THE ARCHAEOLOGY OF HASSANAMESIT WOODS: THE SARAH BURNEE/SARAH BOSTON FARMSTEAD

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Abstract

Between 2003 and 2013 the Fiske Center for Archaeological Research at the University of Massachusetts Boston conducted an intensive investigation of the Sarah Burnee/Sarah Boston Farmstead on Keith Hill in Grafton, Massachusetts. The project employed a collaborative method that involved working closely with the Town of Grafton, through the Hassanmesit Woods Management Committee, and the Nipmuc Nation, the state recognized government of the Nipmuc people. Yearly excavation and research plans were decided through consultation with both the Nipmuc Tribal Council, their designated representative, Dr. D. Rae Gould, and the Hassanamesit Woods Management Committee. Dr. Gould also played a continuous and active role in reviewing and collaborating on research activities including scholarly presentations at national and international academic meetings and public presentations at the community level. Large scale excavation between 2006 and 2013 focused on the Sarah Burnee/Sarah Boston farmstead that was occupied intensively between 1750 and 1840. Sarah Burnee and Sarah Boston were two of four Nipmuc women to own and possibly reside on the 206 acre parcel that today comprises Hassanamesit Woods. The other two, Sarah Robins and Sarah Muckamaug, were Sarah Burnee's grandmother and mother respectively. Excavation, archaeogeophysical survey, soil chemistry, and micromorphological and macrobotanical analysis were combined with the analysis of material culture and faunal material to generate a detailed picture of Nipmuc life during the 18th and 19th centuries. Excavation also found evidence of earlier indigenous occupations spanning some 6,000 years. The most intensive period of occupation covered the period 1750 to 1840, but with a significant spike the period 1790 to 1830. This appears to coincide with the coming of age of Sarah Boston who continues to live in the household with her mother Sarah Burnee Philips. Based on a combination of the documentary, architectural and archaeological data, it seems that an addition was made the structure between 1799 and 1802. A rich material assemblage of more than 120,000 artifacts was recovered from the site that provides detailed information on cultural practices including foodways, exchange networks, agricultural activities and other work-related activities such as basket making. A wealth of foodways related artifacts as well as faunal and floral remains provide ample evidence of daily meals and feasting. The latter conclusion is particularly important because of the implications is has for demonstrating that the Hassanamisco Nipmuc were regularly engaged in political activities. We believe the findings of the project provide empirical evidence that counters arguments made by the Bureau of Indian Affairs that the Hassanamisco Nipmuc did not persist as a politically and culturally continuous community.

Acknowledgements

With a project that spans more than a decade it is difficult to thank all of the people who contributed to the success of the project. The Trust for Public Lands (TPL) under the leadership of Valerie Talmage (now at Preserve Rhode Island) was instrumental in purchasing the Hassanamesit Woods Parcel and working with the Board of Selectman of the Town of Grafton and the residents of the town in agreeing to purchase the property rather than have it sold commercially. TPL also had the foresight to determine whether the property was linked to the Nipmuc Community of Hassamaisco through an archaeological survey carried out by the Fiske Center. That survey carried out by Jennifer Bonner and Elizabeth Kiniry was successful in finding documentary and cartographic evidence that suggested the property was indeed linked to at least one of the original 7 Native Proprietors who the English recognized during the 1727 land redistribution: Peter Muckamaug and Sarah Robins. Once the property was purchased by the Town of Grafton, the town appointed the Hassanamesit Woods Management Committee to oversee the development of the parcel for multiple uses and several of the committee members proved extremely helpful through out the project. In particular we would like to thank Ed Hazard and Jeanne Johnson. Jeanne became a regular volunteer on the project and helped in funding raising efforts. We would also like to thank Donald Clark of the Grafton News who was a regular visitor and helped with fund raising. He also provided photographs that were incorporated into the project archive. Another yearly visitor was Chuck Arning of the National Park Service whose connection with the Blackstone River Valley National Heritage Corridor provided a marvelous outlet for project information. His video footage is an important part of the project archive.

Several for the senior staff at the Fiske Center played pivotal roles in the

Cherly Holley, Rae Gould, and other tribal members visiting the site in 2011.

project. David Landon, Associate Director of the Fiske Center, served as co-PI for the project during the first two years of fieldwork and has supervised the faunal analyses carried out by Ryan Kennedy and Amalie Allard. Jack Gary, now the director of Thomas Jefferson's Poplar Forest, served as the field supervisor for the second phase of fieldwork. Ashley Peles and Peter Molegard, then undergraduates at UMB also worked on the field crew. Susan Jacabucci of the Fiske Center served as a member of the field crew and assisted Heather Trigg in collecting and analyzing pollen samples collected as part of the project. Christa Beranek of the Fiske Center is responsible for the editing and production of the final report.

The most rewarding facet of the project has bee the collaborative relationship that developed between the Fiske Center and the Nipmuc Nation. From the beginning of the project in 2003 and in particular before field work began in 2005 consultation between the Fiske Center and the Nipmuc was handled through the Tribal Council, in particular Chief Raymond Vickers and now Cheryl Holley. A major reason for the ease and supportive quality of the relationship was due to Rae Gould. Between her own research at the site of the current Nipmuc Reservation—the Printer/Cisco Property—and that carried out at Hassanamesit Woods, archaeology has helped in developing a more detailed narrative of recent Nipmuc history that counters the rejection of the petition for federal recognition by the Bureau of Indian Affairs in 2004. During the final years of the project, this collaboration was also facilitated by the involvement of the Institute for New England Native American Studies at UMass Boston and its director Cedric Woods. One result was the growing connection that emerged between the Hassanamesit Woods project and the Native American youth who took summer classes that included site visits and laboratory work on the project. One additional by-product of this blossoming of the collaborative nature of the project was the images produced by Scott Foster.

Too all of the members of the Nipmuc Nation and those most directly involved in the project, we say thank you for sharing your knowledge and allowing us the privilege of learning your history and carrying out excavations on your land.

A final thank you goes to all of the students who toiled on the project both in the field and in the laboratories of the Fiske Center over the past decade. A full list of the students who took part in the field school is in Appendix C.

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Chapter 1: Introduction

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Project Description

This report provides a summary of the archaeological investigations conducted of the Sarah Burnee/Sarah Boston Site (hereafter SB/SBS) as part of the larger Hassanamesit Woods Project in Grafton, Massachusetts between 2006 and the summer of 2013 (Figure 1-1). The SB/SBS was the home of successive generations of a Nipmuc household, passed from mother to daughter from the mid-18th to mid-19th century. It was originally discovered in 2005 and has been the focus of intensive excavations since then. Excavations focused on the house's stone lined cellar, but also covered surrounding areas that included yard and possible garden deposits, a midden area, a possible dry well and a stone quarry pit. All of these are located in a much larger home lot that was surrounded by walls to the north, south and east on the downslope of Keith Hill that crests to the West of the property (Figure 1-2). Through a combination of excavation, geophysical testing, and vegetation and soil chemistry surveys, other parts of the home lot were investigated. Although these efforts found areas of cobble and stone surfaces that may have served as path ways for animals, they did not identify any additional structures such as a barn noted in several documentary sources. To the south of the home lot are two other additional walled-in parcels. One of these, a large parcel immediately south of home lots, appears to have served as the chief pasture for farm animals. To the south of the pasture is an area that documentary sources identity as Swego, an area where one of the site's most noteworthy residents, Sarah Boston, collected herbs (Figure 1-2).

The site is on land currently owned by the Town of Grafton. The project has been conducted under archaeological permit 2853 issued by the office of the State Archaeologist and the Massachusetts Historical Commission. The permit was amended three times, in 2010, 2012 and 2014 to accommodate an expansion of the investigations to include the Deb Newman site west of Salisbury Street on Keith Hill and two additional site areas along Salisbury Street – a stone enclosure immediately west of Salisbury Street and what we believe to be the Lewis Ellis Homestead immediately east of Salisbury Street (Figure 1-1). The Hassanamesit Woods project is a collaborative effort involving the Andrew Fiske Memorial Center for Archaeological Research at the University of Massachusetts Boston, The Nipmuc Nation, and the Town of Grafton, Massachusetts. The Hassanamesit Woods Management Committee played a central role in the project as the Town of Grafton's designated oversight body. During the course of the past 8 years the project has evolved both in scope and direction as a direct result of our growing collaboration with the Nipmuc Nation, the Grafton Land Trust, and the Town of Grafton. Building on our initial investigations between 2003 and 2006 (Bonner and Kinery 2003; Gary 2005; Law, Pezzarossi and Mrozowski 2008), excavations at the SB/SBS have expanded to include additional archaeological fieldwork, geophysical testing, and geo-chemical and palynological sampling associated with what we believe to be the site of the Deb Newman household and that of Lewis Ellis. The results of work at the Deb Newman and Lewis Ellis sites will be discussed in a separate report.

The SB/SBS is located on the eastern slope of Keith Hill in an area characterized by slopping elevations, numerous springs and wetlands. It is located well within the original 1727 plot of Peter Magamaug and Sarah Robbins (see Chapter 2). Our primary focus has been the homelot of Sarah Burnee and Sarah Boston that is enclosed by stone walls along its eastern, southern, and northern boundaries (Figure 1-2). The uplands that comprise the eastern boundaries of the Blackstone River Drainage are characterized by thin soils and prominent outcrops of bedrock. The eastern slope of Keith Hill transitions in elevation down to Miscoe Brook, one of the more prominent features of a landscape that archaeological evidence confirms has been the focus of indigenous occupation for at least seven thousand years based on the stylistic characteristics of projectile points identified by

