored for up to five days and then processed in a wooden butter churn (Gibb and King 1991:113; Randall 2009:66). Both cream and butter were stored in jars or pots; per POTS, the latter were medium to large vessels, more tall than wide, with convex bodies and often with pronounced rims (Beaudry et al:2000) (Figure 30).

Figure 30: Pot rim and body.

However, contrary to Deetz's prediction, ceramics were utilized for other household activities as well. Two sherds within this collection are possibly from candlesticks (Figure 31). In addition, though the exact location of the hearth within the foundation is at this point hypothetical, the lid (Figure 32) and pan fragments (Figure 33) indicate cooking activities somewhere within the household. This is similar to the Allerton/Cushman assemblage; along with vessels associated with dairying, Randall identified cooking pans, pipkins, porringers, and serving plates. The presence of these items, many of which were made of English Border ware, North Devon ware, and redware, indicates that the early colonists were relying on traditional forms as they established themselves in the New World.

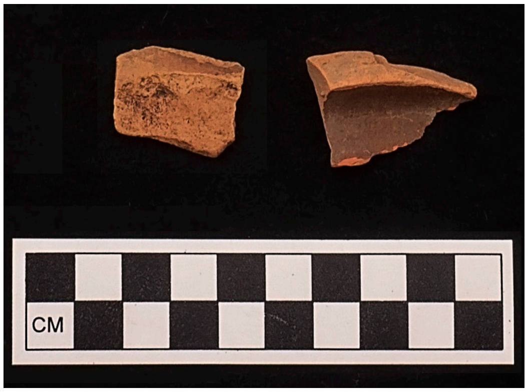

Figure 31: Candlestick fragments.

Figure 32: Lid fragment.

Figure 33: Pan rim sherds.

Along with cooking items, a variety of drinking vessels are present at the First Home site, composing a full fourteen percent of the collection. Many of these vessel types are known to have been used for consuming wine or beer. Due to the unreliability of safe water, the latter were common beverages for both men and women during this time period. In fact, beer has been termed "the water of seventeenth-century England" and individual households within England and colonial America often produced their own (Albertson 1950:478; Deetz and Deetz 2000:122). While as yet there is no evidence that such activities were part of the Alden household production, it is clear that the family at least had access to these commodities. This is not surprising given that large containers of these beverages, other spirits, and water were documented aboard the *Mayflower*'s original voyage (Albertson 1950:478); Albertson goes on to note how John Alden, as ship cooper, would have been responsible for ensuring these precious goods did not leak out of their casks. The fact that the assemblage at the Duxbury home, erected at least seven years after the *Mayflower* docked, reflects these beverages' continued use and importance as standard supplies within the colony.

Notably, both individual and communal drinking vessels are present (Figure 34 and 35). Deetz observed the increase of mugs and cups after 1660 upon colonial American sites; he hypothesized that this trend related to the rise of individualism (Deetz 1977:85). The presence of such personal items at the Alden house might indicate that this family was beginning to participate in this emerging ideology. However, there is no absolute method to prove this theory; while it is likely that the jugs and pitchers were placed upon the table at meal times for communal consumption whether their contents were then shared or poured into individual vessels remains unknown.

Figure 34: Mug fragments.

Figure 35: Pitcher fragments.

Together with these utilitarian functions, the Alden artifacts had ideological ones as well. The large, decorated, tin-glazed charger was likely a display rather than serving item, used to broadcast wealth or merely provide a pleasing household aesthetic. The Chinese porcelain cup, due to its high value, might have also served as a status indicator rather than an individual item for consumption. These vessels might represent John Alden's later, prestigious positions within the Plymouth government. This is not to say that the Aldens were always wealthy compared to their contemporaries. On the contrary, in 1660 John was recorded as being "low in his estate"; for his government service, the Plymouth Court granted him ten pounds. In addition, when he died in 1687 he did not leave a will, presumably due to most of his estate being sold during his lifetime and the remainder already divided among his children (Stratton 1986:233). Therefore, the porcelain cup and the decorative charger may originate from one period of the Alden family's lives when they did enjoy relative economic success.

Overall, traditional English forms, especially the ubiquitous redware, dominate the assemblage; these utilitarian vessels, as well as the range of domestic activities they and the overall variety of ceramic forms represent, reflect a continuation of an English subsistence farming lifestyle within the New World. In contrast, high amounts of storage vessels demonstrate the survival methods employed within the new environment. Therefore, these ceramics represent both one family's day-to-day activities and wider trends of how early settlers functioned within colonial New England. However, it remains uncertain as to how representative this collection is when compared to contemporary sites. As will be discussed in Chapter 5, individual social status, resource access, household economic priorities, and site chronology were all factors which could influence how specific households varied from the patterns shown above.

CHAPTER 4

SPATIAL ANALYSIS

A consideration of space is critical in understanding the Alden site. The archaeological and geophysical studies mentioned in Chapter 1 as well as the above ceramic analysis show that the First Home Site ceramic collection dated from the original Alden occupation period; the question then became whether the assemblage's spatial distribution was a result of designated activity areas, purposeful disposal processes, post-depositional processes, or a combination thereof. Any of these processes could reveal information about the First Home site. Activity areas, including those for cooking or dairying, might provide insight on the interior architectural layout of the First Home site such as the location and usage of specific rooms. Refuse distribution could reflect purposeful sweeping or dumping events. Post-occupational processes such as structural demolition or site disturbance would demonstrate how the First Home site changed over time.

To explore these possibilities, the First Home site was divided into three areas of interest based upon Robbins's excavation methods: the 10x10' units of topsoil removal; the cellar; and the remaining 2.5X2.5' interior house foundation units. Each was utilized to answer specific queries about the use of space at the site.

The first set of analyses was performed using the 10X10' topsoil (Unit 1-96) and the 2.5X2.5' interior house units (Units FA-FNN). This study applied digital mapping methods to artifact counts and proveniences to address whether artifact distributions were the result of occupation-era activity areas, the First Home demolition process, or post-occupation disturbances. Activity areas would be indicated by small concentrations of artifacts, likely with a common function such as dairying or cooking vessels. Structural demolition would be shown by large concentrations of artifacts especially window glass and nails around the house foundation, indicating purposeful demolition and filling areas or where the structure fell in on itself. Post-occupation disturbances from natural forces or landscaping efforts could be demonstrated by randomly distributed artifacts.

The second set of tests was performed on the cellar area. Two questions were posed: 1) are there any significant differences between the artifact distributions of each cellar layer that might indicate a change in cellar usage and household activities over time; and 2) how do those distributions compare with the distributions within the remaining interior household units? If the distributions were similar, it could be theorized that similar depositional events such as intentional dumping or structural collapse influenced both areas. If different, it could be theorized that the cellar represented one or more events that were spatially or temporally separate from those impacting the rest of the household interior.

The third series analyzed the remaining units within the house foundation only seeking any localized patterns of artifact distributions. If present, artifact clusters could reveal information about the usage of space within the house interior. Again, this could include refuse deposal practices or where specific domestic activities were performed. As will be seen, both processes are indicated.

The results from the analyses detailed above led to a final set of questions concerning the architectural layout of the First Home site. Using the spatial distribution data of the interior house and topsoil units, this thesis hypothesizes an overall building plan for the First Home structure as well as the locations and functions of rooms within it.

Methods and Analysis

Section I: Nail, Window Glass, and Ceramic Sherd Correlation Analysis

To begin, gradation maps were created within the ArcMap software utilizing artifact counts and proveniences from topsoil units. These provided a simple visual analysis of site-wide patterns of spatial distribution, specifically where clusters of artifacts occurred (Figures 36-38). As stated above, these concentrations could be the result of activity areas, structural layout, or post-occupational disturbances.

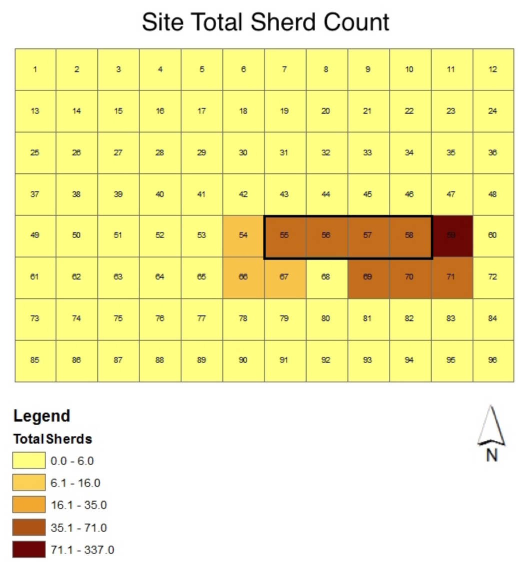

Figure 36: Total sherd count per site-wide topsoil units. The house foundation is outlined in Units 55 through 58.

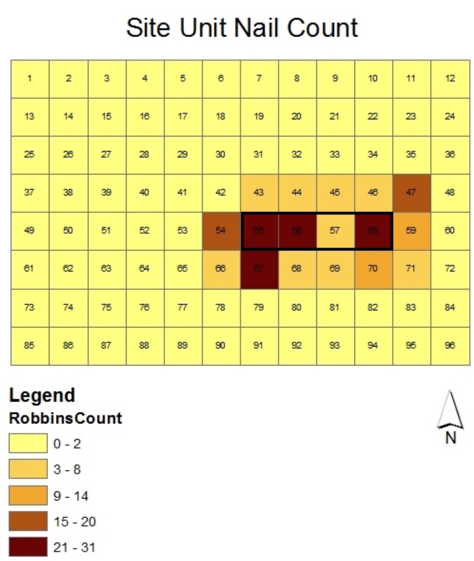

Figure 37: Total nail count per site-wide topsoil units. The house foundation is outlined.

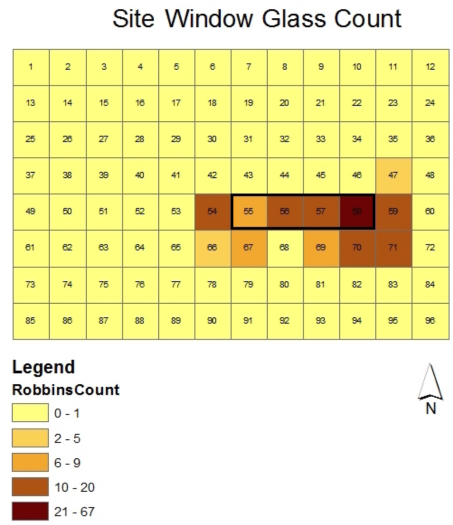

Figure 38: Total window glass count per site-wide topsoil units. The house foundation is outlined.

However, Robbins, like many of his contemporaries, focused his excavations on the area containing direct remnants of the household rather than the surrounding yard space. This methodology created biased results, with high artifact counts around his area of interest, the house foundation, and low counts in all other units immediately outside of it. In addition, due to the fact that units 10 feet or more away from the foundation were not excavated (Figure 3), an abrupt and misleading decrease of artifact counts around the foundation is present in the above graphs. Due to these low or absent artifact counts, no patterns concerning exterior trash disposal areas or other activity areas can be discovered at this time. Such activities may be discoverable through further excavation of the site.

However, the fact that artifact clusters do appear in the foundation area might indicate that their distribution was related to post-occupational structural demolition and foundation filling. Multiple studies have demonstrated that window glass and nail proveniences can be taken as a proxy for architectural elements of a structure (Beaudry et al. 2003:172; Neiman et al. 2000:34). A structure can collapse in on itself, creating a concentration of both artifacts within the foundation which display an approximate outline of the building. Intentional foundation filling with refuse would be indicated by multiple other artifact types within this same interior area. Isolated clusters of glass and nails can approximate the location of specific architectural features such as doors and windows.

A series of tests were performed with the help of Professor Doug Bolender utilizing the Statistical Package for the Social Sciences (SPSS) software to analyze whether nail and window glass distributions were related to the First Home site's demolition. First, a Pearson's correlation coefficient test was run. This analysis tests the strength of the linear relationship between the two variables (see Appendix A: Nail, Window Glass, and Ceramic Sherd Count Correlation Analysis). Since the topsoil units had overall low counts of artifacts, this analysis utilized the count of nails and window glass per interior house unit. The resulting R-value was 0.678, which indicated a significant correlation between glass and nail distributions. An ordinary least squares (OLS) regression was then performed. This tested the null hypothesis that no association existed between the independent variable, nail count, and the dependent variable, window glass count. The OLS model yielded an R-squared value of 0.452 and a p-value of 0.00. The latter value is defined as the probability that one would see the given results given that the null hypothesis was true; in this case, the small p-value led to the null hypothesis of no association between variables being rejected. As a third test, a Global Moran's I test of spatial autocorrelation was performed utilizing the OLS residuals. Given a set of features, the Global Moran's I test considers both feature placement within space and values associated with each to determine whether those values are clustered, dispersed, or randomly distributed across an entire site area; for this analysis, excavation units were the inputted features and artifact counts per unit the associated values. The test revealed a site-wide clustered pattern (Moran's Index value=0.269, z-score=3.216, p-value=0.001). It was therefore hypothesized that nail and glass distributions were correlated enough to reflect one overall deposition event, presumably the structure's demolition. This was significant for interpreting the site: either nail and glass distributions reflected a purposeful filling episode where structural refuse was mixed and piled into the foundation or the collapsed structure's architectural outline including the location of doors and windows.

To examine whether there were any localized differentiations between glass and nail distributions that might reflect the latter possibility, the ArcMap software was utilized to create a gradation map of the residuals from the above OLS analysis (Figure 39). This map showed clusters of window glass in the center of the household and along the northern edge of the foundation, with isolated high values on the east, south, and west edges.

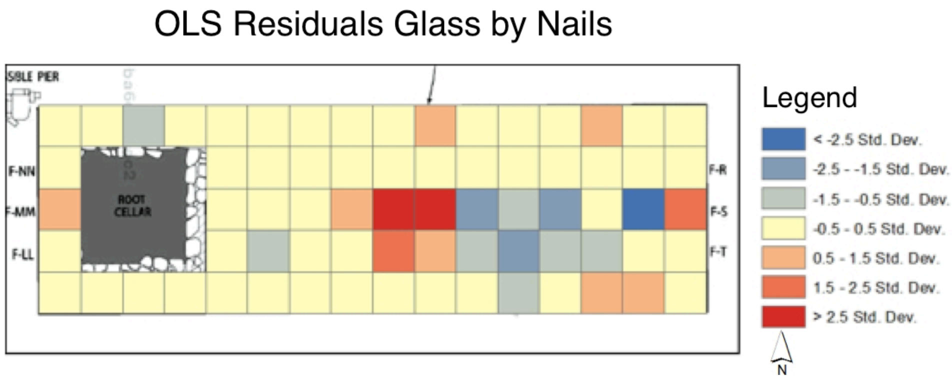

Figure 39: Gradation map of nail and window glass counts OLS residuals.

To explore these concentrations, a Hot Spot Analysis (Getis-Ord Gi*) and a Cluster and Outlier Analysis (Anselin Local Moran's I) were applied (see Appendix A: Nail, Window Glass, and Ceramic Sherd Count Correlation Analysis). These tests statistically analyze localized trends within distributions and create maps that display specific features with higher or lower associated values than expected given the values of surrounding features. Both analyses revealed a high concentration of glass and nails in the center of the First Home site (Figures 40 and 41). This cluster could be the result of intentional foundation filling or internal structural collapse. The Local Moran's I test also revealed an isolated unit of high amounts of glass on the eastern end of the household which might indicate the location of a window.

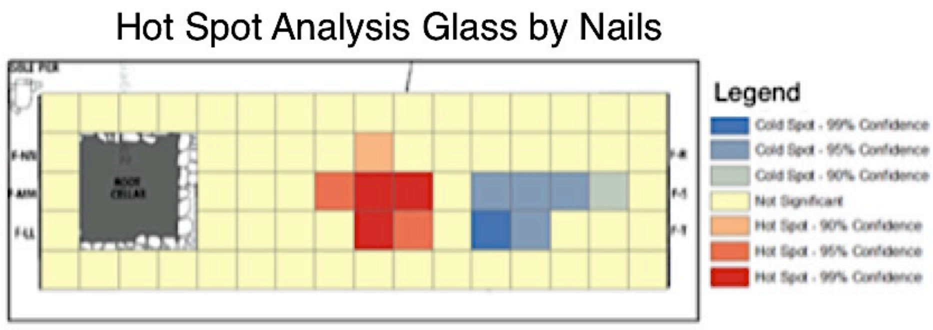

Figure 40: Hot spot analysis of nail and window glass counts OLS residuals per interior house foundation unit.

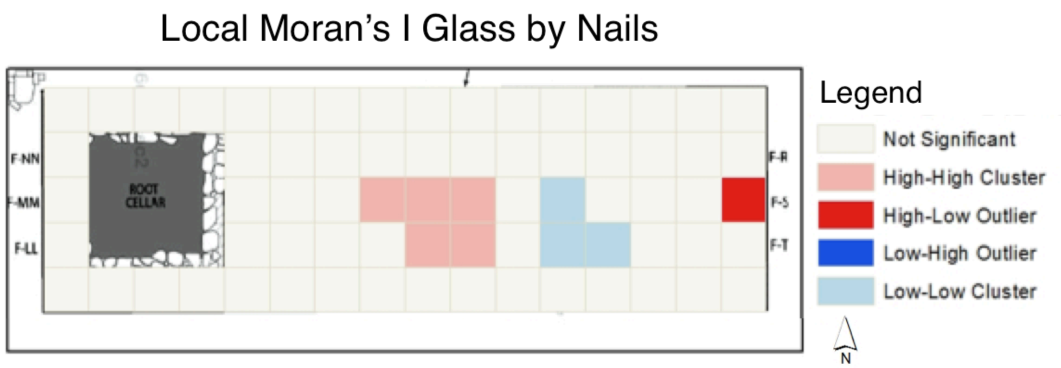

Figure 41: Local Moran's I analysis of nail and window glass counts OLS residuals per interior house foundation unit.

The results of the above tests indicate that window glass and nail distributions were indeed related to the First Home site's demolition. It was therefore hypothesized that if the spatial distribution of ceramic sherds was correlated with those of window glass and nails, it too was the result of post-occupational structural demolition and foundation filling. If the distributions were not correlated, ceramic distributions could be interpreted as randomly-distributed fill, evidence of activity areas, or an indication of refuse disposal practices.

		SherdCount	NailCount
SherdCount	Pearson Correlation	1	.180
	Sig. (2-tailed)		.133
	N	71	71

Table 4: Pearson's correlation test of ceramic sherd and nail counts.

		SherdCount	GlassCount
SherdCount	Pearson Correlation	1	.404**
	Sig. (2-tailed)		.000
	N	71	71

Table 5: Pearson's correlation test of ceramic sherd and window glass counts.

As the Pearson's correlation analyses (Table 4 and 5) above demonstrate, ceramic sherds were correlated with window glass only. To further examine how the distributions of these two artifact classes were related within the household, an OLS analysis was run. A gradation map was produced of the residual values and Global Moran's, Local Moran's, and Hot Spot analyses were performed upon them (see Appendix A: Nail, Window Glass, and Ceramic Sherd Count Correlation Analysis). The resulting maps showed that ceramic sherds and window glass clustered in the northern central portion of the household (Figure 42). Because of the lack of correlation with nails, it was hypothesized that this clustered area represented a depositional event separate from structural demolition and will be further interpreted within following analyses.

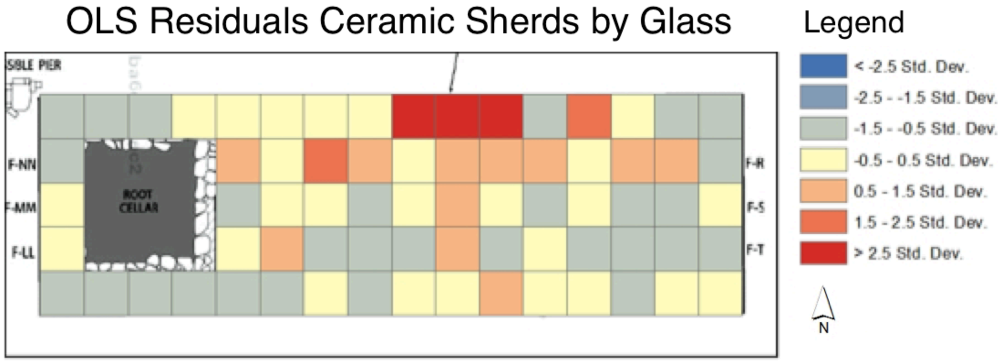

Figure 42: Gradation map of ceramic sherd and window glass counts OLS residuals.

However, the ceramic sherd count data was heavily influenced by redware sherds which composed approximately 82 percent of the First Home collection. As discussed in Chapter 3, redwares were ubiquitous throughout the 17th century and were utilized for many functions. Due to this heavy use, they were often broken, yet because of their simple manufacturing method were inexpensive to replace, leading to a large number of sherds upon early colonial sites. In contrast, other wares, designated 'non-redwares' for this analysis, were less prominent on the site. These vessels were not as replaceable as redwares and were often utilized for specific functions such as cooking or beverage consumption. Because of this dissimilar usage and breakage cycle, it was therefore hypothesized that the spatial distributions of non-redwares might contain patterns that differed significantly from their counterparts. Thus the spatial distributions of the two ware type categories were subsequently analyzed separately.

Again, Pearson's correlation and ordinary least squares regression analyses were applied to analyze the relationship between both ware types and window glass. Nail distributions were not tested given that total ceramic sherd count distributions were not correlated with them. The resulting R-values showed that only redware distributions were significantly correlated with window glass distributions. Again, a gradation map was created utilizing the OLS residuals and Global Moran's, Local Moran's, and Hot Spot analyses were applied. All maps displayed a cluster of redware sherds in the north central portion of the household as shown below in Figure 43 (see Appendix A: Nail, Window Glass, and Ceramic Sherd Count Correlation Analysis).

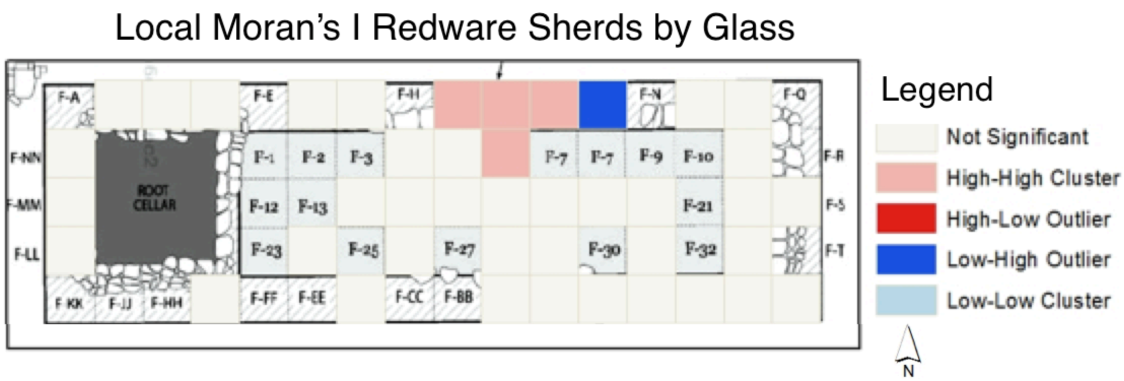

Figure 43: Local Moran's I analysis of redware sherd and window glass counts OLS residuals.

In contrast, non-redware sherd distributions were not significantly correlated with window glass (p-value=0.169). However, counts for these wares are low, especially when compared to redwares, a fact which might have produced biased statistical results. Despite these low counts, the same analytical and mapping steps as above were performed to visualize their spatial distribution. Sherds clustered within the south-central area of the First Home site (Figure 44), a pattern which is seemingly separate from the northern redware cluster in the north.

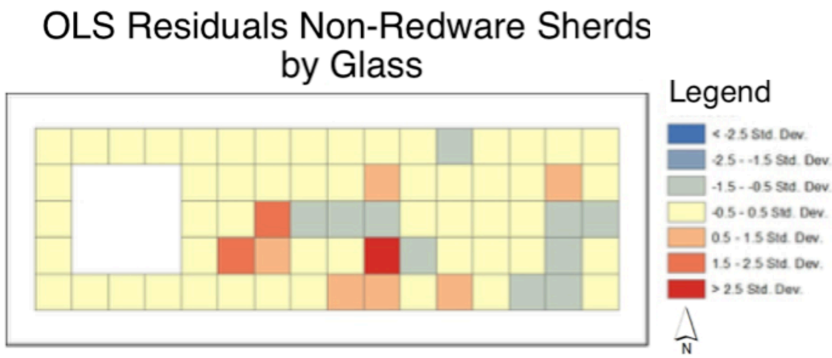

Figure 44: Gradation map of non-redware sherd and window glass counts OLS residuals.

Therefore, overall, it is hypothesized that three depositional events influenced the nail, window glass, and ceramic distributions at the First Home site. The first was likely the demolition of the household in the late 17th century. This led to correlated distributions of window glass and nails which mirrored the architectural layout of the household. The second event deposited a cluster of window glass and redwares along the northern edge of the house foundation while a third produced a concentration of non-redwares in the southern portion. To analyze these further, additional analytical tests were applied to the interior house units which will be detailed in Section III.

Section II: Cellar Analysis

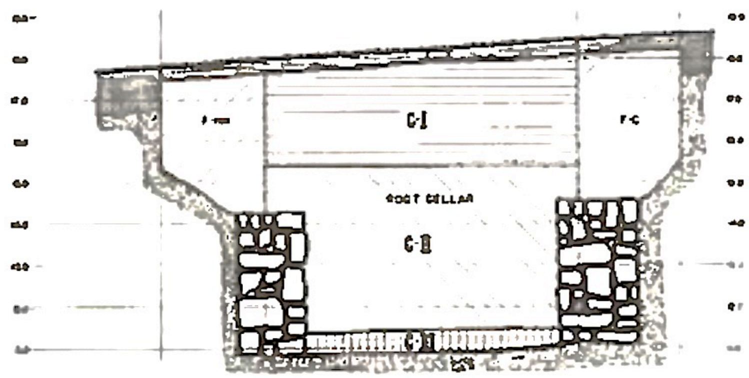

Figure 45: Robbins's cross-section drawing of the cellar layers (Robbins 1969:46).

The cellar contained the highest concentration of artifacts on the First Home site. It was excavated in arbitrary layers, with layer CI being three feet deep, CII four feet, and CIII six inches to capture the bottom of the cellar stratigraphy (Robbins 1960:17-19) (Figure 45). Based upon homogenous soil appearance, Robbins posited that the entire cellar represented one fill event (Robbins 1960:17); this thesis tested his theory and sought any differences between cellar layer artifact distributions and those of the rest of the house interior.

However, the cellar area posed two analytical problems. Because artifacts had both a vertical (cellar layer) and horizontal (unit) provenience, 3D modeling techniques were required for spatial analyses that were beyond the scope of this thesis. Therefore, this area's data was not inputted into ArcMap and mathematical methods were applied instead. However, only three cellar layers were present. Any statistical method comparing the composition of these layers to each other would require a sample size of three, a value too small to produce confident results. Therefore, a simple test was required that could compare the count of artifacts found within the cellar, the interior house units, and the topsoil units.

Comparisons of artifact ratios proved to be an effective method (see Appendix B: Cellar Analysis). Along with meeting the above qualifications, this method negated both unit size and layer depth as contributing factors and instead concentrated on basic assemblage composition, for example the number of redware sherds per number of nails within each cellar layer. Ratios were produced for each cellar layer. Two-tailed t-tests then compared these values with the ratio means and confidence intervals for areas with multiple units. These were the overall cellar, the interior house units, and the site topsoil units.

There were no significant differences between the three cellar layers. However, two noteworthy results were revealed. First, the ratio of nails to glass within the cellar highly exceeded the 95 percent confidence intervals for both the interior house and topsoil units (Tables 6A and 6B). Robbins himself noted the “multitude of nails” found within the cellar and recorded that some even had wood still attached (Robbins 1969:25). Therefore the high count might imply a wooden floor over the cellar or the purposeful deposition of architectural debris within that area.

Category		N	Mean	Std. Deviation	Std. Error Mean
	NailsGlass	0[a,b]	.	.	.
	TotalCeramicsNails	0[a,b]	.	.	.
	TotalCeramicsGlass	0[a,b]	.	.	.
Cellar	NailsGlass	3	6.401851852	2.061555308	1.190239512
	TotalCeramicsNails	3	.3791441136	.1241784135	.0716944404
	TotalCeramicsGlass	3	2.287037037	.3340886504	.1928861723
House	NailsGlass	61	4.020958104	3.341129648	.4277878156
	TotalCeramicsNails	69	.5903150715	1.245626414	.1499557985
	TotalCeramicsGlass	61	1.942700409	3.329084573	.4262456018
Surface	NailsGlass	14	2.008356362	2.022302926	.5404831916
	TotalCeramicsNails	18	.3838435171	.3643935906	.0858883930
	TotalCeramicsGlass	14	.4950326845	.3771535601	.1007985289

Category		t	df	Sig. (2-tailed)	Mean Difference	95% Confidence ... Lower	Upper
Cellar	NailsGlass	5.379	2	.033	6.401851852	1.280664566	11.52303914
	TotalCeramicsNails	5.288	2	.034	.3791441136	.0706678337	.6876203934
	TotalCeramicsGlass	11.857	2	.007	2.287037037	1.457114821	3.116959253
House	NailsGlass	9.399	60	.000	4.020958104	3.165255068	4.876661140
	TotalCeramicsNails	3.937	68	.000	.5903150715	.2910829345	.8895472084
	TotalCeramicsGlass	4.558	60	.000	1.942700409	1.090082260	2.795318558
Surface	NailsGlass	3.716	13	.003	2.008356362	.8407134152	3.175999308
	TotalCeramicsNails	4.469	17	.000	.3838435171	.2026348477	.5650521865
	TotalCeramicsGlass	4.911	13	.000	.4950326845	.2772707021	.7127946668

Table 6A and 6B: Two-tailed t-test on cellar, house, and surface unit total ceramic, glass, and nail ratios.

Second, while the ratios of redware to nails and glass are similar for all three levels, both CII and CIII's non-redware to nails and glass are outside the 95% confidence interval for the house unit mean and CIII is on the upper-most end (Tables 7A and 7B). This suggests that the distribution of redwares and non-redwares are different and implies separate causations. These will be further explored in Section III below.

Category		N	Mean	Std. Deviation	Std. Error Mean
	RedwareNails	0[a,b]	.	.	.
	RedwareGlass	0[a,b]	.	.	.
	NonRedwareNails	0[a,b]	.	.	.
	NonRedwareGlass	0[a,b]	.	.	.
Cellar	RedwareNails	3	.2659015803	.0554703127	.0320258000
	RedwareGlass	3	1.627777778	.1974372849	.1139904696
	NonRedwareNails	3	.1132425332	.0954777698	.0551241161
	NonRedwareGlass	3	.6592592593	.4287986856	.2475670365
House	RedwareNails	69	.5326501353	1.211219056	.1458136393
	RedwareGlass	61	1.695593367	3.162560409	.4049243673
	NonRedwareNails	69	.0576649362	.1934636906	.0232902914
	NonRedwareGlass	61	.2471070421	.8434155430	.1079882946
Surface	RedwareNails	18	.2647154899	.2725991873	.0642522446
	RedwareGlass	14	.3334615674	.3030443671	.0809920139
	NonRedwareNails	18	.1191280272	.1205182101	.0284064145
	NonRedwareGlass	14	.1615711171	.1507619022	.0402928132

Category		t	df	Sig. (2-tailed)	Mean Difference	Confidence ... Lower	Upper
Cellar	RedwareNails	8.303	2	.014	.2659015803	.1281056846	.4036974761
	RedwareGlass	14.280	2	.005	1.627777778	1.137316373	2.118239183
	NonRedwareNails	2.054	2	.176	.1132425332	-.123937395	.3504224618
	NonRedwareGlass	2.663	2	.117	.6592592593	-.405935726	1.724454245
House	RedwareNails	3.653	68	.001	.5326501353	.2416835483	.8236167223
	RedwareGlass	4.187	60	.000	1.695593367	.8856240369	2.505562697
	NonRedwareNails	2.476	68	.016	.0576649362	.0111898832	.1041399892
	NonRedwareGlass	2.288	60	.026	.2471070421	.0310982916	.4631157926
Surface	RedwareNails	4.120	17	.001	.2647154899	.1291551033	.4002758766
	RedwareGlass	4.117	13	.001	.3334615674	.1584889591	.5084341757
	NonRedwareNails	4.194	17	.001	.1191280272	.0591957312	.1790603231
	NonRedwareGlass	4.010	13	.001	.1615711171	.0745237863	.2486184478

Table 7A and 7B: Two-tailed t-test on cellar, house, and surface unit redware, non-redware, glass, and nail ratios.

Cross-mend analysis was also utilized to study the cellar area. Sherds from the reconstructed Iberian storage jar were recovered from CII, CIII, and multiple house units. This distribution implies several depositional or post-depositional events. For instance, after the vessel broke, some sherds might have been swept into the cellar whilst others were scattered across the floor and trampled. Natural post-depositional processes such as water and animal activities might have also been factors of this sherd distribution.

One sherd of a redware pot was recovered within CI and another which mended with it in F26; sherds from another redware vessel with an undetermined form were from CI and CIII. Like the Iberian storage jar sherds, these imply that the cellar layers were at some points open to the rest of the house. However the specific depositional processes influencing these distributions remain undetermined: sherds could have been purposefully swept aside or into the cellar, trampled into the floor, or moved by natural forces such as water or animals.

However, cross-mend analysis of tin-glazed vessels does offer specific details about spatial usage within the house foundation. One tin-glazed sherd was found within cellar Layer II; all others of this ware type were within units F16 and F28 near the center of the house. This implies an in-situ site of vessel use, breakage, and deposition. This area was essential in interpreting activity areas within the household and will be further analyzed in the following section.

Given these artifact distributions, three interpretations for the cellar area are possible. First, the cellar fill could result from refuse accumulation throughout the Alden occupation period. Second, the fill could signify post-occupational events, such as structural demolition, intentional foundation filling, or site disturbance by natural processes or land development. Third, cellar artifact distributions may result from a combination of both occupational and post-occupational period events.