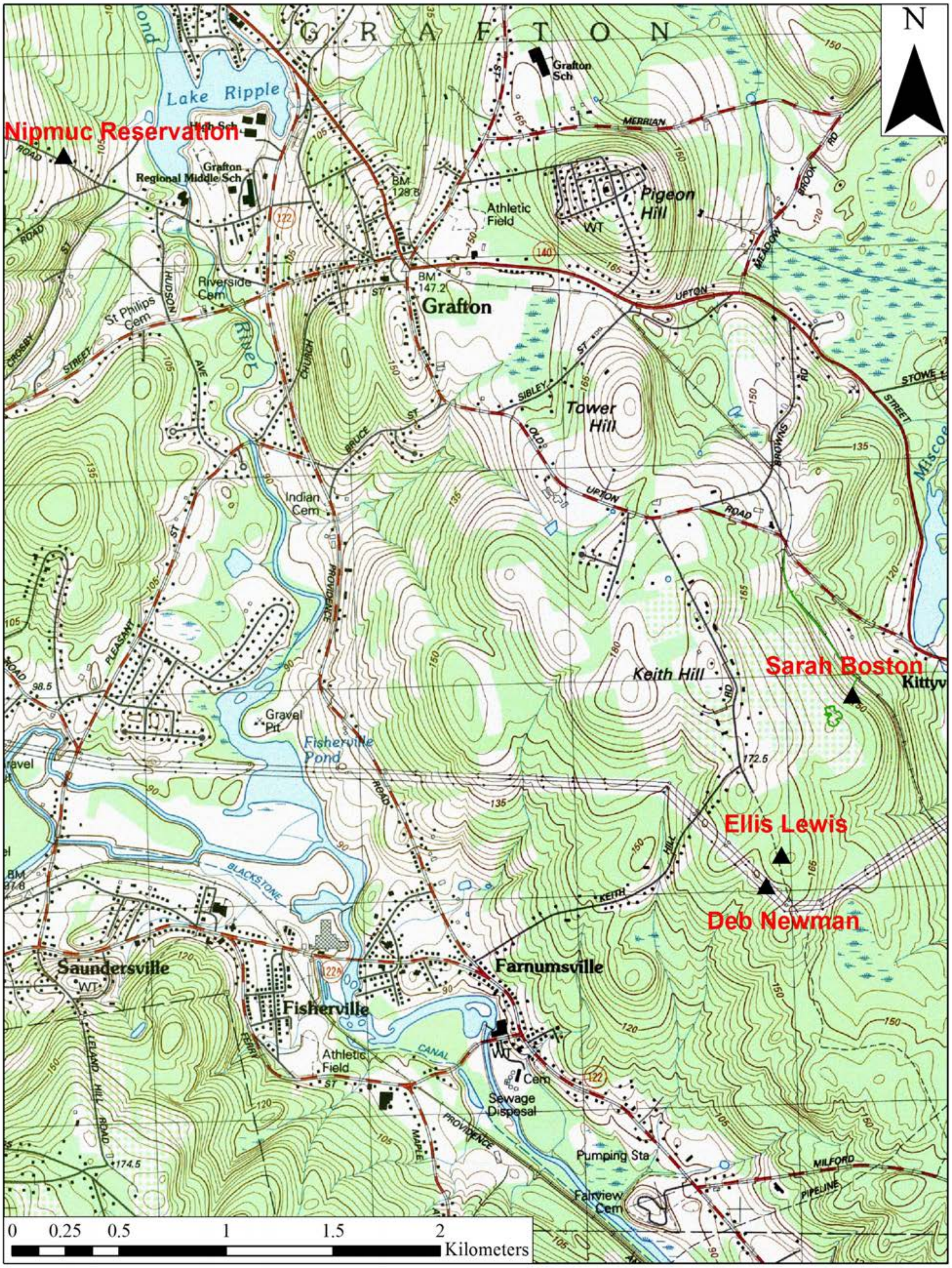

Figure 1-1. Hassanamesit Woods Project Area, Grafton, Massachusetts.

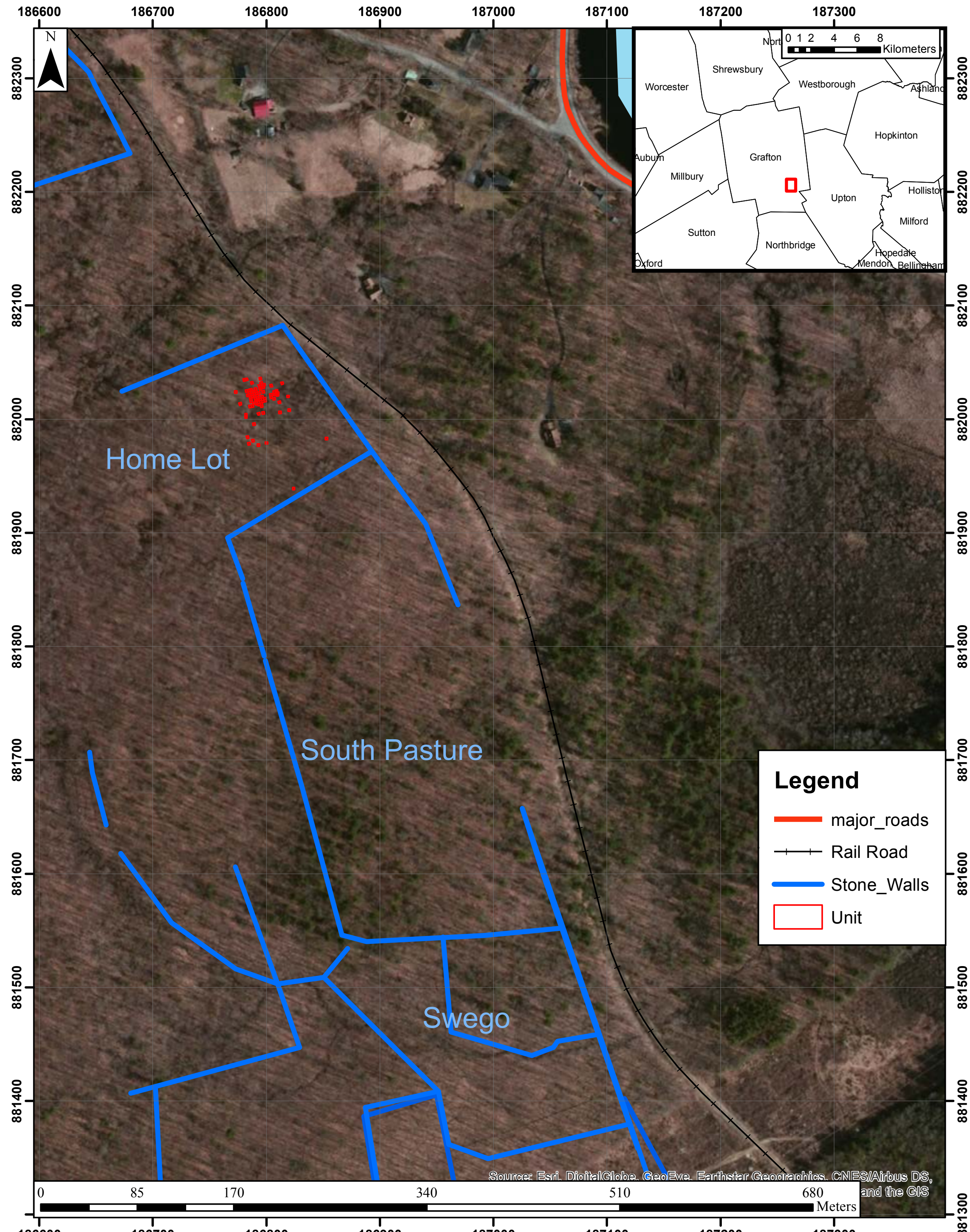

Figure 1-2. Map of Sarah Burnee/Sarah Boston Homelot, South Pasture, and Swego.

archaeologists. The bedrock deposits that characterize Keith Hill include numerous veins of quartz and quartzite that have been used by indigenous populations as lithic sources for thousands of years (Chapter 8). The numerous springs and outcrop seeps around Keith Hill add to drainage patterns that appear to have been taken into consideration with respect to where buildings were located and how they were constructed. The overall wetness of the soils has given rise to a thick third growth deciduous and coniferous forest that incorporates remnant apple trees from what was once the largest orchard in New England (Bonner and Kinnery 2003). The understory varies across the landscape, but in the vicinity of the SB/SBS there is thick mix of rose, honeysuckle, grasses, sedges, and woodland wildflowers.

The Deb Newman site is located west of the SB/SBS and outside the original 203 parcel that constitutes Hassanemsit Woods today (Figure 1-1). This portion of Keith Hill is only a short distance from the SB/SBS and we know from documentary sources that the two Nipmuc women were part of a broader community that continued to live in what has long been Nipmuc country. The Deb Newman parcel is located at 16 Salisbury St, a property currently owned by the Grafton Land Trust. The 50 sq m area in question also lies in a high tension power lane and is within the bounds of a property easement managed by the New England Power Co. The area contains numerous stone walls including some that appear to bound a yard that we believe is associated with the home site. There is also a small stone feature that we believe served as an animal pen near one of the small wetland areas. Flora across the site is low lying and generally dense and composed of a mixture of young deciduous growth and invasive species. In some areas, especially those on higher ground, bedrock has been exposed. The entire easement area including the 50 sq m area in question has been kept clear of trees so as not to interfere with the power lines above. A small stream and intermittent wetlands are located near the site. Both of these drain into the Blackstone River to the west.

Theoretical Context

In the same manner that the areal extent of our investigations has expanded, the collaboration between the Fiske Center and the Nipmuc Nation has broadened over time. The result has been a growing convergence between our work at Hassanamesit Woods and the work carried out by Rae Gould (2010) at the Moses Printer property that today serves as the Nipmuc Reservation and which is also located in Grafton. That convergence has been aided by a shared goal of having archaeology serve the needs of the contemporary Nipmuc community. The pragmatic philosophy that underlies our research (see Preucel and Bauer 2001, Preucel and Mrozowski 2010; Mrozowski 2012) is part of a larger movement within archaeology that involves close collaboration with indigenous groups (e.g., Atalay 2006; Eco-Hawk and Zimmerman 2006; Ferguson 2003, 2004; Lilley 2006; Lydon 2006; Nicholas 2010; Peck et al. 2003; Silliman 2008; C. Smith and Jackson 2006; L. Smith 2000, 2001; L. Smith et al. 2003; Watkins 2005). At Hassanamesit Woods our collaboration has followed two parallel tracks. One has involved close coordination of all research and scholarly activities with the Nipmuc Tribal Council and with Rae Gould. Gould, who serves both as the Historic Preservation officer for the Nipmuc and with the Advisory Council on Historic Preservation has played an integral role in the project and this has only increased as time has passed. Intellectually it is difficult to separate our work at Hassanamesit Woods with Gould's work at the current Nipmuc Reservation (2010, 2013a & b).

The second track has been to explore the use of archaeology in the pursuit of contemporary legal questions surrounding the on-going efforts of the Nipmuc to gain Federal Recognition (see Mrozowski 2012; Mrozowski et al 2009). Much of our research has focused on some of the more traditional strengths of archaeology in documenting the eighteenth and nineteenth-century residents of Hassnamaesit Woods and their connections with the surrounding Nipmuc community. Basic goals such as establishing a chronology of the homestead's development and documenting the range of activities that took place at the site have been a major focus. Linking this history to that of other Nipmuc households, including those of Deb Newman and the Printer/Cisco homestead has aided us in constructing a narrative that counters that of the Bureau of Indian Affairs in its assessment that the Nipmuc failed to provide written evidence of cultural and political continuity over the past 350 years (Adams 2004). As this report will document, the archaeological evidence suggests otherwise.

Over the past decade scholars working in North America have documented the capricious and often biased quality of the Federal Recognition Process that relies exclusively on written forms of documentation. Without the benefit of either oral tradition or archaeological evidence, indigenous groups have found themselves needing to embrace a form of strategic essentialism that ignores the dynamic quality of Native American societies during the colonial period and deeper past (Daehnke 2007; Ferguson 2004; Liebmann 2008 B. G. Miller 2003; M. E. Miller 2004; Mrozowski et al. 2009; Raibmon 2005; Wilcox 2009). Instead indigenous groups are asked to document an unbroken cultural and political stasis that relegates much of Native American history to the separate realm of prehistory (see Schmidt and Mrozowski 2013). This not only devalues Native American history, it also places an untenable barrier to seeing deep time extend into the recent past. Additionally, it reinforces the notion that colonialism resulted in a violent disjuncture that severed all cultural and political continuity with a past that is often characterized as timeless (Ferguson 2004; Gould 2013; Leibmann 2008; Mrozowski 2013; Silliman 2010, 2012). The impact of European colonization across much of the globe is an undeniable reality that is not to be minimized. Yet research in a variety of contexts continues to demonstrate that European colonialism did not result in a loss of indigenous identity. The evidence we have unearthed at Hassanamesit Woods contributes to a narrative of cultural persistence and change that suggests a dynamic and adaptable set of practices that maintain Nipmuc identity in this instance.

There are those who believe that having archaeology serve contemporary political ends lessens its effectiveness as an objective tool of science (e.g. McGhee 2008, 2010). In addition McGhee (2008) argues that to include indigenous voices in our research is to privilege indigenous knowledge over that of the archaeologist. We believe, as do others (Colwell-Chanthaphonoh et al 2010; Nicholas 2010; Silliman 2010), that the kind of indigenous archaeology that McGhee (2008) criticizes, as being unscientific is in fact better science because it does not privilege one form of knowledge over others. The pragmatic philosophy that serves as the Hassanamesit Woods project's intellectual foundation (see Baert 2005; Preucel and Mrozowski 2010; Mrozowski 2012) fosters a more open investigative process in which all forms of knowledge are viewed as having value. Oral tradition is, for example, viewed as being no less biased than legal documents that are the product of contentious histories. The same is true of local histories. These too may be biased, yet it is this very characteristic that makes them valuable as sources of information concerning local perceptions of Native American society. Subjecting these kinds of sources to the same level of critical analysis as other forms of historical information makes them a valuable mechanism for divining the perceptions of local historians who were producing narratives that essentially erased Native American history (see Law-Pezzarrosi in press).

The rehabilitation of local histories is but one example of the level of rigor brought to the investigations at Hassanamesit Woods. The collaborative nature of our work with the Nipmuc is an extension of the multi-scaler, interdisciplinary approach that is an earmark of Fiske Center projects (e.g. Hayes and Mrozowski 2007; Landon and Bulger 2013 Mrozowski 2006a & b; 2010; Mrozowski et al 2005, 2009; Trigg and Landon 2010). This begins with the discovery phase of our research that included geophysical survey and soil chemistry each of which has aided our efforts to identify cultural deposits within the Sarah Burnee/ Sarah Boston home lot and the South Pasture. More traditional field survey methods were employed in our explorations of the Deb Newman site. Pollen cores collected in the vicinity of the Deb Newman site have provided more in-depth information on the vegetation changes in the Keith Hill area more generally. The results of the pollen analysis will not be discussed in this report, but will instead be part of a separate report on the Deb Newman and Lewis Ellis investigations. At the other end of the spectrum, soil micro-morphological analysis carried out by Dennis Piechota (this volume) has provided valuable insights into sedimentary processes that we believe to be linked to specific activities in the area in and around the Sarah Brunee/Sarah Boston home stead. Macrobotanical and zooarchaeological analyses have added important information on the foodways practices and the use of different woods by the site's residents (see Allard 2010, 2015; Pezzarossi, Kennedy and Law 2012; Trigg this volume). Material culture analysis of the surprisingly rich assemblage from the site has focused primarily on ceramics, glassware and metals, but on pipes and lithics as well. Through the use of GIS mapping and analysis programs as well as spatial statistics we have also been able to gather a fairly detailed picture of the different activities that were carried out around the home lot.

Combined, these various analytical approaches present a rich and detailed picture of daily life at the Sarah Burnee/Sarah Boston farmstead between circa 1749 when we believe the foundation we have unearthed was first constructed and the time of Sarah Boston's death in 1837. Ownership of the property remained in the hands of Sarah Boston's daughter until 1870 when the last piece of what had been an original 203-acre parcel was sold. The generational history of the original parcel, described in greater detail in Chapter Two, stands as an emphatic reinforcement of Nipmuc cultural persistence. In the era after King Philip's War (1675-1676) when English colonial governments chose to redistribute Native lands, they did so in a manner that was consistent with their own cultural practices. Therefore it is not surprising that in 1727 when large tracts of Native lands were subdivided, including the original 3,000 acres of Hassanamesit, male ownership – an English tradition – would be used to designate Native lots. Nipmuc cultural persistence, however, can be seen when the 203 acre property ascribed to Peter Muckamaug was transferred in later years through his wife Sarah Robbins' line of ownership, to their daughter Sarah Muckamaug then to their grand daughter Sarah Burnee Phillips and to their great grand daughter Sarah Boston. The persistence of this matrilineal line of descent and property ownership stands as powerful evidence of both the continuing importance of women in Nipmuc society and of Nipmuc cultural practices more broadly.

Environmental Context

Keith Hill Geology and Hydrology

The Sarah Burnee/Sarah Boston Home Site was built above the bedrock of the primordial Avalon Terrane. It is located just southeast of the Bloody Bluff Fault that separates the Avalon from the Nashoba Terranes. Originally both of these massive landforms were part of the ancient supercontinent of Gondwana. They separated from one another 550 million years ago (Ma) and then over 400 Ma they smashed back into each other with a glancing blow along what is today called the Bloody Bluff Fault line. This caused the deep folding in the earth's crust and led to the widespread fault-lines visible in today's bedrock. The ridge of one of these massive folds, called the Milford Antiform, runs from the southwest to the northeast under the Sarah Burnee/Sarah Boston Home Site.

The bedrock directly below the SB/SB Home Site is composed of Northbridge Granite Gneiss, a well-lineated coarse grained rock that weathers to light gray and contains quartz, plagioclase and distinctive amounts of biotite (Walsh et al. 2011). Over the millions of years since its formation numbers of large and small fractures have developed in this bedrock. This structurally weak yet water-impervious metamorphic rock has fractured under tectonic stresses as well as frost-related and fluvial weathering. The gaps in these fractures and faults became slowly eroded and widened by the seepage of percolating groundwater developing subsurface channels for the Keith Hill rainfall. (Figure 1-3). In geologically recent times, the last 20,000 years, this bedrock ridge was cross-cut by glaciers whose weight and insistent southward movement added new fault lines and then widened them into the many wide river valleys that today run southward from northern New England and set the stage for the modern landforms of the region.

Surficial geology studies the sediments below the level of soil but above the bedrock. Such sediments, with the bedrock, define the topography of a region. The area around the SB/SB site is composed of unconsolidated sand, silt and rock

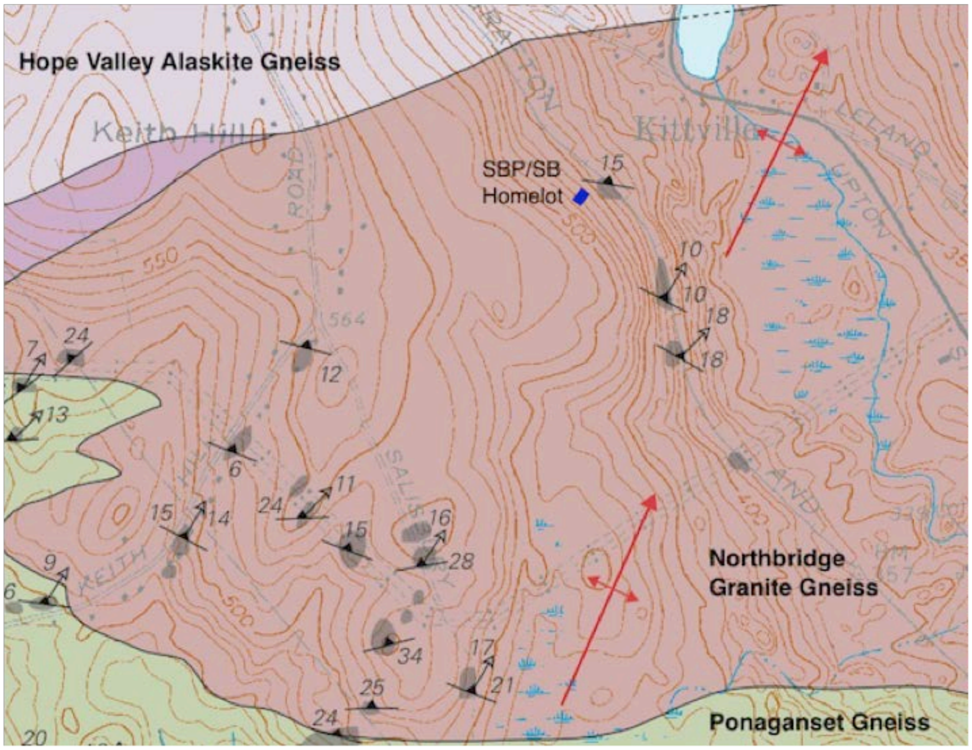

Figure 1-3. Map of the bedrock under the Sarah Burnee/Sarah Boston home site. The blue rectangle indicates the position of the home site on the east slope of Keith's Hill. The ancient and brittle gneiss of the region with its northeasterly dip has developed interconnecting fractures and faults that allow water to percolate down to hillside springs around the home site. Image adapted from Walsh et al. 2011.

that was left by the last, Wisconsinan glaciation as glacial till upslope and glacio-fluvial sediment downslope. It has a widely varying thickness with a marked increase in thickness on drumlin-formed hilltops like Keith Hill and relative thin covering on the slopes. Its high silt and sand content lacking in clays makes it very permeable to groundwater (Figure 1-4).