Section III: Interior House Units Analysis

Cross-mend analysis showed distributions of sherds across the interior of the house foundation and into the cellar. To analyze whether the former area contained any additional spatial patterns two steps were taken. First, a digital map was created within the ArcGIS ArcMap software. One layer represented the interior house foundation units and another the site topsoil units. Artifact counts per unit were then inputted. Counts were categorized by ware type, vessel form, vessel form category, and total sherd count per unit. Second, three statistical analyses were performed and will be explained below (see Appendix C: Site Topsoil and Interior House Unit Analysis).

Three series of maps were created using the interior foundation unit data. The first set were gradation maps scaled on the number of sherds per unit (Figures 46 and 47). These provided a simple visual analysis of where concentrations occurred. The cellar was included within this first series. The second and third map types were statistical outputs based on Local Moran's I and regression analyses. The cellar data was not incorporated into these due to the high amounts of artifacts contained within that would obscure any other spatial patterns in the rest of the house foundation. Total sherd and ware type counts returned significant results whilst vessel form and category did not, a result likely due to their small sample size.

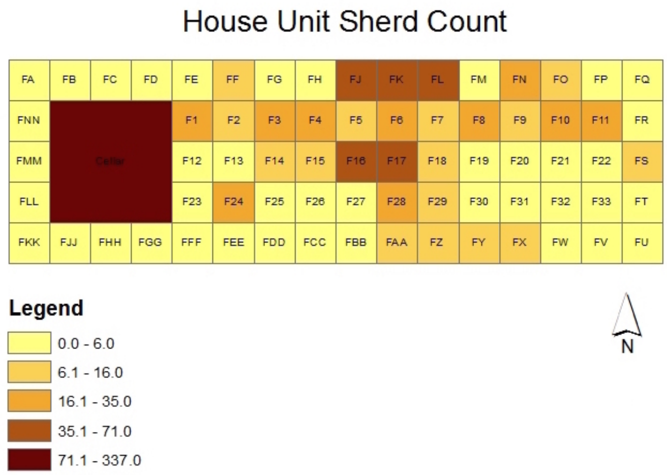

Figure 46: Total sherd count per house unit.

Two clusters were immediately apparent. Excluding the high concentration of sherds within the cellar, two cluster areas are present within the house foundation. First, there is a clear linear pattern along the northern edge. Such linearity rarely occurs naturally and reinforces the hypothesis that the ceramic distribution was the result of cultural patterns such as sweeping rather than random depositional processes. Second, sherds seemed to be concentrated in the middle third of the house, especially the north-central units. It was hypothesized that this clustering represented activity or additional disposal areas within the household.

Multiple tests were applied to evaluate whether the above visually-apparent clusters could be validated statistically. First, a Global Moran's I spatial autocorrelation test was performed on individual excavation units and sherd counts. The test revealed a clustered pattern (Global Moran's I Index value= 0.354; p-value=0.000). Given the low associated p-value, there is a less than 1 percent chance that the clustering observed within the gradation test was caused by random chance. Therefore, this validated the theory that significant spatial clusters of sherds were indeed present.

However, because the Global Moran's I is a test of global spatial autocorrelation, it only assesses whether or not there is clustering at the site-wide level; it does not reveal specific areas where clusters occur. Therefore, a Local Moran's I test was run within ArcMap (Figure 47); it revealed a high amount of sherd clustering within multiple units in the central-northern portion of the house. This confirmed one of the two patterns observed in Figure 46 above.

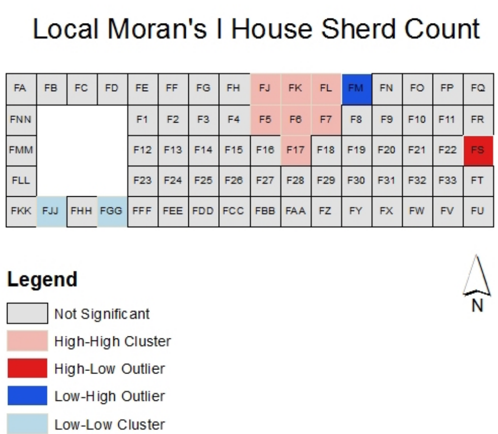

Figure 47: Local Moran's I results of total sherds per house unit. The cellar area is excluded.

However, as noted in Section I of this chapter, it was known that sherd count data was driven by the high counts of redware. Therefore, redwares were again separated from 'non-redwares' (Figures 48 and 49). This division allowed spatial patterns of non-redware sherds which had been obscured by the redware counts to become apparent.

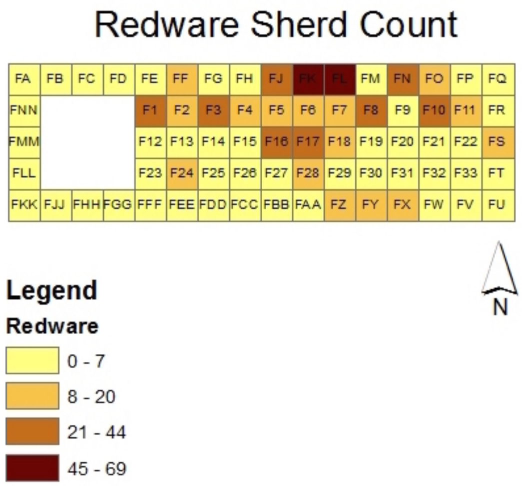

Figure 48: Total redware sherd count per house unit.

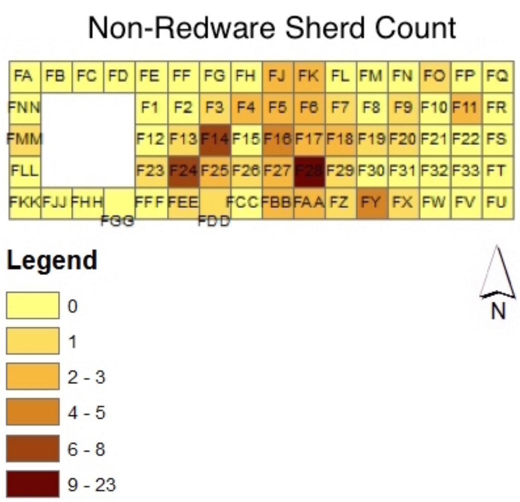

Figure 49: Total non-redware sherd count per house unit.

Figure 48 displays a linear gathering of redware sherds along the northern edge of the foundation whilst in Figure 49 non-redware sherds cluster in the center of the house interior, particularly within the southern portion. These graphs mirror the results of

Figures 43 and 44 in Section I of this chapter. To verify whether the spatial distributions of redwares and non-redwares differed statistically as well as visually, an ordinary least squares regression test was performed which queried whether the distribution of non-redware sherds could be predicated given the distribution of redware sherds (Figure 50).

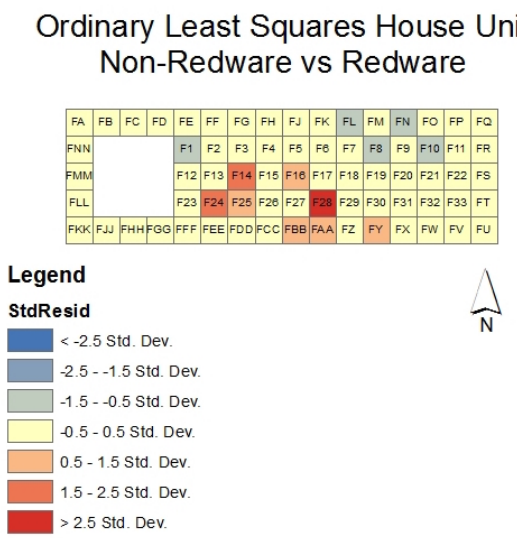

Figure 50: Ordinary least squares regression analysis gradation map. Many more non-redware sherds occur in the southern part of the house foundation than statistically expected.

The regression analysis returned multiple values, the most revealing of which are the p-value and the multiple R-squared value. The former was 0.0037, indicating that there is a significant relationship between non-redware and redware sherds. In other words, one can predict the former's distribution based on the latter's. However, the multiple R-squared of 0.1023 indicates that only approximately 10 percent of the non-redware sherds distribution can be predicted by the redware. Therefore, the analysis demonstrates that, while there is a relationship between the two factors, approximately 90 percent of the non-redware sherd distribution remained unexplained by the redware sherd distribution. This differentiation corresponds to the northern redware cluster and the southern non-redware cluster shown within Figures 48 and 49. It was therefore hypothesized that these distributions were the result of at least two depositional processes, one leading to the northern redware cluster and another the southern non-redware cluster; subsequently, these two areas were interpreted separately.

Northern Cluster

Whilst multiple ware types were found within this area the majority were redwares. Redwares were ubiquitous in time, space, and usage within household activities. Vessels were often broken and cheaply made. Therefore, it can be hypothesized that the distribution of this ware type represents multiple disposal events over a long period of time, with high numbers of vessels utilized for multiple activities in several spatial areas breaking into many pieces. The northern cluster was therefore interpreted as a refuse disposal, where sherds of broken vessels were swept against the back wall and perhaps corners and others were trampled into the house floor. As seen in Section I of this chapter, a high number of window glass fragments were also found within the northern area, which supports this theory of heterogeneous refuse disposal. Architectural comparisons of the First Home site with contemporary homes provided additional evidence as detailed in the section below.

Southern Cluster

To further explore this area, additional gradation maps were created and Global and Local Moran's I tests were performed utilizing the three data sets mentioned above of individual ware type, vessel form, and form category (see Appendix C: Site Topsoil and Interior House Unit Analysis). Some ware types were excluded due to unusable data from extremely low counts or distributions within one or two units only.

The gradation maps revealed interesting results. The non-redware patterning, specifically the clusters within house units F14 and F24 and a second surrounding F28, appear to be driven by the Iberian and North Devon wares (Figures 51 and 52). The sherd and MNV counts in Table 1 of Chapter 3 explain this; both ware types have counts over sixty, whilst all other non-redwares, with the exception of the Native American sherds, are under fifteen. Interestingly, tin-glazed vessels are also clustered in this area (Figure 53). The MNV analysis revealed at least four vessels of this ware type and all were found within units F16 and F28, with the exception of one sherd found within CII.

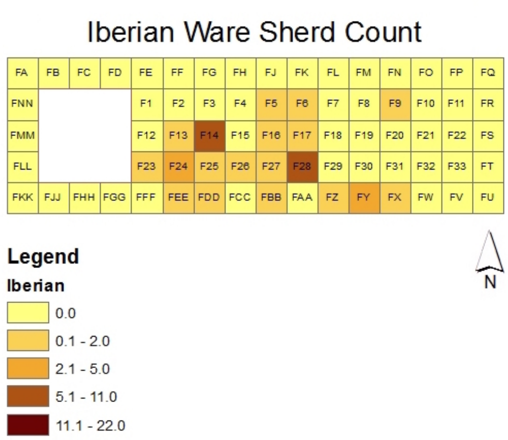

Figure 51: Iberian ware sherd count.

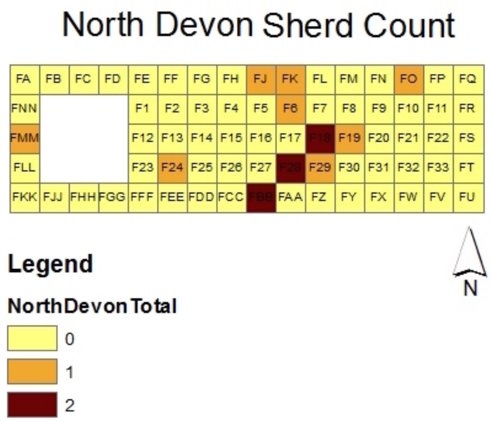

Figure 52: North Devon ware sherd count.

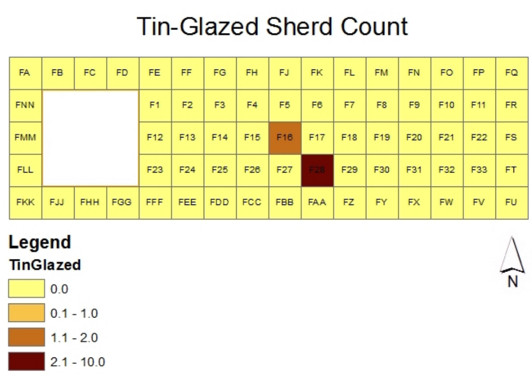

Figure 53: Tin-glazed ware sherd count.

The southern cluster was interpreted as an area where individual vessels were being used, breaking, and being deposited. The functions of these wares was also considered: Iberian jars were utilized to store both wet and dry goods, North Devon vessels for storage and dairying, and tin-glazed vessels often for serving. The clustering of these various activities supports the above hypothesis that this central area was a multi-purpose room where several household actions occurred, including food storage, processing, and consumption.

Architectural Interpretations

The analyses above provided a great amount of information about the First Home site architectural elements. Section I revealed that the distributions of window glass and nails were related to structural demolition. Section II posited that the cellar was covered with a wooden floor. Sections I and III detailed two clusters of ceramic sherds, one of which likely indicated sweeping against a back wall and the other an area within the household where multiple activities were performed. Comparisons of the First Home site with contemporary architectural plans were utilized to further interpret these distributions and usage of space. As will be seen, these comparisons resulted in a hypothesized layout for the Alden home that includes the identification of specific interior rooms and a possible post-in-ground southern extension.

Few domestic structures from the 17th century remain standing; therefore many scholars have turned to probate records. Within these, appraisers occasionally list the deceased's items by the rooms in which they are found, making these documents a proxy for the architectural layout of the houses and outbuildings. However, doing so requires multiple biases to be acknowledged. First, probate documents were only created under certain circumstances, the primary one being the deceased owning property at the time of their death (Izard 1997:148). This meant that many classes of individuals, and the houses in which they lived, went underrepresented. Second, not all probates were recorded in a room-by-room format. Unfortunately, the brief description of John Alden's property belongs to this category, meaning that archaeological analysis is required to understand his family's household. Third, probate records were lists of property deemed valuable, meaning that certain items such as widows and children's belongings were not included. This is especially pertinent when considering ceramics: utilitarian vessels such as redware pots and their location within the home were less likely to have been articulated. This limits understanding of household activity areas for although archaeological analyses like those in the earlier part of this chapter can demonstrate where vessels were eventually deposited their original usage locations remain uncertain.

Despite these biases, probate inventories have proved a valuable source of information concerning the design of 17^{th}-century domestic structures. Multiple studies show that the majority of Plymouth houses in this time period were single-pile hall and parlor plans (Cummings 1979:27; Deetz and Deetz 2000:190). The hall, occasionally termed a kitchen, was a "multipurpose center of all domestic activities" including cooking and eating whilst the parlor was a "best room" often containing the bed belonging to the heads of household (Demos 1970:32; Cummings 1997:14, 16).

Additional rooms for storage, sleeping, or dairying could be constructed on the side or back of structures. The Winslow, Standish, and Second Alden houses for example each have tripartite first-floor plans with a central multi-purpose hall or kitchen (Beaudry et al, 2003:179; Deetz and Deetz 1998:np; Mulholland 2000:240; Robbins 1969:62) (Figure 54). In addition, each had a cellar under one or more of these rooms. At the

Winslow house, the two rooms flanking the kitchen each had a rectangular, stone-lined cellar below while the Second Alden home had one under the eastern buttery or pantry.

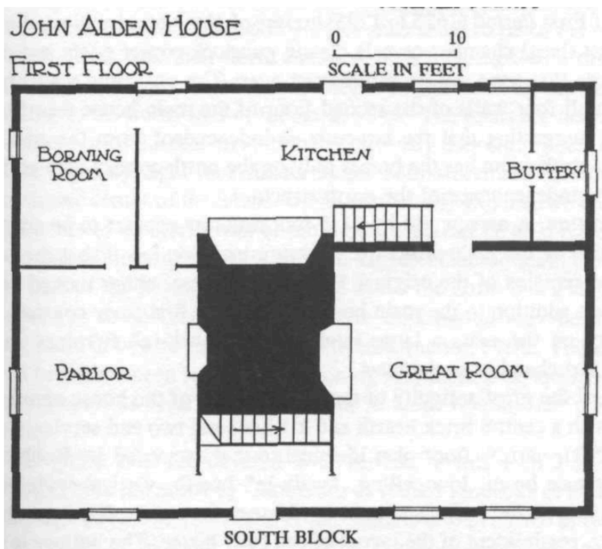

Figure 54: Plan of the first floor of the Second Alden Home with a northern tripartite partition (Wentworth 1980:87, reproduced in Mulholland 2000:239).

Such commonalities between 17th-century New England structures are essential in interpreting the First Home site. It too seems to have a tripartite plan with a cellar on the western end. The ceramic vessels recovered within the center of the house foundation point to a multi-functional space. Numerous ware types, individual vessels, and household activities are represented, varying from storage to dairying to consumption. Therefore, it is hypothesized that the central sherd cluster represents a middle room where several household activities were performed; whether this was specifically a hall or kitchen remains undetermined at this time, though this designation seems probable given the above evidence. It is notable that Robbins identified a six-inch depression in units

F15, F16, F26, and F27 within this same area which he interpreted as a possible hearth. If Robbins was indeed correct, the location of a hearth within this central room would provide further evidence for its identification as a hall or kitchen.

In addition, it is likely that the northern cluster of redware and glass discussed above occurred in the rear of the First Home since many of these houses faced south. Such sweeping of refuse towards a back wall was a common disposal practice (Beaudry et al. 2003). In addition, many of the sherd fragments were found within units FJ through FL, which contain the foundation stones of the house rather than being the interior floor (Figure 55). This is a possible indication of a back door that refuse was swept out of and into the surrounding yard. Unfortunately, Robbins' team only performed topsoil for this area; future excavation might provide evidence for this claim.

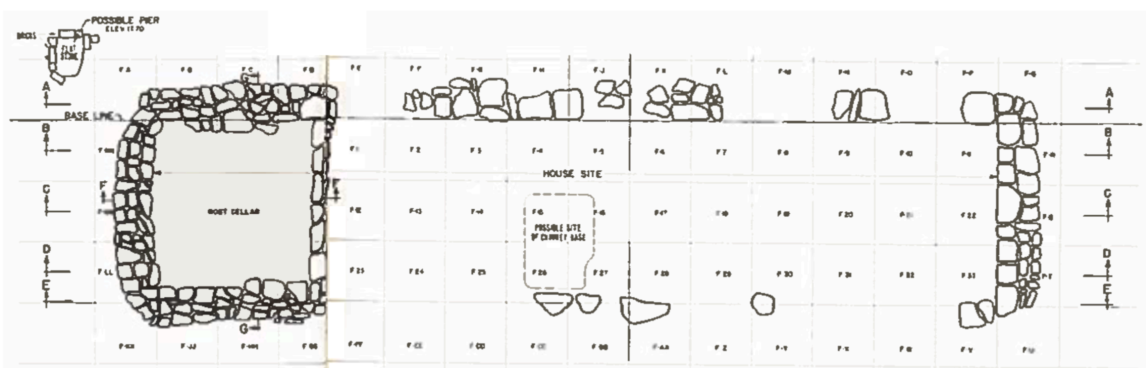

Figure 55: Robbins's map of the house foundation and cellar (Robbins 1969:46-47). Units FJ through FL are located at the top center.

The purpose of the other two hypothesized flanking rooms is unclear. While it is likely that there was a wooden floor over the cellar area, given the lack of a defined ground surface it is not possible to confidently define the usage of the room above utilizing the ceramic sherd distributions. However, the third room on the eastern side of the house, extending approximately from units FM and FY, has comparatively very few ceramics (Figures 46, 48, 49). Those that do occur within this space are located near the northern edge of the foundation, as part of the linear concentration of redwares, and in the approximate corners of the room. This room was then interpreted as an area where either fewer ceramic vessels broke or fewer activities utilizing ceramics occurred, perhaps a parlor with a large bed or a storage room containing furniture or linens.

Artifact distributions can also hypothesize about the areas outside of the house foundation. Gradation maps of ceramic sherds, nails, and window glass counts all demonstrate clusters extending along the entire southern edge (Figures 36 through 38 in Section I). Goldstein (2001) utilized such artifact distributions to identify a post-in-ground porch extension at the Winslow site. Robbins' probing excavation methodology was useful only in identifying the stone foundation. It is entirely possible that unexcavated postholes are present on the site which, when coupled with the artifact distributions mentioned above, would given evidence that the household had a frontal post-in-ground section. Indeed multiple scholars have already hypothesized such a layout for the First Home (Beaudry et al. 2003; Chartier 2001); future excavation is required to test these theories.

If correct, the above proposals offer a great amount of insight concerning the First Home. Ceramic analysis demonstrated which activities might have taken place within the Alden home. This spatial study proposes the areas, perhaps even specific rooms, where they occurred. This data indicates that the First Home had a tripartite plan, with a western floored cellar, a central hall or kitchen perhaps with a hearth and a back door, and an eastern parlor or storage room. The house might have had a southern post-in-ground extension where additional activities took place. These results, while tentative, offer a more detailed picture of how the Alden family utilized, organized, and lived at the First Home site. The data also offers a tremendous opportunity for future research for it suggest that the First Home was constructed in a similar plan to other houses of the time. This contributes information on overall 17th-century New England architectural forms and initiates discussion on differences between households caused by construction methods, resource access, and individual preference.

CHAPTER 5

CONCLUSION

Comparative Analysis

By comparing finds from the First House to contemporary sites, further information concerning the use of ceramics within early colonial New England can be gathered. In addition, site comparisons can evaluate how typical the Alden family assemblage and household activities were within wider colonial trends. For this analysis, two sites were utilized. One was the Allerton/Cushman site, located in Kingston approximately five miles south of Duxbury. Like John Alden, Isaac Allerton was an original *Mayflower* passenger and served as the Assistant Governor for the Plymouth Colony. His family moved from Plymouth to Kingston around 1630; his daughter Mary and son-in-law Thomas Cushman then occupied the site until the late 1600s (Randall 2009:26). Thus, the two sites are comparable in occupation period as well.

The 2016 University of Massachusetts, Boston excavations at Burial Hill in Plymouth were also consulted. Units 17, 21, and 24, together composing one large unit at the base of Burial Hill, contained two postholes, a butchered and partially articulated calf skeleton, and other 17th-century domestic refuse. Based upon these artifacts and maps of the original Plymouth village layout, these finds are believed to be the remnants of one of the first colonial houses. Unit 20, just above these units upon the hillside, also contained a large amount of 17th-century ceramics. This dense area of artifacts might indicate an extension of the site below the crypt or a second household, and therefore was included in this analysis as well.

Ware Type	Sherd Count	MNV
Redware	625	81
Stoneware	124	16
Tin-Glazed	46	7
Slipware	33	6
North Devon	161	5
Border Ware	80	3
Grand Total	1066	118

Table 8: Ware types recovered at the Allerton/Cushman site. North Devon sherds were not further identified by Brain's typology. (Chart reproduced from Randall 2006:33.)

Feature	Stoneware	North Devon Type 1	North Devon Type 3	North Devon Gravel-Tempered	Border Ware	Tin-Glazed	Redware	Un-identified	Native
Buried ground surface	5	6	7		7	2	73	3	6
Deep trench		2		3		1	32		48
Shallow trench	2		6				21		13
Calf burial					2	2	23		26
Ephemeral trench		1					1		
Truncated post hole									5
Grand Total	7	9	13	3	9	5	150	3	98

Table 9: Ware types recovered from features in Units 17, 21, and 24. Values are by sherd count. North Devon sherds are designated by Brain's typology. (Beranek and Landon 2017, report in preparation.)

Vessel Count	Ware Type	Form	Sherd Record Number(s)
2	Frechen stoneware	Hollowware, likely jugs or bottles	101, 102, 109 (lighter paste); 143 (darker paste)
1	Unidentified	Indeterminate	108
3	Redware, MNV based on differences in paste and inclusions	Indeterminate	Distinct pastes can be seen in records 132, 142, and 149. Other recs not assigned to a vessel: 122, 127, 129, 134, 135, 137, 138, 141, 145, 146, 147
2	Borderware	Likely mugs or other drinking vessels	104 (green/brown); 112, 148 (some sherds yellow/green); 106 (not assigned to a vessel)
1	Slip decorated ware (redware or N. Devon sgraffito)	Indeterminate	131
1	Tin glaze earthenware (buff paste)	Indeterminate	111, 133
1	Tin glaze earthenware (reddish paste)	Indeterminate	113, 150
1	North Devon (Brain Type 1)	Indeterminate	103, 130, 136, 139, TBD
1	North Devon (Brain Type 3)	Indeterminate	107, 114, 144
1	North Devon gravel	Indeterminate	105
1	Possible North Devon (Brain Type 2), tentative	Indeterminate	140

Table 10: Unit 20 minimum number of vessel analysis. (Beranek and Landon 2017, report in preparation.)

The results of Tables 8 through 10 display a shared cultural toolkit. Overall, similar ware types are found across all three sites, with both traditional English and other European wares represented. The former compose the vast majority of each collection, redware vessels being especially prominent. This ware, often dismissed in academic works, was clearly crucial for early colonists; it provided them with the inexpensive, easily-manufactured, utilitarian vessels that allowed the continuation of traditional English subsistence farming lifeways within the New World.

Ceramic sherds also represent a maintenance of English trade patterns. The high numbers of English wares originate from multiple provinces within the country, especially those in the north and west. These demonstrate an internal flow of goods and people. The colonists themselves are examples of this phenomenon; many traveled from these areas to eventually join the *Mayflower* in London and could well have brought vessels with them. In contrast, wares from China, Germany, Spain, and possibly the Netherlands or France demonstrate extended trade routes. These vessels would have passed through English ports then been transferred, either on the *Mayflower* or later supply ships, across the Atlantic for the newly-founded colony.

Despite these overall similarities, differences between the site assemblages are apparent. First, Cistercian and Iberian wares are curiously absent from the Allerton site or on Burial Hill. As for the first, if indeed the Allerton site contained such sherds it is likely that they were identified as general redwares rather than the specific Cistercian type. In addition, Cistercian vessels were created in the same utilitarian forms as redwares and other coarse earthenwares that are present at the other two sites; therefore, their absence does not reveal substantial differences between their owners' households in terms of functional usage yet might when considering trade and resource access. Additional analyses are required to address the latter subjects. However, the absence of Iberian storage jars is significant and may relate to site chronology, resource access, and domestic activities. The Alden or Allerton houses date at least seven years after the original Plymouth Burial Hill assemblages; it is possible that supply ships carrying Iberian storage jars did not arrive at the colony until this time. However, given that the former sites are contemporaneous, it is curious that these jars are completely absent at the Allerton site. This points to a difference in household economies. Iberian jars serve a specific purpose as large containers of olive oil or dry goods; it is possible that the Allertons utilized similar forms made of different ceramic wares, did not require the same amount of bulk reserves, or even did not invest in identical goods.

Second, slipware is noticeably absent within Units 17, 21, and 24, paralleling the First Home assemblage, and has an extremely low count in Unit 20. This data agrees with historical research that suggests that slipware, in comparison with other ware types, was rare on early colonial sites (Jefferson Patterson Park and Museum 2002a:np). However, 33 sherds composing at least six vessels were recovered from the Allerton site (Randall 2006:33). This might be related to the third disparity: whilst stoneware composes a full 13 percent of the Allerton collection it is a mere 0.91 and 0.03 percent of the European ceramics at the Alden and Burial Hill sites respectively. These two wares would have been more expensive than other coarse earthenwares due to manufacturing and decorative techniques as well as long-distance importation costs; therefore, they are a possible indication that the Allertons were wealthier than their contemporaries the Aldens. The fact that Allerton was a successful merchant with access to these foreign goods provides evidence for this hypothesis (Bowers 2015:9; Randall 2006). Another possibility is that the Allerton/Cushman site assemblage reflects the later Cushman occupation period, in which case both household economic success and an increased number of imported trade goods within the colony over time are conceivable factors. While further investigation is required to determine their exact causes, overall these three differentiations between the Burial Hill, Alden, and Allerton assemblages demonstrate that while Plymouth colonists were relying on a similar cultural toolkit to survive and establish themselves within the New World, varying resource access, personal preference and social status, and even slight distinctions between site chronologies all had a material impact on how they did so.

Future analysis on the First Home site itself would also be useful yet was outside the scope of this thesis. The metal artifacts include a rare 17th-century snapchaunce gun, utensils, tools, and barrel elements from John Alden's trade as a cooper; all could offer further information about the daily lives of this family. In addition, a more detailed analysis of window glass, nails, and brick would provide data concerning the architectural layout of the house and thereby address the tripartite layout hypothesis. Further excavation of the area surrounding the house foundation would address this theory as well provide insight on early colonial yard usage. With the increased digitization of collections and technological advancements, comparison between these early New England domestic sites will be facilitated. Through such analyses, scholars will be able to further understand both communal lifestyles and nuances within specific households. The latter could aid in further understanding individual status, personal and economic decisions, and cultural change through time.

Conclusion

The data addressed three aspects of the First Home site: the usage of specific ceramic types and forms, household activities including foodways and trash disposal practices, and the architectural forms in which these behaviors were enacted. As seen, each topic relates information on not only how the Aldens lived but also wider cultural trends within the early colonial lifestyle.

First, the First Home ceramic assemblage provides a representative sample of the vessel types utilized in early colonial New England. Like their neighbors, the Aldens had access to many vessel forms and types, both English and foreign. Overall, redware dominates early colonial assemblages while expensive and decorative wares are less common. It is through further analyses of assemblage compositions that differences in trade access, individual status, or occupation periods may be discerned.

Second, the Alden site demonstrates the subsistence farming lifestyle shared between early colonial sites. At the First Home, daily activities included dairying, food and beverage preparation and consumption, and storage. These mundane actions are what allowed the Aldens and other colonial families to survive and establish themselves within the New World.

The spatial analysis of the First Home site demonstrates the third and final trend. It is proposed that the Aldens, like many of their contemporaries, utilized storage cellars, designated one room as a multi-purpose area, and reserved another for storage and sleeping. Therefore, while specific house architectural types varied, the use and organization of internal spaces remained similar.

Further studies might specify how individual households varied within these broader trends and their development through time; however, at this time it is clear that the colonists were relying on familiar cultural materials and behaviors within their new surroundings. The information presented above promotes a larger goal: the grounding of the mythology surrounding these individuals with everyday, material realities. Such reinterpretation challenges the Pilgrim myth by demonstrating the heterogeneity present within and around Plymouth Colony. With such knowledge, the narrative of early colonial life can be rewritten to reflect these historic personages not as mythologized figures but real, living individuals. This goal is not only significant for the living Alden descendants who seek to connect with their ancestors but for all who wish to learn how these individuals lived within the past.

APPENDIX A
NAIL, WINDOW GLASS, AND CERAMIC SHERD COUNT CORRELATION ANALYSIS

Section I: Gradation Maps

Figures 1 through 4 display maps generated for the correlation analysis between nail and window glass counts. Figures X through X are gradation maps of total nail and window glass counts per site collection and interior house foundation units.

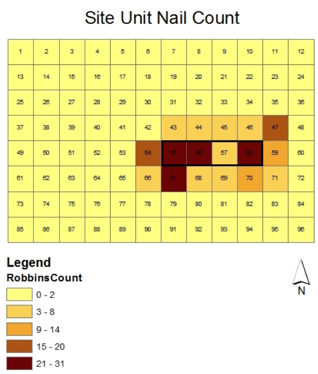

Figure 1: Total nail count per site unit. Units containing the house foundation are outlined.

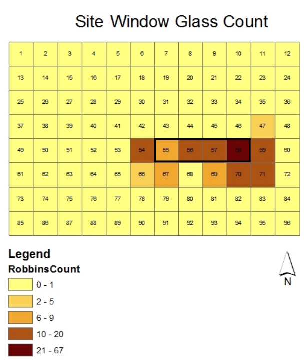

Figure 2: Total window glass count per site unit. Units containing the house foundation are outlined.

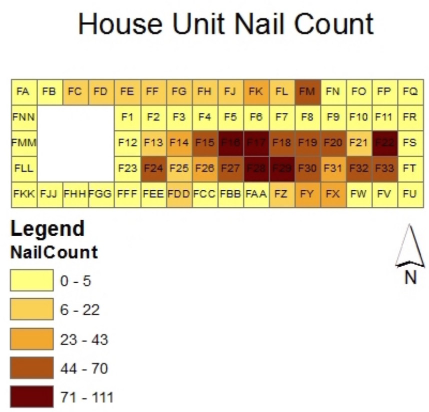

Figure 3: Total nail count per interior house foundation unit.

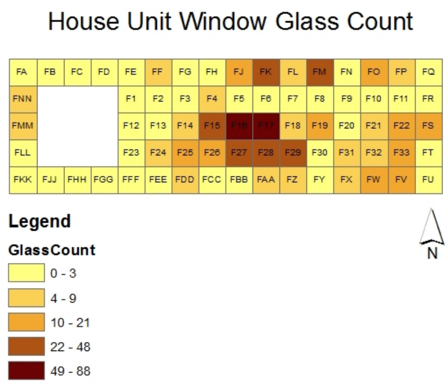

Figure 4: Total window glass count per interior house foundation unit.

Section II: Nail and Window Glass Count Correlation Analysis

Pearson's Correlation Coefficient (R)

It was assumed that if nails and window glass counts were correlated, they represented one deposition event, the demolition of the house structure. To test this association, two statistical tests were performed. The first was a Pearson's correlation test that measures the linear association between two continuous variables (Freedman 1978:118; Galton 1888; Pearson 1900). It assumes a normal distribution curve. Returned R values are between -1 and 1, with the former indicating a strong negative correlation and the latter a strong positive correlation when the two variables are plotted on a scatterplot. An R value of 0 indicates no relationship. For this analysis, the cellar area was excluded. The result as displayed in Table 1A and 1B show that glass and nails are overall significantly correlated, suggesting that they result from the same depositional event, likely the collapse or dismantling of the house structure. Differing localized distributions possibly indicate the locations of interior architectural features such as windows.

Correlations (all units)

		GlassCount	NailCount
GlassCount	Pearson Correlation	1	.678**
	Sig. (2-tailed)		.000
	N	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

Table 1A: Pearson correlation test on nail and window glass counts for all units.