Surficial sediments along with landscape help define the groundwater hydrology and areal watersheds. The thick till on top of Keith Hill provides a large reservoir for stored groundwater. Seeps of this groundwater dot the hillside and add a steady small background flow to the two major surface streams running down the easterly slopes to the north and south (known as Swego) of the SB/SBS. The thin till layer on the slopes and specifically around the SB/SBS makes for easy access to shallow upslope and downslope bedrock seeps or springs. The dip of fractured bedrock downward towards the northeast also channels some groundwater from the thick till moisture reservoir of the Keith hilltop through the horizontal laminations and vertical cracks in the bedrock.

It is likely that there was Nipmuc knowledge of this local hydro-geological effect and its tendency to produce small bedrock springs of purified water on hillsides all along the area of the Blackstone River Valley where springs would be important year-round but especially during the dry summer months (Stone and Stone 2006). Also surface runoff, when it was available, may have been contaminated by waste from animal husbandry during the 18th and 19th centuries and the manuring of croplands. Such springs of purified water would be closer to hand than the waters of the Miscoe Brook. When the modern Grafton and Upton (the former Providence and Worcester) railroad track bed was laid in the late 1840s just east of the SB/SBS it cut into the shallow bedrock further exposing a line of these small springs.

Soil science studies the relatively thin layer of

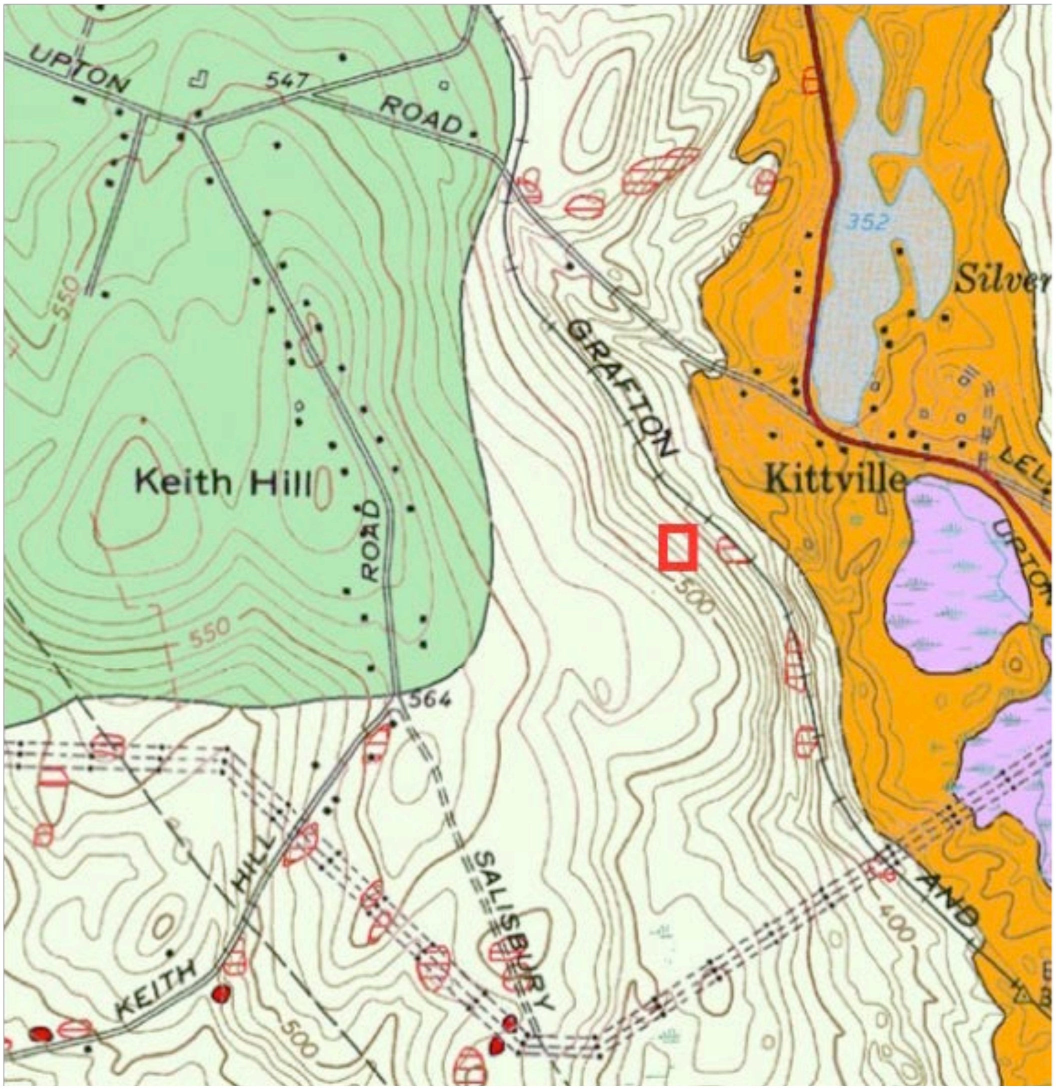

Figure 1-4. Subsurface sediment depths at Keith's Hill. The approximate location of the Sarah Burnee/Sarah Boston Home Site is shown as a rectangle on the eastern slope of the hill near 'Kittville'. As is common on drumlins the deepest glacial till sediments (shown in green) occur on the hilltop upslope of the house. Thick sediment provides a large reservoir of fresh water for the many springs that surface downslope around the house and are especially visible along the cuts made for the current railroad tracks. The shallow glacial till downslope forces groundwater to the surface and may have been a contributing reason why this location was chosen for the SB/SB Home Site. Image adapted from Stone and Stone 2006.

sediment exposed to the atmosphere. It has a long history of independent development from the rest of geology because it has been driven by particular economic interests such as agriculture and civil engineering. It studies what in geology is referred to as the pedosphere, the layer of unconsolidated sediment that is altered in place by interactions with the aerial environment including all plants, animals and humans. The soils around the SB/SB home site began developing from the surficial sediments described above after they were deposited by the Wisconsinan glaciation. For economic reasons the soils of the United States and most countries are classified today according to their content, hydrology, acidity and other traits important to agricultural and engineering uses. The soils surrounding the SB/SBS are designated as Paxton 305B, a type of fine sandy loam derived from glacial till composed of schist or other metamorphic rock and typically found on the slopes of the drumlins of the Blackstone River Valley. Nearly devoid of clays this soil type is well-drained, that is, groundwater passes freely through it, an important trait on slopes with shallow sediment depths above impervious bedrock bearing extensive cracks and faults (Taylor 1998).

Modern Vegetation

The current vegetation and plant communities provide a comparative context for the archaeological pollen, seeds, and wood recovered during this project. The slope, presence of wetlands, and depth of the soil vary and contribute to diverse vegetation, and even while the canopy is largely closed, there are some openings, especially near the SB/SBS house foundations. The vegetation survey of the SB/SBS homelot focused on the woody/arboreal vegetation along a 90-m transect. Every meter we identified the woody vegetation growing in or directly shading a 1 x 1 meter square. We began the transect west and down slope of the stone wall running along the railroad tracks and worked east in 1 meter increments through the homelot and to the pasture wall recording the woody vegetation from the shortest (generally juvenile plants) to the tallest mature canopy. The terrain was generally sloping with a closed tree canopy and included a modest wetland. We identified 11 taxa with the oak group subdivided into red-type and white-type. Oak (*Quercus* sp.) was the dominant tree type, followed by maples (*Acer* sp.), and witchhazel (*Hamamelis* sp.). Witchhazel was particularly numerous along the eastern stone wall of the homelot where the soil was deep and moist. Other tree taxa identified included (in order of dominance) hickory, ash, dogwood, birch, and elm. Other woody vegetation identified included holly, wild roses, raspberry/blackberry canes, and greenbrier. The transect did not contain any softwoods although there were a few juvenile trees nearby, and the Pasture and Swego lots contained small stands of pine. Understory vegetation in the transect consisted of ferns, primarily along the railroad tracks to the east (downslope) of the wall, where there was no overstory. Ferns were also present in the wetlands, but their density was low. Poison ivy was common along the wall, and grasses along the wetlands.

Notable vegetation in areas of the homelot that were not covered by the transect includes the historic apple orchard. Although most of the trees are senescent, covered in honeysuckle, some still bear fruit including one directly above the house foundation. Invasive multiflora rose and honeysuckle are common near the house foundation, especially to the south. The herbaceous vegetation consists of poison ivy, grasses and sedges, especially down slope of the house foundation, wintergreen, and other forest wildflowers. Within the homelot are stands of pines, oaks, hickory and maple, and an ash tree grows above the house foundation. While the canopy of the homelot is largely closed, the forest is young, and the presence of the apple trees amongst the larger oaks, maples and ashes attest to that youth. The area near the Deb Newman site may give an indication of the types of vegetation available in secondary succession areas. In the past, these might have been agricultural fields that were allowed to go fallow or farms that had been abandoned. Informal assessments of vegetation from areas that were cleared of trees under the power lines near the Deb Newman site includes dense stands of blueberries, strawberries, raspberries, wild grapes, poison ivy, small elms, and hazelnuts in the dryer areas.

Cultural Context

Keith Hill has a deep human history with evidence of Native American land use spanning between 7 and 8,000 years based on the presence of accepted tool types. Archaeological research in the area has documented a variety of site types overwhelmingly represented by lithic use sites, but also including several quarries within easy walking distance of the SB/SBS (see Chapter 8). Based on the results of numerous cultural resource management studies in the immediate area, the overlapping communities of Hassanamesit and Grafton have been the continuous focus of human settlement for at least the past 10,000 years (Fragola and Ritchie 1996; Gary 2005; Mulholland et al. 1986; Pagoulatos 1988; Glover 1998; Ritchie and Van Dyke 2005; Tritsch 2006). In his analysis of the Native American lithics and pottery from the SB/SBS, Bagley (2013; Chapter 8) concludes that lithic tool production and general quarrying was the most noteworthy use of the area by its Native inhabitants. The extensive outcrops in the area not only provided lithic materials, in particular quartz and quartzite, but also a topography that lent itself to the construction of rock shelters and other stone structures. Our investigations of the SB/SB site have rekindled an interest in a host of stone structures in Southern New England more generally that have been the subject of speculation for more than century (see Ives 2013). For most of the past 60 to 70 years there has not been much in the way of systematic, professional investigation of these sorts of stone structures. Our own work on this project has not delved too deeply into this question because the foundation and stonework we have investigated has clear cultural affiliations and dates to the last 350 years. Although there are Native American sites in the project area and greater Keith Hill that are part of a deeper past (Bagley 2013; Chapter 8) our primary focus is the Native and Anglo-American history of the more recent past and its connections to today.