Correlations (glass>0; nails>0)

		GlassCount	NailCount
GlassCount	Pearson Correlation	1	.658**
	Sig. (2-tailed)		.000
	N	46	46

**. Correlation is significant at the 0.01 level (2-tailed).

Table 1B: Pearson correlation test on nail and window glass counts for units where nail and window glass counts were greater than zero.

Ordinary Least Squares (OLS) Regression Model

An OLS model was the second method utilized to analyze the relationship between nail and window glass counts. It also tests the strength of an association between two variables (Esri 2017c:np; Freedman 1978:192; Galton 1888). It assumes the variables have a linear relationship and fall along a normal distribution curve. When the variables are plotted, a line of best fit is produced which seeks to minimize the sum of squared errors between actual observations and points upon the line. Overall, the line represents the predicted values for the dependent variable based upon the independent variable values. R coefficient values, standard error, t, and significance values are produced. This thesis utilized glass as a dependent variable and nails as the independent variable. Like the Pearson's R tests, the results in Table 2A and 2B show that glass and nails are correlated. Figure X displays the test residuals.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.678[a]	.460	.452	11.164

a. Predictors: (Constant), NailCount

b. Dependent Variable: GlassCount

Table 2A: OLS model of nail and window glass counts model summary.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.765	1.610		1.096	.277
	NailCount	.352	.046	.678	7.661	.000

a. Dependent Variable: GlassCount

Table 2B: OLS model of nail and window glass counts coefficients.

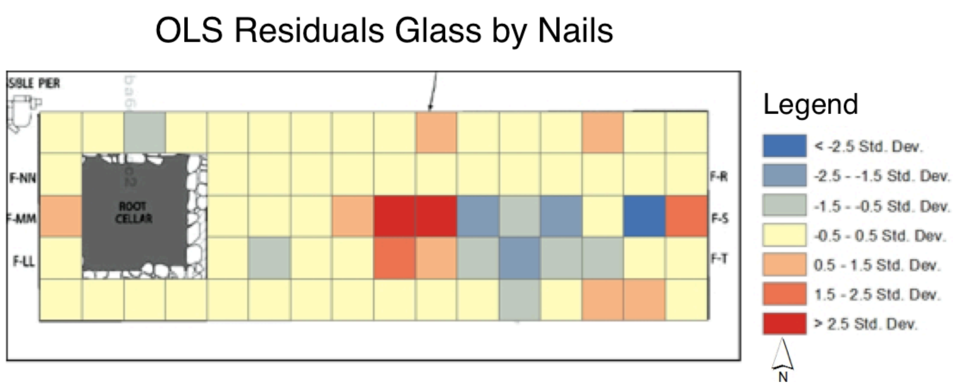

Figure 5: Gradation map of nail and window glass counts OLS residuals.

Global Moran's I Test of Spatial Autocorrelation

Having established that nails and window glass were correlated, a following question was how the two variables were spatially distributed across the First Home site. A Global Moran's I test analyzes whether distributions are clustered, dispersed, or random (Esri 2017d:np; Getis and Ord 1992; Moran 1950). It was hypothesized that clusters of nails and window glass represented the architectural layout of the house such as the location of doors, windows, or walls.

The Global Moran's I test is calculated using a standard normal distribution parabolic curve. This curve is utilized to represent the probability that an observed pattern is caused by random chance. The middle of the curve equates to the mean of values generated by chance; by inputting a set of features into the Global Moran's I test and comparing where output values fall upon the curve, one can evaluate the amount of differentiation between a randomly-generated pattern and the one being evaluated. The Global Moran's I test produces three significant values: a p-value, a z-score, and a

Moran's index value (Table 3). A p-value relates the probability that a spatial pattern was caused by random chance; when an event is placed on the normal distribution curve, a p-value is the area underneath the curve from that point. For example, a set of features returning a p-value- of 0.01 has a one percent chance of being the result of random processes and correlates to either the left or right end tails of the normal distribution curve, or the top or bottom one percent. Global Moran's I relies on a statistical threshold for determining significance of 0.05, or a five percent probability that a pattern is random. A p-value generated with a given set of features must be underneath this value for the features' spatial patterning to determined significant, or a result of non-random processes.

Whether an outputted p-value is on the left or right side of the normal distribution curve depends on whether the associated z-score is positive or negative. A z-score represents the number of standard distributions away from the mean of features with a random distribution an inputted set of feature values is. High z-scores correspond with low p-values; in other words, the farther away an event is from the middle of a normal distribution curve, the smaller amount of area there is underneath the curve and the lower the probability that the event is caused by random processes.

A Global Moran's I index value is calculated with a formula that relates the distance of each input feature value from the mean of those values, distance between features, and the total number of features; output values fall between -1 and 1. A value close to -1 indicates dispersion while those close to 1 indicate clustering. The Global Moran's I combines this result with the output p-value and z-score of a data set to conclude the type and significance of the observed pattern and reject or accept the null hypothesis.

Global Moran's I Summary		**Dataset Information**	
Moran's Index:	0.269972	**Input Feature Class:**	House_OLS_Glass_by_Nails
Expected Index:	-0.014286	**Input Field:**	STDRESID
Variance:	0.007811	**Conceptualization:**	INVERSE_DISTANCE
z-score:	3.216406	**Distance Method:**	EUCLIDEAN
p-value:	0.001298	**Row Standardization:**	TRUE
		Distance Threshold:	2.5003 US_Feet

Table 3: Global Moran's I of the OLS nail and window glass counts residuals.

The results display a clustering of regression model residuals. However, this test displays overall patterns rather than localized trends. To further explore the latter, one can utilize a Local Moran's I test.

Anselin Local Moran's I Test (Cluster and Outlier Analysis)

A Local Moran's I test was performed to provide more information on specific areas within the site (Figure 6). This test relies on the same parameters that the Global Moran's I test does, utilizing a normal distribution curve and a 95 percent confidence interval with a related p-value significance level of 0.05 to analyze features and their associated counts (Esri 2017a:np; Getis and Ord 1992; Moran 1950). Generated gradation maps display where high and low feature value counts appear based on expected and observed values.

Local Moran's I Glass by Nails

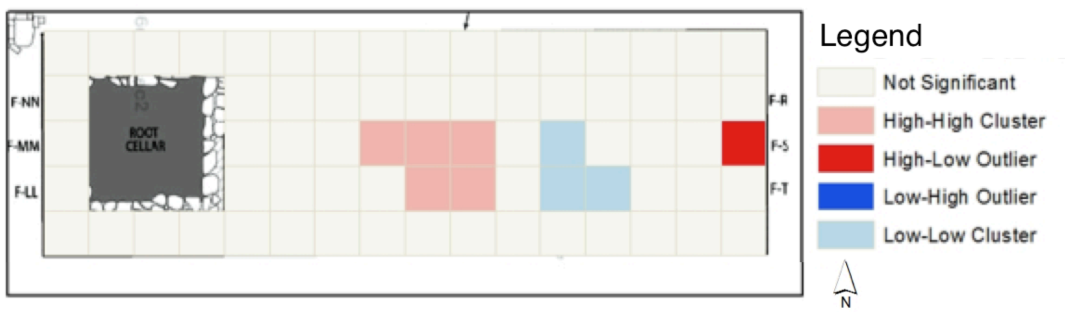

Figure 6: Local Moran's I analysis of nail and window glass counts OLS residuals per interior house foundation unit.

Figure 6 shows significant concentrations of glass within the center of the house and on the far eastern end. Ceramic sherds were also concentrated in the former central area. The latter cluster might indicate a window.

Hot-Spot Analysis (Getis-Ord Gi)*

A Hot-Spot analysis was a second method used to test localized trends of nail and glass residual distributions (Figure 7). It computes the Getis-Ord Gi* statistic for each inputted feature and counts. These are compared to expected values based on neighboring features. The test produces z-scores and p-values that assess whether value differences are statistically significant (Esri 2017b:np; Getis and Ord 1992). Like a Local Moran's I test, a hot-spot analysis produces a gradation map. The glass and nail residual maps were similar to those illustrated above, again displaying a centralized clustering and another on the east end of the house foundation.

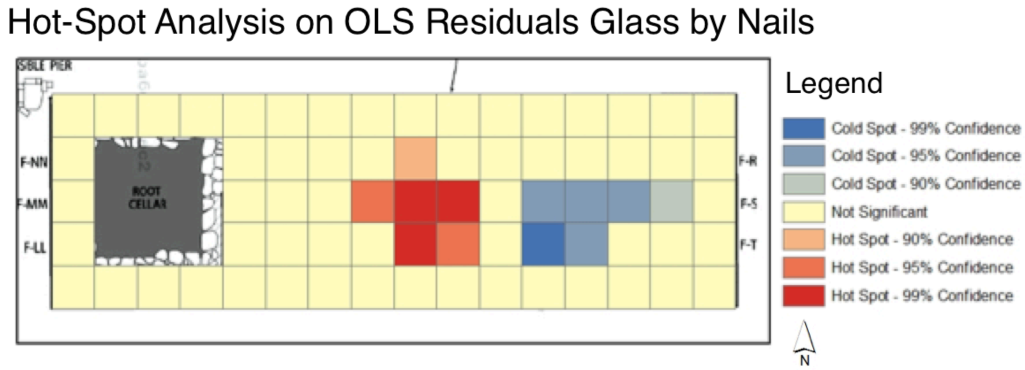

Figure 7: Hot-spot analysis of nail and window glass counts OLS residuals.

Section III: Ceramic Sherd, Nail, and Window Glass Count Correlation Analysis

The above tests established that nails and glass were correlated and were related to the house demolition. It was theorized that if ceramic sherd counts also correlated with nail and window glass counts, they too were related to demolition rather than in-situ activity areas or refuse disposal within the house. The following set of analyses comparing ceramic sherd counts to nails and window glass utilized the same steps as above. The first series compared total ceramic sherd counts per unit to both glass and nails whilst the second divided ceramics into redwares and non-redwares. Sherd counts were inputted as the dependent variable and window glass and nail counts as independent variables.

Series I: Total Ceramic Sherds and Nail Count Correlation Analysis

The first set of analyses examined whether the distribution of all ceramic sherds recovered from the First Home site was correlated with the distribution of nails. Table 4A and 4B suggests that the two variables were not significantly correlated. Therefore, no additional analyses were performed.

Correlations (all units)

		SherdCount	NailCount
SherdCount	Pearson Correlation	1	.180
	Sig. (2-tailed)		.133
	N	71	71

Table 4A: Pearson correlation tests on total ceramic sherd and nail counts for all units.

Correlations (sherds>0; nails>0)

		SherdCount	NailCount
SherdCount	Pearson Correlation	1	.194
	Sig. (2-tailed)		.251
	N	37	37

Table 4B: Pearson correlation tests on total ceramic sherd and nail counts for units where ceramic sherd and nail counts were greater than zero.

Series II: Total Ceramic Sherds and Window Glass Count Correlation Analysis

The distribution of all ceramic sherds was then compared to the distribution of window glass. Pearson's correlation tests (Tables 5A and 5B), ordinary least squares regression (Table 6A and 6B) showed that the two variables were correlated; the residuals were displayed in a gradation map (Figure 8). Therefore, Global Moran's I (Table 7), Local Moran's I (Figure 9), and Hot-Spot analyses (Figure 10) were performed to analyze both general and localized trends.

Correlations (all units)

		SherdCount	GlassCount
SherdCount	Pearson Correlation	1	.404**
	Sig. (2-tailed)		.000
	N	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5A: Pearson's correlation tests on total ceramic sherd and window glass counts for all units.

Correlations (sherds>0; glass>0)

		SherdCount	GlassCount
SherdCount	Pearson Correlation	1	.429**
	Sig. (2-tailed)		.003
	N	46	46

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5B: Pearson correlation tests on total ceramic sherd and window glass counts for units where ceramic sherd and window glass counts were greater than zero.

Model Summary[a]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.404[a]	.163	.151	13.211

a. Predictors: (Constant), GlassCount

b. Dependent Variable: SherdCount

Table 6A: OLS regression model of ceramic sherd and window glass counts model summary.

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	7.259	1.817		3.995	.000
	GlassCount	.385	.105	.404	3.672	.000

a. Dependent Variable: SherdCount

Table 6B: OLS regression model of ceramic sherd and window glass counts coefficients.

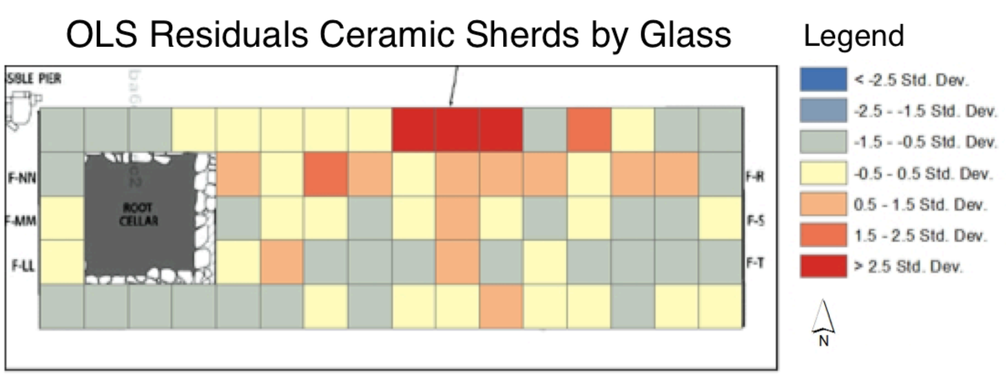

Figure 8: Gradation map of ceramic sherd and window glass counts OLS residuals.

Global Moran's I Summary		**Dataset Information**	
Moran's Index:	0.332968	**Input Feature Class:**	House_OLS_Sherd_by_Glass
Expected Index:	-0.014286	**Input Field:**	STDRESID
Variance:	0.008221	**Conceptualization:**	INVERSE_DISTANCE
z-score:	3.829894	**Distance Method:**	EUCLIDEAN

p-value:	0.000128	**Row Standardization:**	TRUE
		Distance Threshold:	2.5003 US_Feet

Table 7: Global Moran's I of the OLS ceramic sherd and window glass counts residuals.

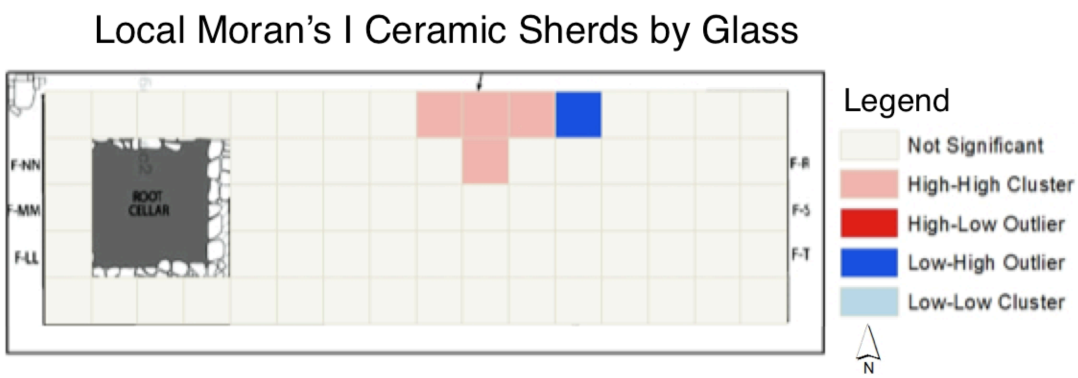

Figure 9: Local Moran's I analysis of ceramic sherd and window glass counts OLS residuals.

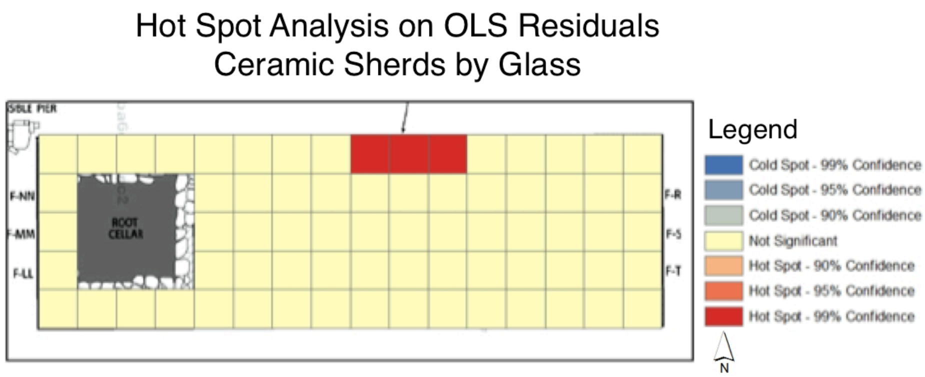

Figure 10: Hot-spot analysis of ceramic sherd and window glass counts OLS residuals.

Series IV: Total Redware Sherd and Window Glass Count Correlation Analysis

It was known that the ceramic sherd spatial distribution was driven by redwares; therefore, ceramics were divided into redwares and non-redwares to address this bias and further identify possible relationships between sherd and window glass distributions. A Pearson's correlation test (Tables 11A and 11B) and an OLS regression (Table 12A and 12B, Figure 11) displayed a correlation between redwares and glass. Therefore, Global Moran's I (Table 13), Local Moran's I (Figure 12), and Hot-Spot analyses (Figure 13) were again performed.