The excavations in Hassanamesit Woods unearthed evidence that also extends beyond the confines of the SB/SBS to other Nipmuc households – that of Deb Newman and the Printer-Cisco homestead (Gould 2010, 2013) and may extend to the parts of Worcester County where historic period Nipmuc sites have been encountered archaeologically (e.g Bagley 2013; Leveilee, Dalton and Hoffman 1994). These connections speak to a continuing Nipmuc presence that involved economic and political activities that were part of an unbroken chain that continues to the present. This evidence of political and social continuity comes in several forms and will be a common thread throughout the report. Chapter Two contextualizes our investigations with an updated and more detailed discussion stemming from Heather Law Pezzaorossi's continuing analysis of primary documents, oral histories, and local histories. This is followed by a discussion of the methods employed during our investigations with a special emphasis on the lessons that have been learned as a result of our collaboration with the Nipmuc. Running the gambit from discussions of more traditional archaeological methods of site discovery and excavation, to the development of a project blog, this discussion of project methodology represents a work in progress. In this regard it remains consistent with a pragmatic philosophy that calls for an open process that is itself organic in quality. The actual discussion of project results covers Chapters Three, Four and Five, as well as a series of additional contributions that report on the various investigations and analysis. These chapters present a range of discussions including year-to-year excavation summaries, a discussion of site architecture and spatial evidence, a summary of material culture with more detailed discussions of particular artifact classes, followed by individual summaries of more specialized analyses including geochemical, macrobotantical and micromorphological studies. These chapters are followed by a concluding chapter that includes recommendations concerning the continuing preservation of the SB/SBS foundation and landscape and other portions of the Hassanamesit Woods property.

Chapter 2: Hassanamesit History

Heather Law Pezzarossi

Hassanamesit Woods is now a tract of land set aside for hiking trails and outdoor education; however it was once part of a large 10,000 acre area inhabited by the Hassanamisco band of the Nipmuc. In 1654, "Hassanamesit" or "land of the small stones" (Doughton 1997) became the third of several praying towns gathered by John Eliot to propagate the gospel. Beginning in 1646, John Eliot's "praying towns" were set up in outlier communities to preach Christianity and establish "proper" English style congregations where Natives were expected to abide by English land practices and gender roles, and to accept their place in the colonial social order (see Figure 2-1; O'Brien 1997:27). The establishment of "praying Indian towns" under the General Courts act of 1652 paved the way for Indians to be brought into the "civility" of the English system via religious conversion, cultural indoctrination and general control and surveillance (Mandell 1991).

Women were at the center of Native daily life. The role of women encompassed not only child rearing and the majority of food staple production, but they also held key economic roles as sachems, shamans, and traders. Perhaps most importantly, women were the spiritual connection between the people and the earth (Richmond and Den Ouden 2003:183). Because the women of Native society were so important, the missionaries' first step towards destabilizing the community was to reduce their status (Richmond and Den Ouden 2003:183). They did so by imposing European restrictions on daily life. For example, Native women were to be trained in "domestic" skills such as weaving and spinning. Their original roles as agriculturalists and leaders were suppressed, leaving the men to do the women's jobs (Richmond and Den Ouden 2003:184).

Along with the breakdown of gender identities within a Native community, the missionaries also sought to isolate Native converts from their normal socio-economic networks (Tinker 2003). Eliot tried to enforce the rejection of Native lifeways, which meant, for the converts in the praying towns, total isolation from relatives in the home village. John Eliot also took the isolation tactic one step further by separating the group from the colonial towns (Tinker 2003). The praying town actually acted as a buffer between the more hostile Indian groups and the English settlers (Tinker 2003:27). By the mid 17th century, Eliot's seven praying towns served to increase the security of the colony and extend colonial English law into the western interior (Kawashima 1969:44)

The success of these praying towns was variable, and Eliot's influence upon the people of such villages is still being researched. For example, when reporting on Hassanamesit, Daniel Gookin reports in 1674, "they have a meeting house for worship of God after the English fashion of building, and two or three other houses after the same mode; but they fancy not greatly to live in them" (Doughton 1997). This quote shows that while historic documentation may claim a simple story of successful conversion, everyday life for those at Hassanamesit may have remained more traditionally Nipmuc than they were willing to show to their English guardians. At another Nipmuc praying town, that of Magunkaquog, there is strong archaeological evidence that supports a similar situation to that described by Gookin for Hassanamesit. At Magunkaquag, excavations suggest that what is believed to be the community meeting house was used primarily as a place to accommodate English visitors to the settlement, such as Eliot, and to store much of the English material culture that would have been incorporated into instruction in English ways of life (Mrozowski et al 2005, 2009).

Hassanamesit and Natick were the only praying towns reported to have had churches; they served as centers for instruction for teachers who would later go to other villages. At that time Hassanamesit was four miles square, consisting of about 8000 acres. Because of its westerly position relative to other praying towns, Hassanamesit was considered a gateway to the frontier and acted as a buffer, protecting the English from Native forces

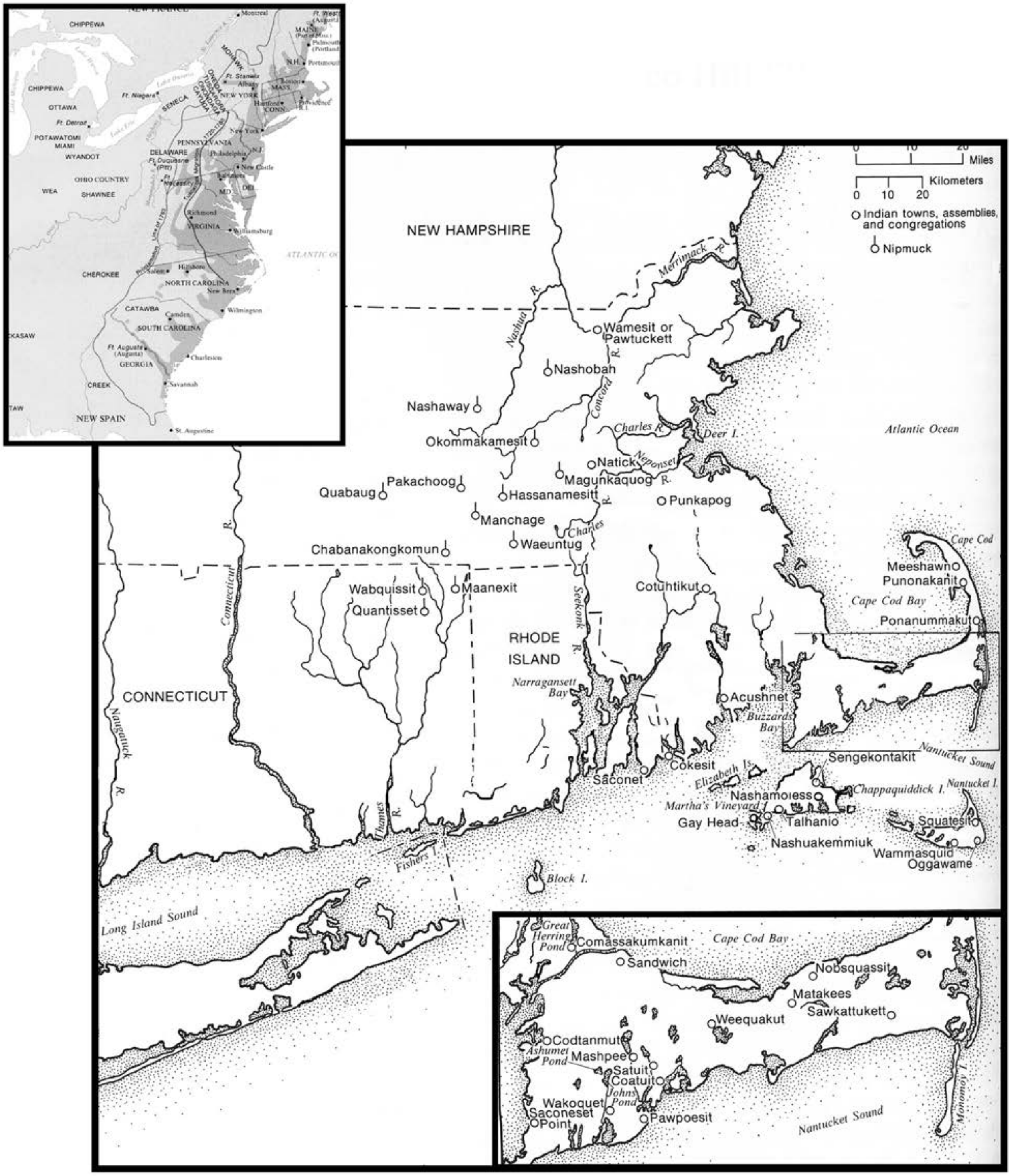

Figure 2-1. The locations of the "Praying Indian" communities in Massachusetts and Connecticut.

to the west (Tritsch 2006). During King Philip's War, Hassanamesit, like other praying villages, was targeted by both English and Native factions. Shortly after hostilities reached a head in the summer of 1675, several leading figures from Hassanamesit including Joseph and Sampson, sons of Hassanamesit leader Petavit, retreated to Marlborough for English protection (Doughton 1997). During that time lawmakers at Boston decided that all Native sympathizers with the English should be confined to Natick, Punquapog, Nashobah, Wamesit and Hassanamesit (Doughton 1997). Only two months later, the English sacked Hassanamesit and burned the crops while leaving other non-praying villages alone (Doughton 1997). Perhaps 200 villagers were eventually taken from Hassanamesit by King Philip's troops over the summer and fall of 1675, others at Hassanamesit were evacuated to Deer Island by the English where they would face harsh winter conditions with little shelter or food (Doughton 1997). Those left in the area faced death if they were caught travelling the countryside (Doughton 1997).