Correlations (all units)

		Redware	GlassCount
Redware	Pearson Correlation	1	.340**
	Sig. (2-tailed)		.004
	N	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

Table 11A: Pearson correlation tests on redware sherd and window glass counts for all units.

Correlations (Redware>0; Glass>0)

		Redware	GlassCount
Redware	Pearson Correlation	1	.394**
	Sig. (2-tailed)		.010
	N	42	42

**. Correlation is significant at the 0.01 level (2-tailed).

Table 11B: Pearson correlation tests on redware sherd and window glass counts for units where redware sherd and window glass counts were greater than zero.

Redware by Glass, Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.430[a]	.185	.152	14.845

a. Predictors: (Constant), GlassCount

b. Dependent Variable: Redware

Table 12A: OLS regression model of redware sherd and window glass counts model summary.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	8.344	3.619		2.305	.030
	GlassCount	.331	.139	.430	2.379	.025

a. Dependent Variable: Redware

Table 12B: OLS regression model of redware sherd and window glass counts coefficients.

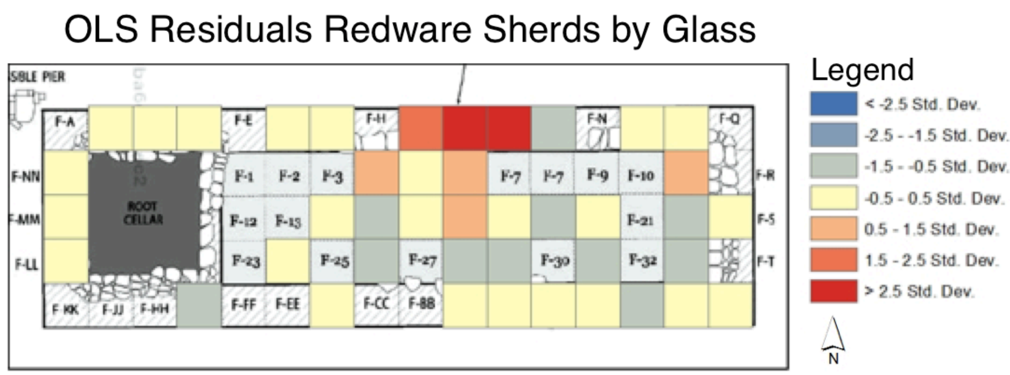

Figure 11: Gradation map of redware sherd and window glass counts OLS residuals.

Global Moran's I Summary		Dataset Information	
Moran's Index:	0.278341	**Input Feature Class:**	House_OLS_Redware_by_Glass
Expected Index:	-0.024390	**Input Field:**	STDRESID
Variance:	0.006233	**Conceptualization:**	INVERSE_DISTANCE
z-score:	3.834506	**Distance Method:**	EUCLIDEAN
p-value:	0.000126	**Row Standardization:**	TRUE
		Distance Threshold:	5.597 US_Feet

Table 13: Global Moran's I of the OLS redware sherd and window glass counts residuals.

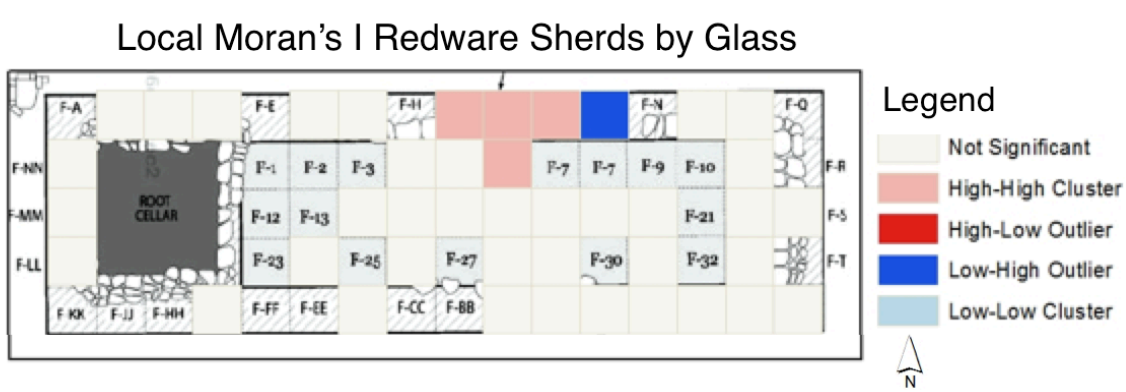

Figure 12: Local Moran's I analysis of redware sherd and window glass counts OLS residuals.

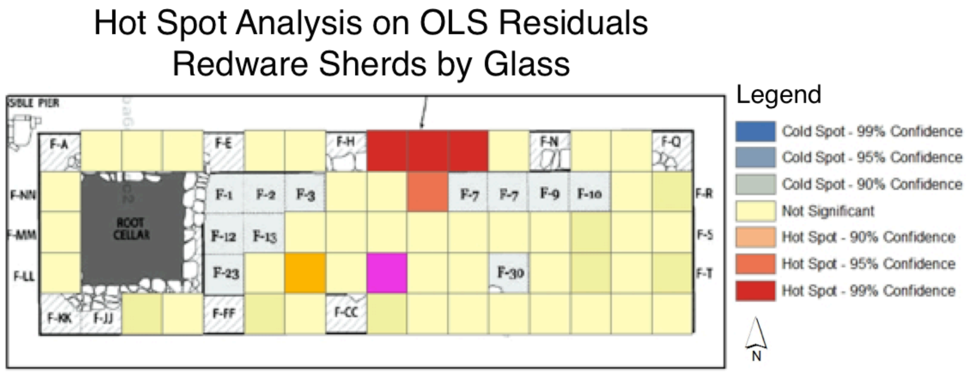

Figure 13: Hot-spot analysis of redware sherd and glass OLS residuals.

Series V: Total Non-Redware Sherds and Window Glass Correlation Analysis

A Pearson's correlation test (Table 14A and 14B) and OLS analysis (Table 15A and 15B, Figure 14) did not show a correlation between non-redwares and glass. However, Global Moran's I (Table 16), Local Moran's I (Figure 15), and Hot-Spot analyses (Figure 16) were utilized to assess localized patterns as seen through the spatial distribution of the residuals.

Correlations (all units)

		NonRedware	GlassCount
NonRedware	Pearson Correlation	1	.378**
	Sig. (2-tailed)		.001
	N	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

Table 14A: Pearson correlation tests on non-redware sherd and window glass counts for all units.

Correlations (Non-Redware>0; Glass>0)

		NonRedware	GlassCount
NonRedware	Pearson Correlation	1	.272
	Sig. (2-tailed)		.169
	N	27	27

Table 14B: Pearson correlation tests on non-redware sherd and window glass counts for units where non-redware sherd and window glass counts were greater than zero.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.272[a]	.074	.037	4.306

a. Predictors: (Constant), GlassCount

b. Dependent Variable: NonRedware

Table 15A: OLS regression model of non-redware sherd and window glass counts model summary.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.310	1.050		2.200	.037
	GlassCount	.057	.040	.272	1.416	.169

a. Dependent Variable: NonRedware

Table 15B: OLS regression model of non-redware sherd and window glass counts coefficients.

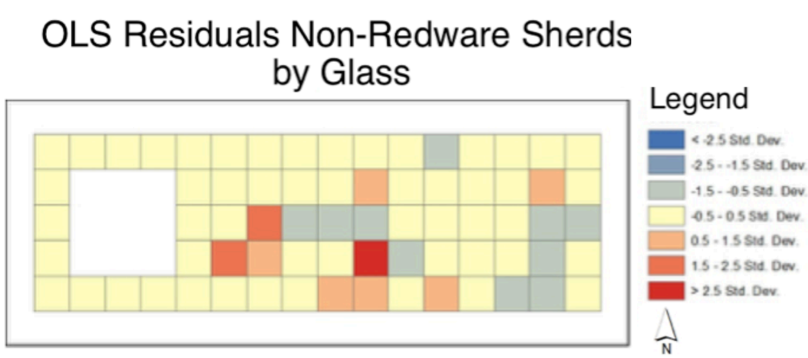

Figure 14: Gradation map of redware sherd and window glass counts OLS residuals.

Global Moran's I Summary		**Dataset Information**	
Moran's Index:	-0.003530	**Input Feature Class:**	House_OLS_NonRedware_by_Glass
Expected Index:	-0.014286	**Input Field:**	STDRESID
Variance:	0.005508	**Conceptualization:**	INVERSE_DISTANCE

z-score:	0.144916	**Distance Method:**	EUCLIDEAN
p-value:	0.884777	**Row Standardization:**	TRUE
		Distance Threshold:	2.5003 US_Feet

Table 16: Global Moran's I of the OLS non-redware sherd and window glass counts residuals.

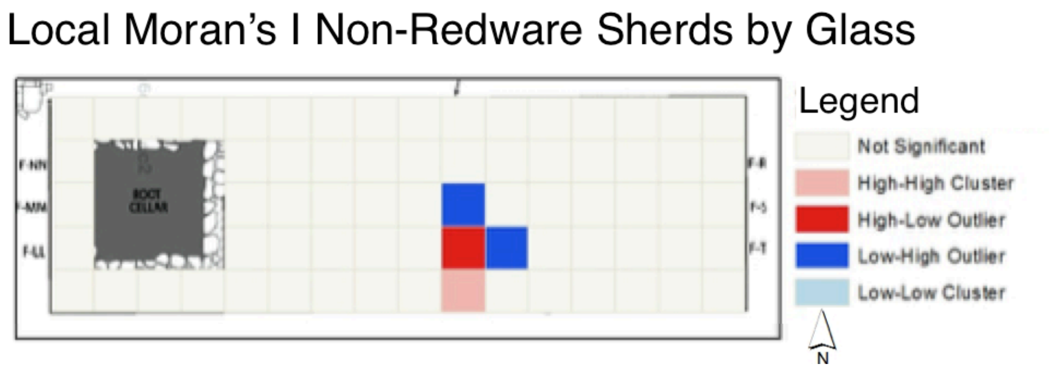

Figure 15: Local Moran's I analysis of non-redware sherd and window glass counts OLS residuals.

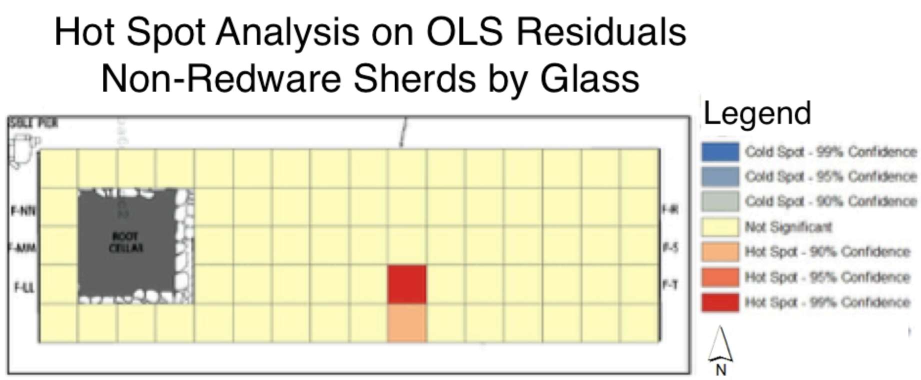

Figure 16: Hot-spot analysis of non-redware sherd and window glass counts OLS residuals.

APPENDIX B
CELLAR ANALYSIS

Series I: Artifact Ratios

Tables 1 through 3 display artifact ratios for the three areas of interest: the cellar, the units within the house foundation, and the topsoil units across this site. Ratios are calculated as, for example, the number of redware sherds divided by the number of non-redware sherds. Values of zero were produced when the numerator was equal to zero; null values were produced when denominator values were zero and therefore were displayed as blank.

Unit	Redware: NonRedware	Redware: Nails	Redware: Glass	Non-Redware: Nails	Non Redware: Glass	Nails: Glass	Total Ceramics: Nails	Total Ceramics: Glass
CI	9.75	0.29	1.73	0.03	0.18	5.96	0.32	1.91
CII	2.19	0.20	1.75	0.09	0.80	8.65	0.29	2.55
CIII	1.40	0.30	1.40	0.22	1.00	4.60	0.52	2.40

Table 1: Artifact ratios per cellar layer.

Unit	Redware: Non-Redware	Redware: Nails	Redware: Glass	Non-Redware: Nails	Non-Redware: Glass	Nails: Glass	Total Ceramics: Nails	Total Ceramics: Glass
F1		0.76	2.78	0.00	0.00	3.67	0.76	2.78
F2		0.86	2.40	0.00	0.00	2.80	0.86	2.40
F3	6.00	0.35	1.20	0.06	0.20	3.4	0.41	1.40
F4		0.00	0.00	0.00	0.00	0.64	0.00	0.00
F5	1.00	0.03	0.01	0.03	0.01	0.39	0.07	0.03
F6	0.50	0.07	0.05	0.13	0.11	0.80	0.20	0.16
F7		0.09	0.18	0.00	0.00	2.05	0.09	0.18
F8	9.50	0.60	2.71	0.06	0.29	4.50	0.67	3.00
F9	18.50	0.41	1.54	0.02	0.08	3.75	0.43	1.63
F10	5.00	0.10	0.34	0.02	0.07	3.62	0.11	0.41
F11	3.00	0.02	0.04	0.01	0.01	2.28	0.02	0.05
F12		4.33		0.00			4.33	
F13	4.00	0.44		0.11			0.56	
F14		0.00	0.00	0.00	0.00	5.67	0.00	0.00
F15		0.05	0.07	0.00	0.00	1.52	0.05	0.07
F16	0.00	0.00	0.00	0.01	0.01	1.08	0.01	0.01
F17	1.88	0.19	0.24	0.10	0.13	1.31	0.28	0.37
F18	0.00	0.00	0.00	0.04	0.43	9.71	0.04	0.43
F19	2.00	0.03	0.12	0.01	0.06	4.41	0.04	0.18

F20	0.00	0.00	0.00	0.04	0.20	5.50	0.04	0.20
F21	0.52	0.80	3.00	1.53	5.75	3.75	2.33	8.75
F22	6.00	0.05	0.18	0.01	0.03	3.42	0.06	0.21
F23	34.00	6.80	17.00	0.20	0.50	2.50	7.00	17.50
F24		0.02	0.14	0.00	0.00	7.00	0.02	0.14
F25		0.06	0.08	0.00	0.00	1.42	0.06	0.08
F26		0.00	0.00	0.00	0.00	1.78	0.00	0.00
F27		0.02	0.03	0.00	0.00	1.18	0.02	0.03
F28	10.00	0.22	0.43	0.02	0.04	1.91	0.24	0.47
F29	6.00	0.10	0.38	0.02	0.06	3.63	0.12	0.44
F30	5.67	0.31		0.05			0.36	
F31	14.00	0.35	2.33	0.03	0.17	6.67	0.38	2.50
F32		0.30	4.00	0.00	0.00	13.50	0.30	4.00
F33	6.00	0.14	0.29	0.02	0.05	2.10	0.16	0.33
FA		0.00		0.00			0.00	
FAA	2.00	0.60	1.50	0.30	0.75	2.50	0.90	2.25
FB		0.33	0.50	0.00	0.00	1.50	0.33	0.50
FBB	0.00	0.00	0.00	0.38	3.00	8.00	0.38	3.00
FC		0.07	0.25	0.00	0.00	3.50	0.07	0.25
FCC		0.00		0.00			0.00	
FD		0.38	3.00	0.00	0.00	8.00	0.38	3.00
FDD	4.00	0.29	1.00	0.07	0.25	3.50	0.36	1.25
FE		0.25		0.00			0.25	
FEE	0.00	0.00	0.00	0.09	0.25	2.75	0.09	0.25
FF		0.37	1.00	0.00	0.00	2.70	0.37	1.00
FFF		0.00		0.00			0.00	
FG		0.43	3.00	0.00	0.00	7.00	0.43	3.00
FGG		0.17	0.33	0.00	0.00	2.00	0.17	0.33
FH		0.60	6.00	0.00	0.00	10.00	0.60	6.00
FHH		0.00	0.00	0.00	0.00	6.00	0.00	0.00
FJ	22.00	2.44	3.67	0.11	0.17	1.50	2.56	3.83
FJJ		0.00		0.00			0.00	
FK	34.50	1.53	2.38	0.04	0.07	1.55	1.58	2.45
FKK								
FL		5.89	10.60	0.00	0.00	1.80	5.89	10.60
FLL		0.36	1.33	0.00	0.00	3.67	0.36	1.33
FM		0.02	0.04	0.00	0.00	1.70	0.02	0.04
FMM	4.00	0.19	0.67	0.05	0.17	3.50	0.24	0.83
FN		1.04	14.00	0.00	0.00	13.50	1.04	14.00

FNN		0.15	0.50	0.00	0.00	3.25	0.15	0.50
FO	9.00	0.17	0.53	0.02	0.06	3.06	0.19	0.59
FP		0.11	0.50	0.00	0.00	4.50	0.11	0.50
FQ		0.00		0.00			0.00	
FR			0.00		0.00	0.00		0.00
FS		0.60	0.67	0.00	0.00	1.11	0.60	0.67
FT		0.00	0.00	0.00	0.00	5.00	0.00	0.00
FU		0.12	2.00	0.00	0.00	17.00	0.12	2.00
FV		0.13	0.50	0.00	0.00	4.00	0.13	0.50
FW		0.14	0.26	0.00	0.00	1.89	0.14	0.26
FX	10.00	0.37	1.67	0.04	0.17	4.50	0.41	1.83
FY	1.80	0.38	3.00	0.21	1.67	8.00	0.58	4.67
FZ	15.00	2.14	5.00	0.14	0.33	2.33	2.29	5.33

Table 2: Artifact ratios per interior house unit.