In the period after King Philips war in New England (the late 17th century), the Massachusetts Bay Colony made it a priority to secure the colony against powerful Native groups that had rebelled (Kawashima 1969). The lasting impact of the war caused the tightening of policies concerning Native people and sought to isolate them within reservations in order to exercise increased surveillance and control over them (Kawashima 1969, Massachusetts Archives Collection [MAC] Vol. 31:11). Although Hassanamesit persisted as a praying town on paper, it was supposedly emptied, along with all other praying villages except Natick (Mandell 1996). Records show that many former Hassanamesit residents were confined to the settlement at Natick (Doughton 1997:12), however, archaeological and documentary research concerning another of the seven original "Praying Indian" communities, Magunkaquog, has demonstrated that it was not abandoned after King Philip's War (Mrozowski et al 2005, 2009). Hassanamesit was described as having been a larger community than Magunkaquog by Daniel Gookin (1674) so it is not surprising that it survived the vagaries of the conflict and may have served as a continuous residence for former Praying Town in habitants despite colonial records to the contrary.

Several men in Natick, known to be Hassanamesit, including "Waban, Piambow, John Awassamog, and the Trays" made many attempts to claim rights to their former home despite the efforts of factions lead by "Black James" and Wampus to deed away most of the Nipmuc territory to the Massachusetts Colony in return for small tracts of their own (Mandell 2008: 44). Hassanamesit petitioners show up in a 1680 claim with men from Natick, Punkapaug and Wamesitt claiming land between Hassanamesit and Natick for themselves (MAC Vol. 30:262a). While the war may have triggered new or strengthened old regional alliances (Mandell 2008:44), communities seem to have maintained some of their former identities and had some success in reoccupying established localities (Mandell 2008:44) because two years later, another petition, complaining of colonial encroachment at Hassanamesit appears (MAC Vol. 30:276a), implying that enough of the Hassanamesit community had returned to the Grafton area to notice an increase in settler presence. After King Phillip's War, the colonial government largely ignored isolated and distant Native enclaves like Hassanamesit and nearby Chabunagunkamun (Mandell 2008:47). For the following 20 years, the people who managed to return to Hassanamesit probably carried on a hybrid lifestyle that took advantage of both their connections to the colonial community and their relative autonomy (Mandell 2008:47).

The Native self-governance that characterized early Native plantations effectively came to an end with the 1694 act for the "Better Rule and Government of the Indians" that targeted the "flaw" of allowing Native people to rule themselves (Kawashima 1969). It assigned groups of three English settlers "guardianship" over Native plantations to "inspect and care" for the Native people (Kawashima 1969). Coupled with the 1702 law that prohibited Native people from selling their land without the consent of the General Court (Mandell 1991), the paternal guardian system was fully established. The newly appointed guardians were tasked with moral policing, such as keeping liquor from being sold or consumed by Native people, as well as a host of other civil and judicial responsibilities (Kawashima 1969).

Although little documentation exists for Hassanamesit during this period, it is clear that as early as 1698, Hassanamisco families, including that of James the Printer, began returning to Hassanamesit (Doughton 1997; Gould 2010). Residual hostilities kept many English from continuing their settlement of the frontier in the wake of King Philip's War (Tritsch 2006), however not all settlers were deterred. Within months of the passing of the 1702 law described above, the General Court began to receive petitions by white settlers to purchase, occupy and found a town within the lands of the Hassanamesit reservation (MAC Vol. 113:320). By the mid 1720s the General Court had declined several petitions to lease or buy Native lands within the plantation (MAC Vol. 113:637) however despite restrictions, between 1654 and 1727, 500 acres of the original 8,000 had already been sold to English settlers. By 1724, those at Hassanamesit had been encroached upon to the extent that they filed a complaint with the General Court against the English settlers who were "boxing" all their timber (a process which involved cutting a large hole in the base of the tree to collect sap); effectively ruining the trees for timber harvest (Tritsch 2006). It seems that by the mid 1720s the land at Hassanamesit had come into high demand. As interest began to rise, the Court sent scouts to reassess the land at Hassanamesit (MAC Vol. 31:120). With favorable findings and recommendations for an English town, the Native people found themselves increasingly more entangled with colonial forces.

In 1727, the people of Hassanamesit were approached by the colony to sell their land. In return for the sale of their 7,500 acre property, the colony of Massachusetts established a Trusteeship under the purview of the General Court like those described in the 1694 legislation above, consisting of three men to oversee the affairs of the Hassanamisco Indians (MAC Vol. 113:736). The court set aside 1,200 acres for the private ownership of seven known Hassanamesit families, all of whom could be traced back to leaders amongst Eliot's praying town community. These families were expected to embrace English styles of land ownership and "improve" their parcels in such a way that was satisfactory to the Trustees by clearing, fencing, or altering the natural landscape. One hundred acres were also set aside for the general use and improvement of the entire Native group. The proceeds from the sale of the land, totaling 2500 pounds, were to remain in the hands of the Trustees, with the understanding that the yearly interest of the total sum would be divided and allocated out to the seven Native families. The remaining 6,200 acres of Hassanamesit land were divided between 40 English families who settled in the area.

Legally, or at least in theory, the responsibility of the Guardians and the General Court was to secure Native land in the face of white encroachment (Kawashima 1969:50), however the Court's arrangements, coupled with the readily available trust fund and a weak economy proved to be an unfortunate situation for the Hassanamisco people. Firstly, legislation stipulated the parceling out of land to male heads of household. This practice ran contrary to Hassanamesit and Nipmuc tradition and greatly reduced the amount of land to which the Hassanamesit families were entitled. By Doughton's (1997) accounts, Nipmuc women probably outnumbered Nipmuc men during this period by two to one (Tritsch 2006). Secondly, the General Court's instructions gave the Trustees a right to invest monies earned from land sales (Mandell1996). Over time, this right would lead to corruption, embezzlement, faulty investments, and the eventual disappearance of much of the original fund (Mandell 1998). Furthermore, the rural economy of the mid 18th century caused the depletion of land value along with the increase in the price of consumer goods (DOI 2001). These conditions proved to be the undoing of several family inheritances throughout the years.

Native residents were not completely without recourse, however. It is interesting to note that although the trustees had much control over the lives of the Native people, the Nipmuc were able to engage the colonial legislation on their own by lodging complaints against the Guardians with the General Court (Kawashima 1969:47). These complaints were seriously considered at least part of the time, as some petitions resulted in the dismissal of Guardians and the appointment of replacements at Hassanamesit and elsewhere (Kawashima 1969:47, DOI 2001). It is not impractical to consider these complaints as dialectically hindering and enabling Native people, as it may have allowed for "better" Guardians to be ap-

Figure 2-2. 1728 Grafton Proprietors Map showing Peter Muckamugg and Sarah Robins' lot as well as Moses Printer's lot. (Reproduced with permission of the American Antiquarian Society.)

pointed, but may have also precipitated the desire to exercise further suppression of the upstart and vocal Native dissenters.

One of the original seven parcels to be set aside for Hassanamisco families was the Peter Muckamaug and Sarah Robins property (Figure 2-2; see also Moses Printer Parcel on same plan), the focus of our archaeological investigations over the past nine years. The name used to identify the parcel in English documents and maps reflects the male centered legal system. The Native tradition was different. Land was passed down through the female line in Nipmuc society and that actuality is borne out by a history of female headed households on the property. Their story is one of accommodation, resistance and cultural and political continuity.

Sarah Robins

It was one such prominent Nipmuc family that first inhabited the "Muckamaug Parcel." Sarah Robins (Figure 2-3), the matriarch of the property, is perceived to have been an heir of one of the leaders in the praying village, the Sachem Petavit (whose alias was "Robin") (Gookin 1674:191, Earle Papers 1:1). This information comes from the Earle Papers, a collection of documents compiled by John Milton Earle who was commissioned by the Commonwealth of Massachusetts to prepare a report concerning the condition of the

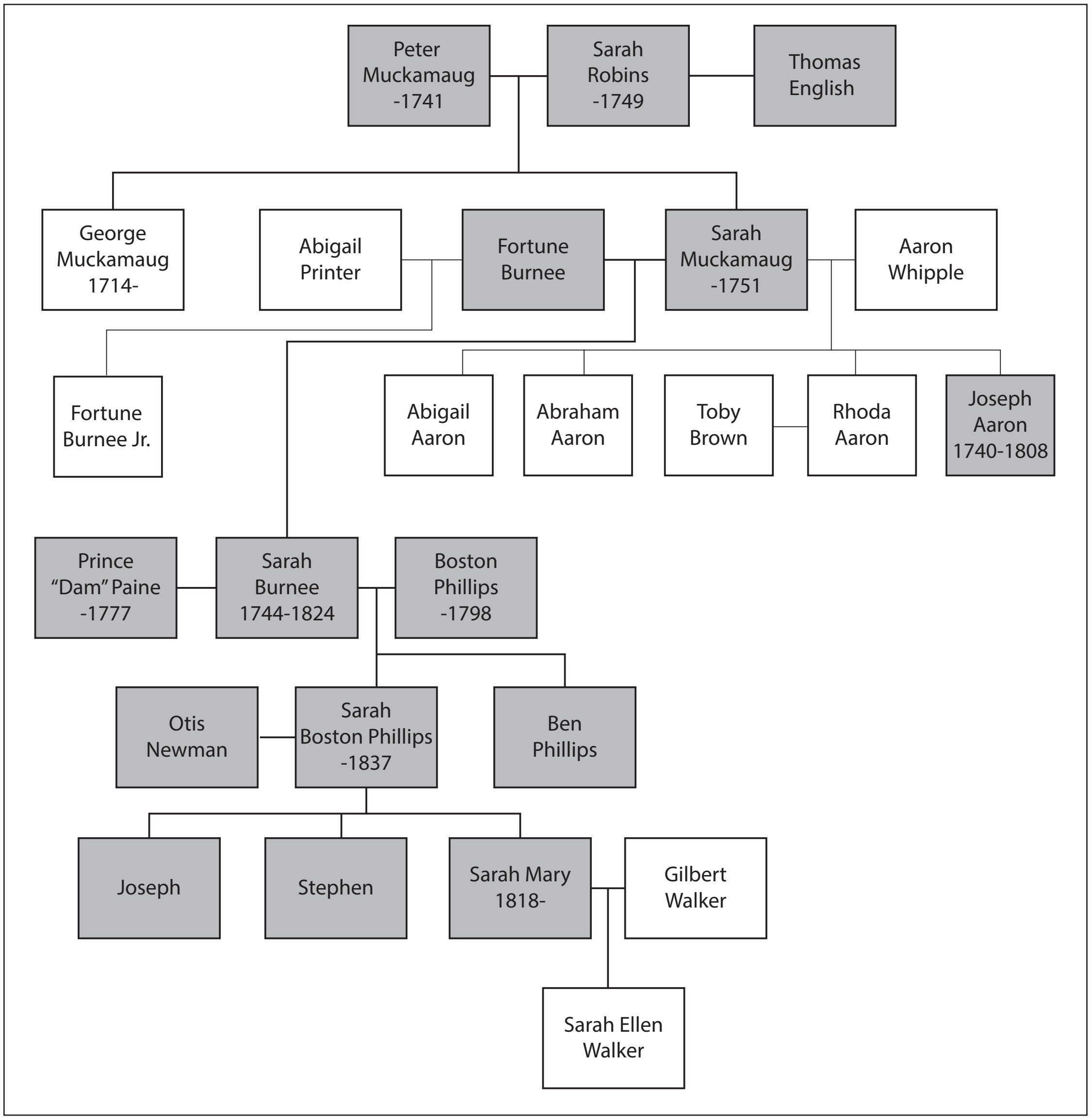

Figure 2-3. Family tree of individuals mentioned in the text. People who are known to have lived on the property are shaded.

Indian in the state in 1859 (Earle 1861). According to the documents he collected the first allotments of Hassanamesit property in 1728 included that of Sarah Robins' whose entitlement was postponed to a later date due to her absence (Earle Papers, 1:2). She and her husband, Peter, who may have been Narragansett (Mandell 2004) or a Nipmuc from Natick, probably lived in or near Providence, Rhode Island, during the late 17th century hostilities in New England (Mandell 2004). In the aftermath of King Philips' War, many Native groups traveled to Providence and surrendered there, likely because Rhode Island did not sell their captives into slavery like Massachusetts or Plymouth, rather they were indentured for a set period of time (Lauber 1913: 129). Local officials sold most of these men, women, and children into "involuntary indenture" for a period of years based on their age at surrender. Small children under 5 were indentured until age 30 while older children from 5-10 were indentured until age 38. Those children surrendered between the ages of 11-15 were bound until age 27; why these ages were chosen is unclear (see Lauber 1913: 129-130).

While we do not have much evidence to support this hypothesis, it is possible that Peter and Sarah were children during King Philips' War, maybe age 5-10, and they were indentured for a period of 28-33 years, which would mean that they would have gained their freedom sometime between 1703 and 1708. Perhaps this is why Peter appears in local documents in 1708 (Mandell 1998), but not earlier. Although it is unclear where they met, we think that Sarah and Peter had a son, "George Muckamuck alias George Read" who was baptized Jan 5, 1734-5 at the age of 20 in Grafton (Rice 1906:94). This means he would have been born around 1714, maybe in Providence. They also had a daughter (birth date unknown) whose name was also Sarah. It is not clear whether they had been dividing their time between Hassanamesit, Providence and elsewhere, or if they had stayed in one place during that time.

When Peter and Sarah returned to Hassanamesit in 1729 to claim their plot of land (Earle Papers 1:2) they did not bring either of their children along with them. It seems that Sarah was apprenticed in Providence at the time (Mandell 1998), and little is known of George's history. Because of her position in the community, Sarah Robins and Peter were allotted about 100 acres to "improve" on the eastern slope of Keith Hill. A 1886 deed map shows the "Muckamaug right of way" connecting their property to the main route to Mendon over the crest of Keith Hill (Figure 2-4).

Upon Sarah Robins return to Hassanamesit, colonial records show that she and her husband Peter became active members of the Native community. When Moses Printer (a Native neighbor at Hassanamesit; see Figure 2-2) passed away in 1729, his children were orphaned. Although the older children were let out to the trustees as apprentices, Sarah and Peter agreed to look after one of his younger children (Earle Papers: Octavo Vol. 1).

Also in 1729, John Hazelton of Sutton agreed to lease 2 meadows that belonged to Sarah and Peter. He paid the Trustees, "for the use of the said Peter and his Squaw Twenty Shillings per Annum for four years" (Earle Papers: Octavo Vol. 1) under the terms that the Trustees would make allowances should Peter care to "improve any part of the grass for his own use" (Earle Papers: Octavo Vol. 1). This agreement, like many others made at the same time with other Native proprietors at Hassanamesit, included the installation of a "good four rail fence" which, at the end of the four-year term, would be left in good condition for the future use of the owner. Interestingly, the same John Hazelton proposed a similar deal with Christian Misco for the use of her meadow and orchard yard. He proposed to fence the area, care for the apple trees, and yield to Misco's right to any apples, "as she shall have occasion to use for her own eating" (Earle Papers: Octavo Vol. 1). He also agreed with the Trustees to apprentice Moses Printer's daughter Elizabeth until her 18th birthday. In return for her care, Hazelton agreed, "to teach [Elizabeth] to Read English and to Learn her the Catechism" (Earle Papers: Octavo Vol. 1).

This tradition of caretaking, whether of land, or of people, has a long history at Hassanamesit and indeed throughout Colonial New England. It reflects the colonial belief that the Native people could not take care of themselves or their land in a "proper" way. This will be discussed below in detail; however at this time it is of interest to note the language that was used to record these various transactions. In the records kept of these proposals by the Trustees the deals described above were, "Consented to and Concluded on between the Trustees and the Several Patrons before named respectively" (Earle Papers: Octavo Vol. 1). This wording is problematic because the word "patron" has many definitions. It could mean that the Native proprietors (the "patrons") had consented to the agreement, or it could mean the English caretakers (the "patrons") had made the agreement with the Trustees, or it could mean that all parties involved (the "patrons") had agreed. Because the wording is so ambiguous, and because there are no records of any contracts or leases being signed by any of the parties involved, it may be impossible to ever know if the Muckamaugs and the other Native landowners ever consented to the use of their land.

The 1730s seem to have been a trying time for the Hassanamisco community. As more and more English families settled in the area, Native land plots were surrounded by English farmsteads, iso-

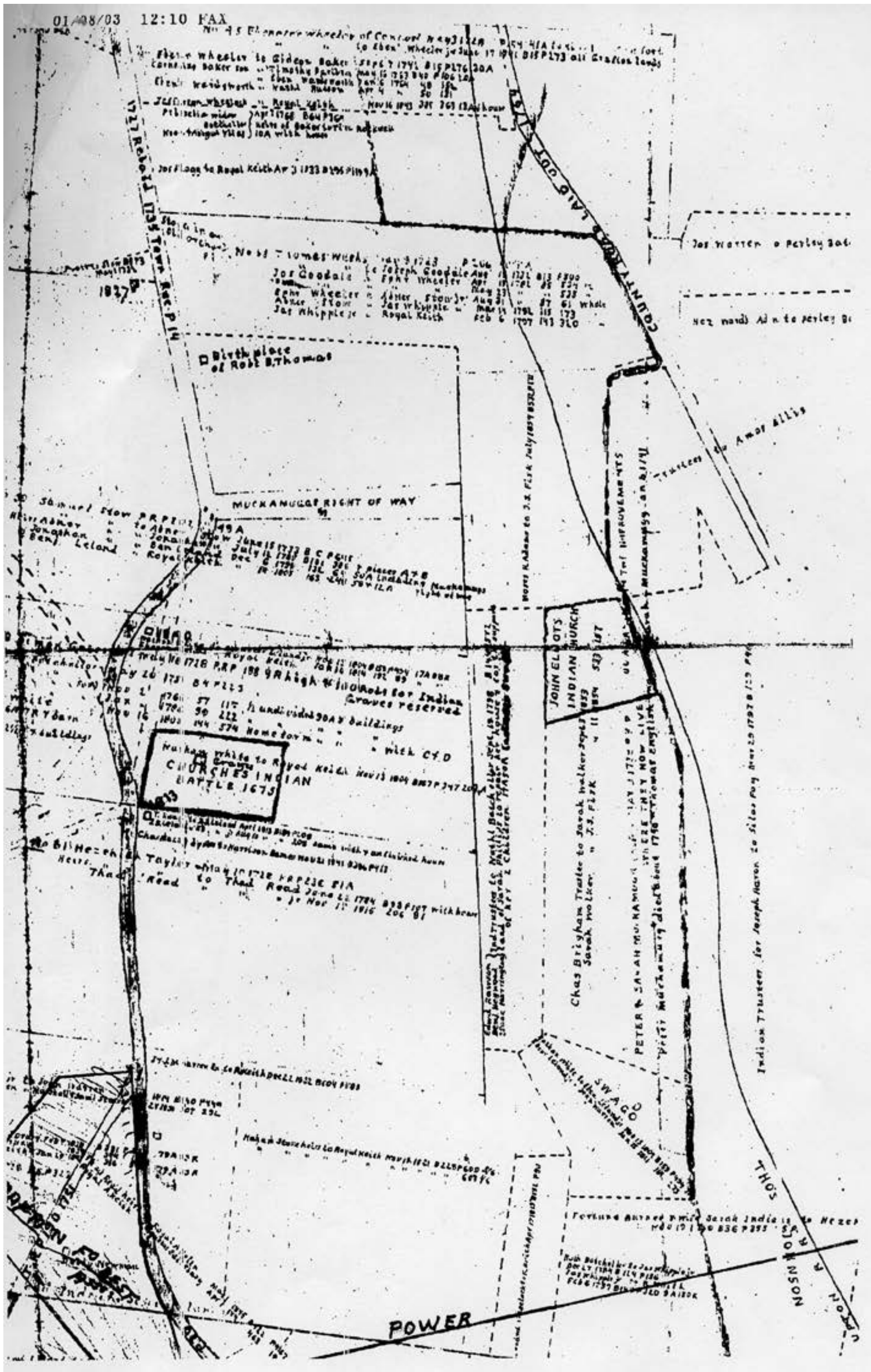

Figure 2-4. 1886 deed map of Keith Hill (original on file at UMass Boston).

lating them from one another (Mandell 2008:82). While Sarah and Peter seem to have avoided the sale of their property during the 1730s, other Hassanamisco families began to resort to selling their land to pay medical and other debt, as well as establish English style farms (Mandell 2008). Sarah Robins and her husband Peter lived on their parcel together until Peter's death in 1740 (MAC Vol

31:294). We do not know how Peter died, but the diary of Rev. David Hall from Sutton reveals that many died of "throat distemper" (diphtheria) and "lung fever" (pneumonia) in the area in the winter of 1740 and spring of 1741 (Benedict and Tracy 1878:59; Hall 1741). Sarah remarried immediately after Peter's death, on Jan 8, 1741 to an Indian man named Thomas English (Rice 1906:200). Very little is known about English; it is unclear where Sarah met her new husband. From then until her death in 1748/9 she appeared frequently on the books as "Sarah Robins alias English." At some point during the early 1740s, Sarah Robins' daughter, Sarah Muckamaug returned from Providence, perhaps to care for her aging mother (Mandell 1998).