Unit	Redware: Non-Redware	Redware: Nails	Redware: Glass	Non-Redware: Nails	Non-Redware: Glass	Nails: Glass	Total Ceramics: Nails	Total Ceramics: Glass
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36								
37								
38								
39								
40								
41								
42		0.00	0.00	0.00	0.00	2.00	0.00	0.00
43		0.13		0.00			0.13	
44		0.25		0.00			0.25	
45		0.14		0.00			0.14	
46	0.00	0.00		0.13			0.13	
47		0.00	0.00	0.00	0.00	3.60	0.00	0.00
48								
49								
50								
51								
52								
53								
54	0.67	0.10	0.13	0.15	0.20	1.33	0.25	0.33
55	0.75	0.11	0.33	0.14	0.44	3.11	0.25	0.78
56	2.00	0.13	0.21	0.06	0.11	1.63	0.19	0.32
57	6.00	0.75	0.35	0.13	0.06	0.47	0.88	0.41
58	1.67	0.20	0.07	0.12	0.04	0.37	0.32	0.12
59	3.67	0.92	0.61	0.25	0.17	0.67	1.17	0.78
60								
61								

62								
63								
64								
65								
66	2.00	0.40	0.67	0.20	0.33	1.67	0.60	1.00
67	0.50	0.04	0.11	0.07	0.22	3.00	0.11	0.33
68		0.13	1.00	0.00	0.00	8.00	0.13	1.00
69	1.67	0.63	0.71	0.38	0.43	1.14	1.00	1.14
70	2.50	0.36	0.25	0.14	0.10	0.70	0.50	0.35
71	1.33	0.50	0.21	0.38	0.16	0.42	0.88	0.37
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Table 3: Artifact ratios per topsoil unit.

Series II: T-tests on cellar units

The above ratios provided a basic comparison between individual units. To statistically assess differentiations between the three designated areas of the cellar, interior house units, and the topsoil units, a two-tailed t-test was utilized. This analyzes whether the means of two or more inputted data series are statistically equivalent. It assumes that all series follow a normal distribution curve and are independent from one another. Tables 4A and 4B compares total nail, window glass, and ceramic sherd counts within the three areas of interest; Table 5A and 5B divides ceramic sherds into redwares and non-redwares. Comparisons were performed utilizing the means and 95% confidence intervals for each unit category.

Category		N	Mean	Std. Deviation	Std. Error Mean
	NailsGlass	0[a,b]	.	.	.
	TotalCeramicsNails	0[a,b]	.	.	.
	TotalCeramicsGlass	0[a,b]	.	.	.
Cellar	NailsGlass	3	6.401851852	2.061555308	1.190239512
	TotalCeramicsNails	3	.3791441136	.1241784135	.0716944404
	TotalCeramicsGlass	3	2.287037037	.3340886504	.1928861723
House	NailsGlass	61	4.020958104	3.341129648	.4277878156
	TotalCeramicsNails	69	.5903150715	1.245626414	.1499557985
	TotalCeramicsGlass	61	1.942700409	3.329084573	.4262456018
Surface	NailsGlass	14	2.008356362	2.022302926	.5404831916
	TotalCeramicsNails	18	.3838435171	.3643935906	.0858883930
	TotalCeramicsGlass	14	.4950326845	.3771535601	.1007985289

Category		t	df	Sig. (2-tailed)	Mean Difference	95% Confidence ... Lower	Upper
Cellar	NailsGlass	5.379	2	.033	6.401851852	1.280664566	11.52303914
	TotalCeramicsNails	5.288	2	.034	.3791441136	.0706678337	.6876203934
	TotalCeramicsGlass	11.857	2	.007	2.287037037	1.457114821	3.116959253
House	NailsGlass	9.399	60	.000	4.020958104	3.165255068	4.876661140
	TotalCeramicsNails	3.937	68	.000	.5903150715	.2910829345	.8895472084
	TotalCeramicsGlass	4.558	60	.000	1.942700409	1.090082260	2.795318558
Surface	NailsGlass	3.716	13	.003	2.008356362	.8407134152	3.175999308
	TotalCeramicsNails	4.469	17	.000	.3838435171	.2026348477	.5650521865
	TotalCeramicsGlass	4.911	13	.000	.4950326845	.2772707021	.7127946668

Table 4A and 4B: Two-tailed t-test on cellar, house, and surface unit total ceramic, glass, and nail ratios.

Category		N	Mean	Std. Deviation	Std. Error Mean
	RedwareNails	0[a,b]	.	.	.
	RedwareGlass	0[a,b]	.	.	.
	NonRedwareNails	0[a,b]	.	.	.
	NonRedwareGlass	0[a,b]	.	.	.
Cellar	RedwareNails	3	.2659015803	.0554703127	.0320258000
	RedwareGlass	3	1.627777778	.1974372849	.1139904696
	NonRedwareNails	3	.1132425332	.0954777698	.0551241161
	NonRedwareGlass	3	.6592592593	.4287986856	.2475670365
House	RedwareNails	69	.5326501353	1.211219056	.1458136393
	RedwareGlass	61	1.695593367	3.162560409	.4049243673
	NonRedwareNails	69	.0576649362	.1934636906	.0232902914
	NonRedwareGlass	61	.2471070421	.8434155430	.1079882946
Surface	RedwareNails	18	.2647154899	.2725991873	.0642522446
	RedwareGlass	14	.3334615674	.3030443671	.0809920139
	NonRedwareNails	18	.1191280272	.1205182101	.0284064145
	NonRedwareGlass	14	.1615711171	.1507619022	.0402928132

Category		t	df	Sig. (2-tailed)	Mean Difference	Confidence ... Lower	Upper
Cellar	RedwareNails	8.303	2	.014	.2659015803	.1281056846	.4036974761
	RedwareGlass	14.280	2	.005	1.627777778	1.137316373	2.118239183
	NonRedwareNails	2.054	2	.176	.1132425332	-.123937395	.3504224618
	NonRedwareGlass	2.663	2	.117	.6592592593	-.405935726	1.724454245
House	RedwareNails	3.653	68	.001	.5326501353	.2416835483	.8236167223
	RedwareGlass	4.187	60	.000	1.695593367	.8856240369	2.505562697
	NonRedwareNails	2.476	68	.016	.0576649362	.0111898832	.1041399892
	NonRedwareGlass	2.288	60	.026	.2471070421	.0310982916	.4631157926
Surface	RedwareNails	4.120	17	.001	.2647154899	.1291551033	.4002758766
	RedwareGlass	4.117	13	.001	.3334615674	.1584889591	.5084341757
	NonRedwareNails	4.194	17	.001	.1191280272	.0591957312	.1790603231
	NonRedwareGlass	4.010	13	.001	.1615711171	.0745237863	.2486184478

Table 5A and 5B: Two-tailed t-test on cellar, house, and surface unit redware, non-redware, glass, and nail ratios.

APPENDIX C
SITE TOPSOIL AND INTERIOR HOUSE ANALYSIS

Series I (Figures 1, 2, and 3) display ware type sherd count gradation maps for the site topsoil units. Because sherd counts were low, wares were grouped into redwares and non-redwares. Units containing the house foundation are outlined.

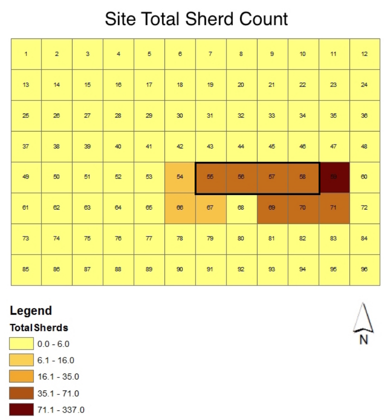

Figure 1: Total ceramic sherd count for site topsoil units. Units containing the house foundation are outlined.

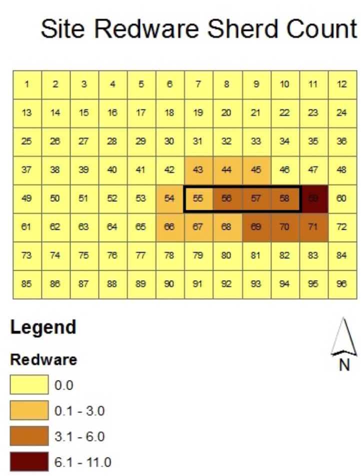

Figure 2: Total redware sherd count for site topsoil units. Units containing the house foundation are outlined.

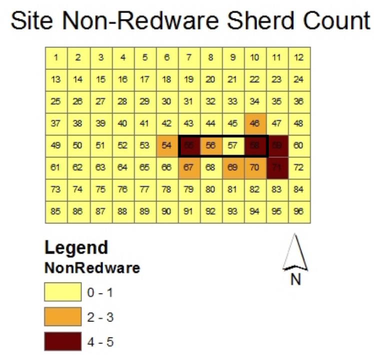

Figure 3: Total non-redware sherd count for site topsoil units.

Series II (Figures 4 through 13) displays ware type sherd count gradation maps for the units within the interior of the house foundation. The cellar area was excluded and addressed in a separate analysis.

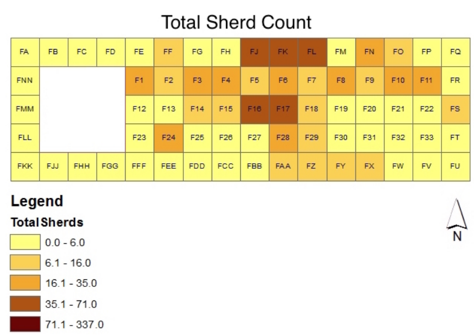

Figure 4: Total ceramic sherd count for interior house units.

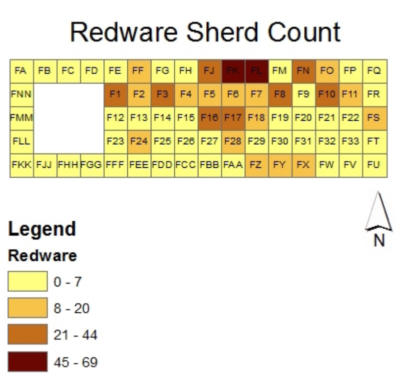

Figure 5: Total redware sherd count for interior house units.

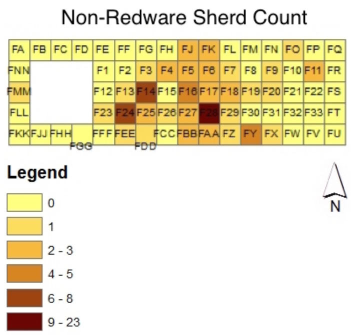

Figure 6: Total non-redware sherd count for interior house units.

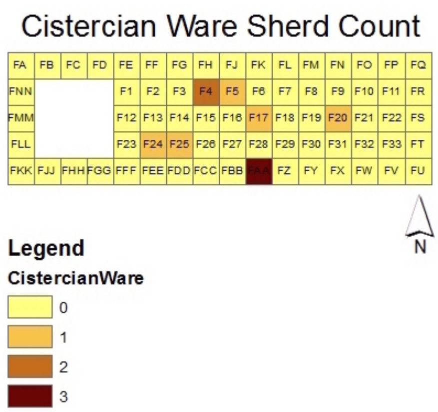

Figure 7: Total Cistercian ware sherd count for interior house units.

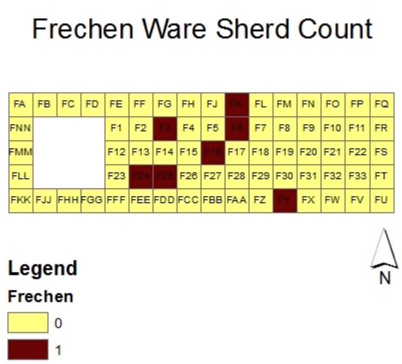

Figure 8: Total Frechen ware sherd count for interior house units.

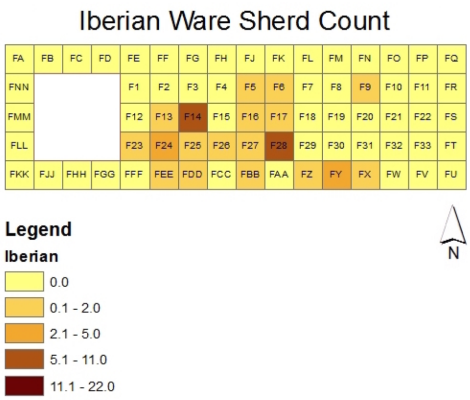

Figure 9: Total Iberian ware sherd count for interior house units.

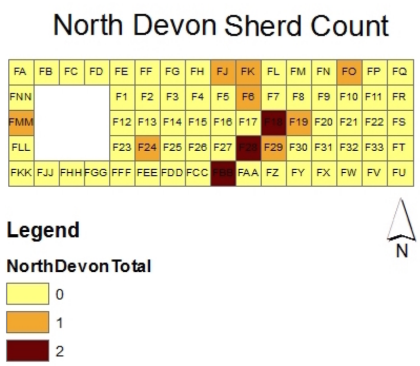

Figure 10: Total North Devon ware sherd count for interior house units.

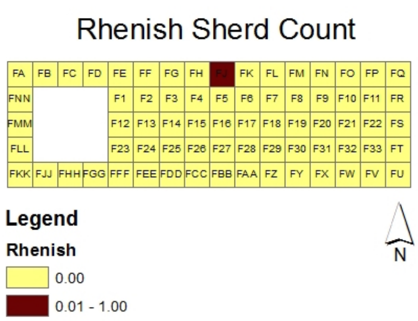

Figure 11: Total Rhenish ware sherd count for interior house units.

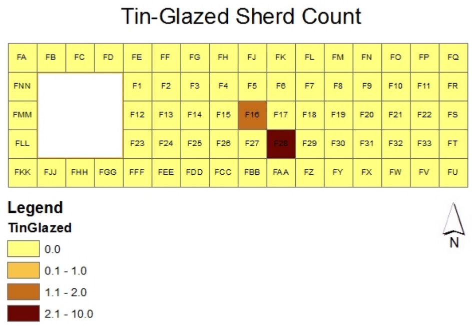

Figure 12: Total tin-glazed ware sherd count for interior house units.

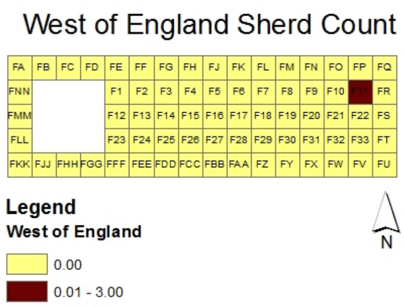

Figure 13: Total West of England ware sherd count for interior house units.

Series III (Figures 14 through 22) displays ceramic vessel form sherd count gradation maps for the units within the interior of the house foundation. Gradation maps for topsoil units were not produced due to low counts.

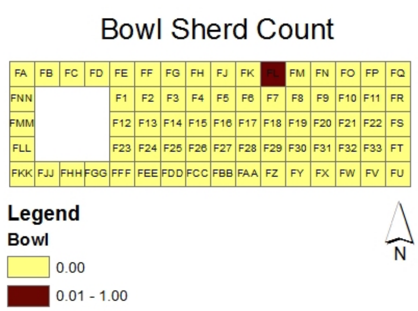

Figure 14: Total bowl sherd count for interior house units.

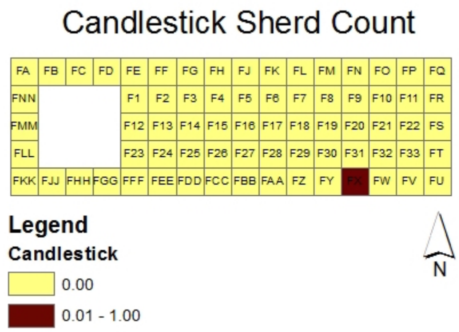

Figure 15: Total bowl sherd count for interior house units.

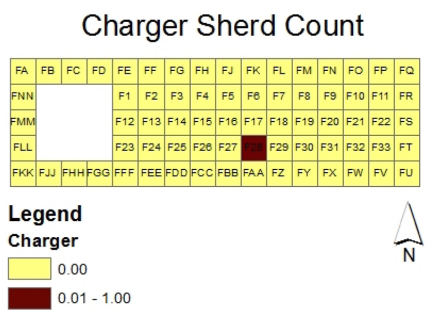

Figure 16: Total charger sherd count for interior house units.

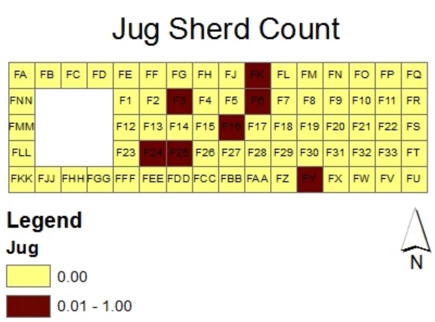

Figure 17: Total jug sherd count for interior house units.

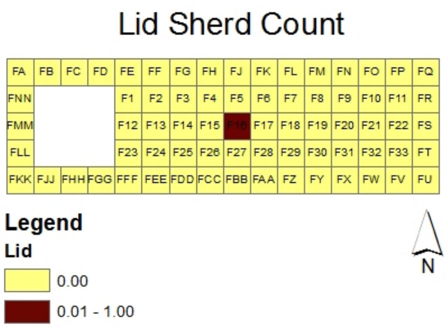

Figure 18: Total lid sherd count for interior house units.

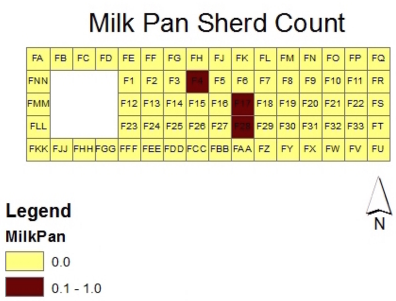

Figure 19: Total milk pan sherd count for interior house units.

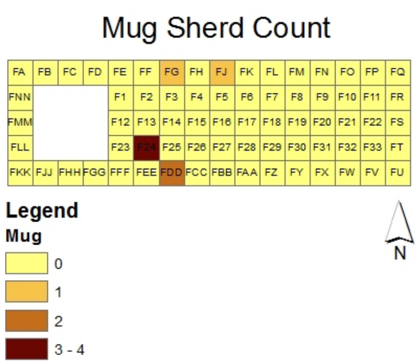

Figure 20: Total mug sherd count for interior house units.

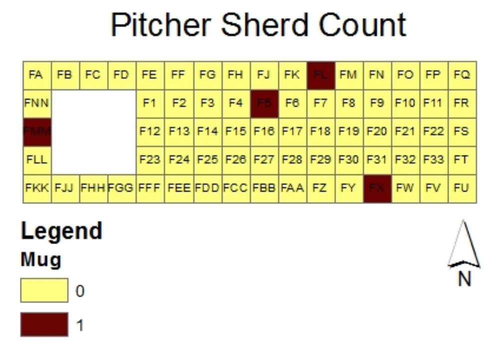

Figure 21: Total pitcher sherd count for interior house units.

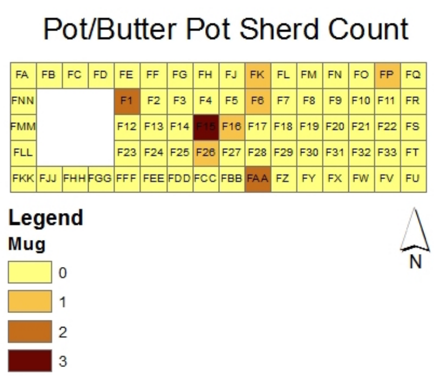

Figure 22: Total pot/butter pot sherd count for interior house units.

Series IV (Figures 23 through 27) displays ceramic vessel form category sherd count gradation maps for the units within the interior of the house foundation. Gradation maps for topsoil units were not produced due to low counts.

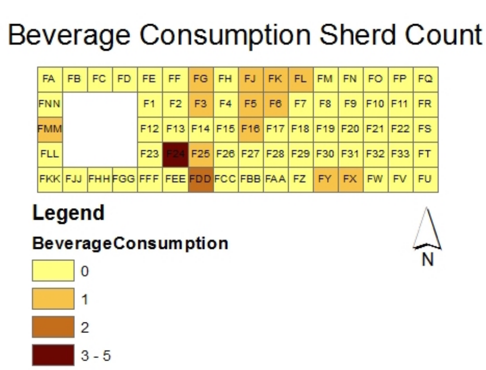

Figure 23: Total beverage consumption vessel sherd count for interior house units.

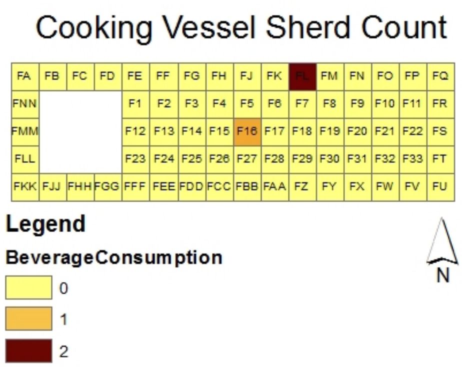

Figure 24: Total cooking vessel sherd count for interior house units.

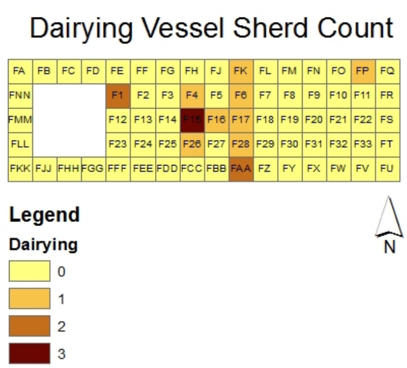

Figure 25: Total dairying vessel sherd count for interior house units.

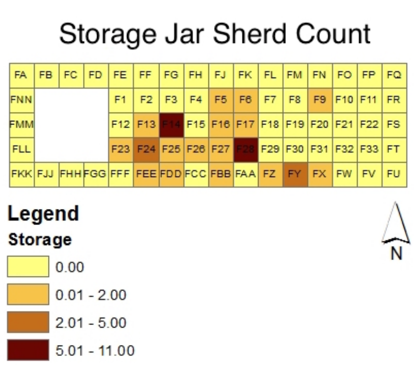

Figure 26: Total storage jar sherd count for interior house units.

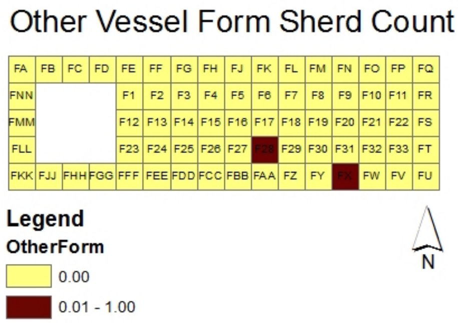

Figure 27: Total other vessel form sherd count for interior house units.

Table 1 shows results of a Global Moran's I test on selected variables within the cellar, the interior house units, and the topsoil units. Ware types listed as N/A had counts that were too low for analysis.

Site Topsoil Units	**Moran's Index**	**Variance**	**Z-Score**	**P-Value**	**Pattern**
Sherd Count	0.568	0.004	8.274	0	Clustered
Sherd Count (house units excluded)	0.304	0.004	4.715	0.000002	Clustered
Ware					
Border Ware	N/A				
Chinese Porcelain	N/A				
Cistercian Ware	N/A				
Creamware	N/A				
Frechen	N/A				
Iberian	N/A				
North Devon I	N/A				
North Devon II	N/A				
North Devon III	N/A				
North Devon Total	N/A				
Redware	N/A				
Rhenish	N/A				
Tin-Glazed	N/A				
Unidentified	N/A				
West of England Type D	N/A				
Whiteware	N/A				
Form					
Bowl	N/A				

Candlestick	N/A				
Charger	N/A				
Cup	N/A				
Jar	N/A				
Jug	N/A				
Lid	N/A				
Milk Pan	N/A				
Mug	N/A				
Pan	N/A				
Pipkin	N/A				
Pitcher	N/A				
Pot/Butter Pot	N/A				
Form Category					
Beverage Consumption	N/A				
Cooking	N/A				
Dairying	N/A				
Storage	N/A				
Other	N/A				

Interior House Units	**Moran's Index**	**Variance**	**Z-Score**	**P-Value**	**Pattern**
Sherd Count (cellar excluded)	0.354	0.007	4.198	0.000027	Clustered
Ware					
Border Ware	N/A				
Chinese Porcelain	N/A				
Cistercian Ware	0.002	0.006	-0.448	0.653673	Random
Creamware	N/A				
Frechen	0.054	0.007	1.32	0.186762	Random
Iberian	0.089	0.005	1.36	0.173809	Random
North Devon I	N/A				
North Devon II	N/A				
North Devon III	N/A				
North Devon Total	0.1	0.007	1.32	0.186762	Random
Redware	0.355	0.007	4.25	0.000021	Clustered
Rhenish	N/A				
Tin-Glazed	-0.029	0.0006	-0.571	0.567539	Random
Unidentified	N/A				
West of England Type D	N/A				
Whiteware	N/A				

Form					
Bowl	N/A				
Candlestick	N/A				
Charger	N/A				
Cup	N/A				
Jar	0.089	0.005	1.36	0.173809	Random
Jug	N/A				
Lid	N/A				
Milk Pan	0.15	0.005	2.135	0.032681	Clustered
Mug	-0.049	0.003	-0.571	0.567	Random
Pan	N/A				
Pitcher	-0.05	0.006	-0.448	0.653693	Random
Pot/Butter Pot	0.098	0.006	1.383	0.166457	Random
Form Category					
Beverage Consumption	0.095	0.005	1.541	0.123	Random
Cooking	-0.027	0.002	-0.247	0.804	Random
Dairying	0.246	0.007	3.106	0.001891	Clustered
Storage	0.123	0.006	1.739	0.081878	Clustered

Table 1: Global Moran's I values on selected variables. Counts with limited distribution or low values were excluded.

Series V (Figures 28 through X) displays Local Moran's I gradation maps on selected ceramic ware types within the interior house foundation units. Excluded ware types had counts that were too low for analysis.

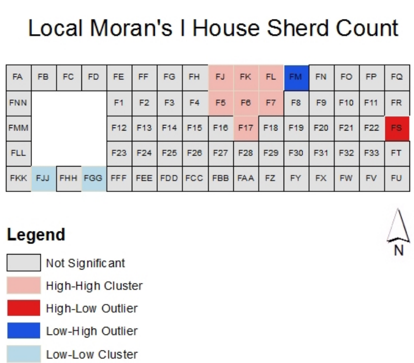

Figure 28: Local Moran's I for total ceramic sherd count within the interior house foundation units.

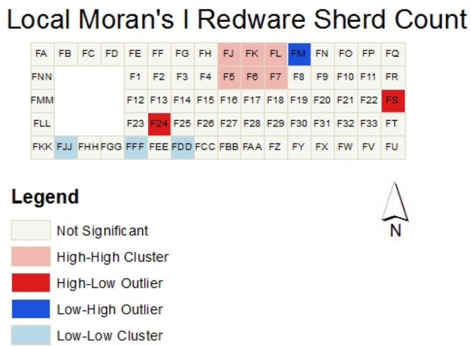

Figure 29: Local Moran's I for total redware sherd count within the interior house foundation units.

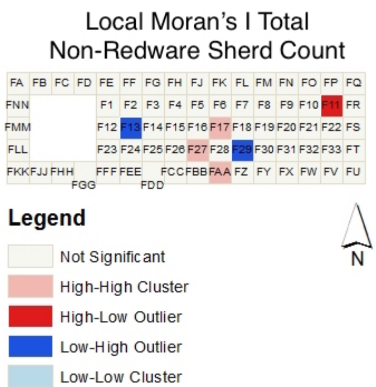

Figure 30: Local Moran's I for total non-redware sherd count within the interior house foundation units.

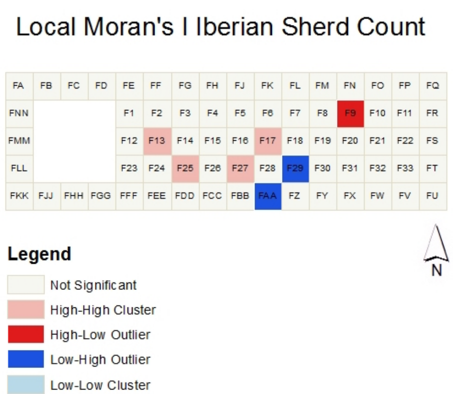

Figure 31: Local Moran's I for total Iberian ware sherd count within the interior house foundation units.

To explore the relationship between redwares and non-redwares distributions, multiple statistical tests were applied. The first was an ordinary least squares (OLS) regression. Results are displayed in Table 1 and Figure 32. A Local Moran's I test and a Hot-Spot analysis were also performed (Figures 33 and 34). All of the tests display a cluster of non-redwares in the southern-central portion of the house foundation.

Summary of OLS Results - Model Variables

Variable	Coefficient [a]	StdError	t-Statistic	Probability [b]	Robust_SE	Robust_t	Robust_Pr [b]
Intercept	1.018440	0.444611	2.290631	0.025042*	0.338169	3.011633	0.003631*
HOUSEUNITWAR	0.029699	0.027072	1.097070	0.276422	0.014025	2.117547	0.037818*

OLS Diagnostics

Input Features:	fishnethousegrid	Dependent Variable:	HOUSEUNITWARE.TOTALSHER
Number of Observations:	71	Akaike's Information Criterion (AICc) [d]:	365.645039
Multiple R-Squared [d]:	0.017144	Adjusted R-Squared [d]:	0.002900
Joint F-Statistic [e]:	1.203563	Prob(>F), (1,69) degrees of freedom:	0.276425
Joint Wald Statistic [e]:	4.484006	Prob(>chi-squared), (1) degrees of freedom:	0.034213*
Koenker (BP) Statistic [f]:	0.065908	Prob(>chi-squared), (1) degrees of freedom:	0.797390
Jarque-Bera Statistic [g]:	3739.575143	Prob(>chi-squared), (2) degrees of freedom:	0.000000*

Table 1: Ordinary least-squares (OLS) regression analysis results on non-redware versus redware total sherd count per interior house foundation units. Asterisks denote significance utilizing a p-value of 0.01. The results display a significant correlation between the spatial distributions of non-redwares and redwares.

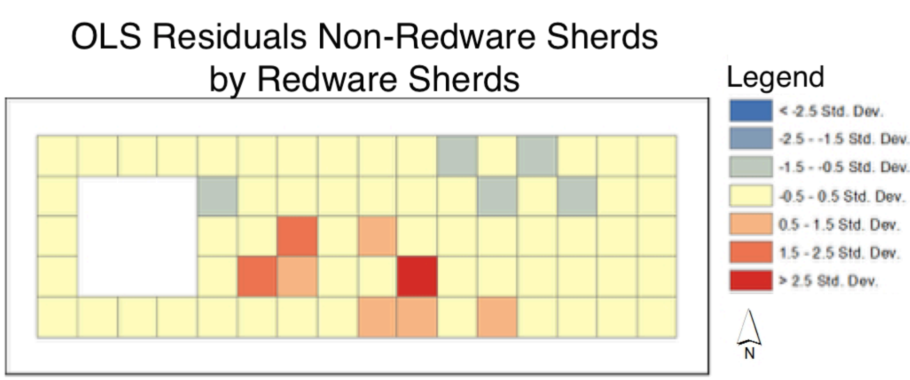

Figure 32: Gradation map of non-redware and redware sherd counts OLS residuals.

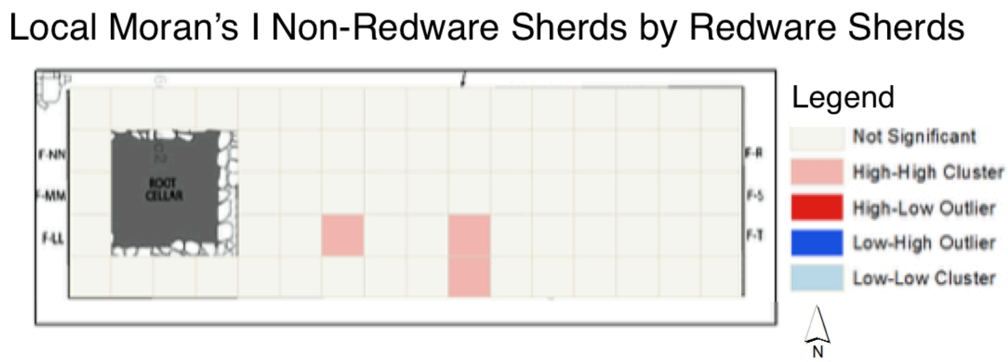

Figure 33: Local Moran's I analysis of non-redware sherd and window glass counts OLS residuals.

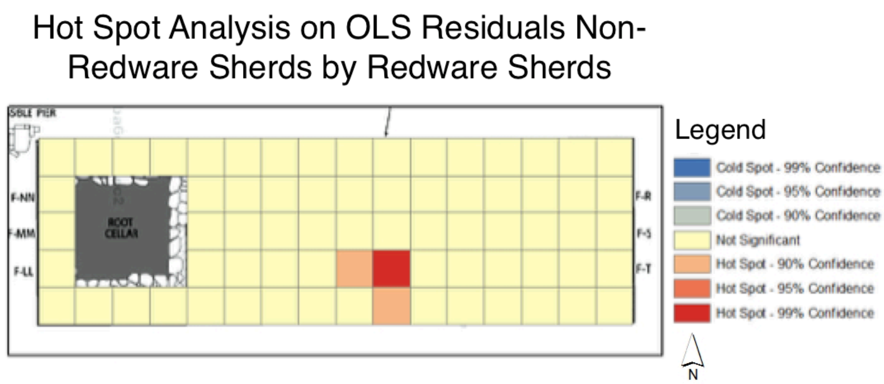

Figure 34: Hot-spot analysis of non-redware sherd and window glass counts OLS residuals.

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