The records of the Grafton meetinghouse provide an interesting insight into Native/Settler relations in the early days of the incorporated Hassanamisco township. The meetinghouse was established in 1731 with the promise of providing not only dedicated pews for Native families, but also an integrated education where white and Nipmuc people would be taught together. However, even at this early stage, the involvement of the Native community in the church, and by extension, the rest of the town's affairs, is questionable. While there were indeed dedicated pews for the Native community, at the very back of the church, "on either side of the front door against the wall of the house" (Pierce 1879:171), there were no recorded members of the Hassanamisco community at the ordination of the Reverend Solomon Prentice in 1731 (Pierce 1879:166). In fact, one document from Dudley, Massachusetts suggests that as early as 1733 the Native community may have formed their own congregation separate from the Grafton town meetinghouse. It seems that the Dudley community (which surrounded the Chabanakongkomun tract), about 15 miles to the southwest, had invited "the Rev. Mr. Printer of Hassanamisco" (Ami Printer) to preside over the ordination of their new pastor (Dudley 1893: 18). This evidence points not only to Mr. Printer's leadership in the Hassanamesit community, but the maintenance of Native social ties between the Hassanamisco and the Chabanakongkomun communities, across relatively long distances (Mandell 2008:84).

Ten years later, the Blackstone Valley and all of New England was buzzing with news about a new evangelical approach to worship that instilled in many a new enthusiasm for the Christian faith. In 1740, the movement's chief proponent, George Whitefield, spoke to a crowd of 23,000 on Boston Common, many of whom were young people, servants, slaves and the poor (Lambert 1992:185). Critics complained that the "groans, cries, screams, and agonies" of the crowds had reduced what was normally a somber and quiet worship to a display of "ridiculous and frantic gestures" (Lambert 1992:185; Perry 1871: 453-454). Whitefield and his converts fanned out around the region, speaking in towns all over Massachusetts about the "New Light," and the radical and evangelical style of worship they taught. The ordained minister at the meeting house in Grafton, Solomon Prentice, was an ardent follower of the "New Light" and often invited what were commonly called "itinerant" or "lay preachers" to speak from the pulpit of the Grafton meetinghouse (Pierce 1879:174). While ten years earlier, the Hassanamisco community seems to have isolated themselves from the settler congregation, Prentice's actions during this tumultuous time may hint at an attempt to draw the Native community back into the fold. In 1742 Prentice invited Ezekiel Cole, a traveling preacher and member of the Native community of Hassanamesit to deliver a sermon to the congregation (Pierce 1879:174). Did Cole reflect an enthusiasm that he shared with his Hassanamisco community members? Did this movement empower the Native community, young or old, or both? We do not know how the Native community reacted to this event, but it seems that the acceptance of "uneducated exhorters and itinerants into his pulpit" (Pierce 1879: 175) soon became a source of much contention among the settlers, and eventually contributed to Solomon Prentice's dismissal from the church in 1747 (Pierce 1879:175).

Before she died, Sarah Robins and her fellow community members once again petitioned the General Court in Boston in 1744. To the dissatisfaction of the Native Proprietors, it seems that the Trustees were asking the Indians to travel to the Trustees to get their money. The petitioners asked with deference for new Trustees, claiming, "that one of the Honorable Trustees (in the affair of our money) is Dishonest from said Trust and the other two are desirous to be dismissed" (MAC Vol 31:476). They begged further that the new Trustees be, "nearor to us" so that they "may come at [their] money without such Great expense of Time and Travel" (M.A. Series 228, Vol 31:476). Finally they informed the General Court that they had not received their interest money, "all most two years last past by which means [they] have ben great sufferers" (MAC Vol 31:476). For elderly community members like Sarah Robins, it seems likely that a long journey to collect her income would have been taxing and even detrimental to her health. This collective act by the Hassanamesit community shows solidarity among its members as well as a continued working knowledge of colonial law and their recourse within the system. It also demonstrates a shared political will that speaks to a continuing sense of group identity. The resolve was later passed by the General Court and new Trustees were appointed (MAC Vol. 31:476).

By the time of this petition in 1744 four out of the seven petitioners were women. This statistic speaks to the continuing absence of Native men or the retained importance of women in Native community organization. More than likely a combination of both factors, it nevertheless reinforces the notion that Native women played an important role in group politics and that a sense of shared identity also remained alive.

Sarah Muckamaug

Sarah and Peter's daughter, Sarah Muckamaug, had a decidedly different life from her parents. Sarah grew up in Providence, probably on Towne Street, as an indentured servant to the Whipple family in the early to mid 18th century. She likely had little contact with her parents, and certainly, being indentured at a young age, probably had not had many chances to return to Hassanamesit for visits. Sarah lived and presumably worked in the house of John Whipple (Earle Papers 1:4), a politician and lawyer. The Whipples had several houses; most of them were built in the vicinity of the oldest structure, located near what is now 369 N. Main Street at the intersection of North Main and Mill Streets (Whipple and Carroll 2003). They also owned adjacent properties on the town common, a cooper's shop, and many other properties throughout Providence and the rest of Rhode Island (Whipple and Carroll 2003). The first Whipple house, the home of John Whipple's father, Capt. John Whipple, was probably one of the oldest houses in Providence, even in the early 18th century. It was built before King Phillip's War by John's grandfather, Captain John Whipple (Whipple and Carroll 2003). It operated as a tavern beginning in 1674 and was one of the only structures spared during the siege of Providence during King Philip's War, reportedly because Roger Williams was known to have worshiped there (Whipple and Carroll 2003). It continued to operate as a tavern and dwelling house as the other Whipple houses were built around it.

The Whipple family was extremely large, wealthy, and influential in Providence and the larger Rhode Island colony at the time. Probate records show that they rejected the Puritanical values of their predecessors and embraced a more lavish way of life . They surrounded themselves with the finest china, furniture, and clothing that money could buy (McLaughlin 1986:69). John's brother, Colonel Joseph Whipple (1662-1746), is still known as one of the "merchant princes" of Providence (Whipple and Carroll 2003). He was a well respected figure in Providence, serving as the town deputy, on the town council and as a colonel in the regiment militia at various times during the early 18th century. He likely lived in one of the houses near to where Sarah Muckamaug was indentured. He had many servants and six slaves at the time of his death.

At some point in the early 18th century, probably around 1725, Sarah had an intimate relationship with a man named Aaron Whipple, who was enslaved to Colonel Joseph Whipple. Sarah and Aaron were reportedly married in the home of William Page around 1728, however town records show no such marriage in Providence (Earle Papers 1:4). The couple had two daughters, Rhoda and Abigail, and two sons, Abraham and Joseph (Earle Papers 1:4). We have no dates for the births of the first three children, but the fourth, Joseph Aaron, was born in Providence around 1740, with the help of a midwife named Hallelujah

Olney (Earle Papers 1:4). For reasons not entirely understood, Sarah left Providence with her youngest child, Joseph, shortly after his birth, to return to Hassanamesit. Sarah and Aaron left their older children, Rhoda, Abigail and Abraham in Providence, just as it seems Sarah Robbins and Peter Muckamaug had done, in the service of the Brown family (Earle Papers 1:4). We know that Rhoda Aaron eventually married Toby Brown, a fellow servant of the Brown Family in 1751 (Arnold 1891). Nothing can be found concerning the fates of Abigail and Abraham. Perhaps Sarah's mother had written her and asked her to return home to claim her land rights; perhaps she felt an obligation to care for her mother in her old age; maybe some event in Providence compelled her to leave when she did. But regardless of her reasons for returning home, it is important to note that without the foresight of Sarah Muckamaug, Sarah Robins' land may have been swallowed up by other surrounding parcels and the family legacy may have been forever lost.

Along the road to Hassanamesit, Sarah Muckamaug stopped at the Wilkinson Farm in what is now Lincoln, Rhode Island. We do not know for sure why she went to the Wilkinsons'; she may have known Israel Wilkinson through the Whipples, who also owned land in the area, or it may have been only a chance encounter. The Wilkinson land was in the current village of Manville, and sat about a half mile "from the Blackstone River on the main road from Providence to Woonsocket Falls, three miles from the latter place, and twelve from the former" (Wilkinson 1869:104). Nineteenth-century descriptions report that the Wilkinson homestead was situated on a hill on the west side of the river, facing east with a view of both the river below, and Cumberland Hill beyond (Wilkinson 1869: 104). Based on the location of the Wilkinson house and the description of the surrounding landscape, we can surmise that Sarah Muckamaug likely travelled what was called "The Great Road" for the first half of her journey (Kevin Klyberg, personal communication 1/31/2013).

The Great Road was one of two main roads through the Blackstone Valley from Providence to Southeastern Massachusetts (Figure 2-5). Constructed between 1660 and 1683, the route wound roughly along the west bank of the Blackstone River and was eventually connected to Worcester in 1737. Concurrently, the "Mendon Road" ran along the eastern side of the Blackstone and lead to Mendon, Massachusetts. The walk from Towne Street, where her employer, John Whipple lived, to the Wilkinson farmstead is now about a 4 hour walk, but given the fact that she was travelling with a child and taking into consideration road conditions that colonial officials called, "rough, hilly, crooked and indirect" (Rhode Island Parks Assoc. 1987:13), the journey may have taken up to twice as long.

About halfway through her day's journey, Sarah would have passed by the Old Arnold Tavern and the Quaker Friends Meetinghouse in what is now Lincoln, RI. When Sarah Muckamaug passed by the old tavern it would have been owned and occupied by Job Arnold, his wife Freelove Arnold and their many children; one of whom, Stephen Arnold, though just a child at the time, would later become a justice of the peace in Smithfield and preside over the marriage of her youngest daughter, Sarah, in 1771 (for genealogical connections see Roelker 1952).

When Sarah Muckamaug arrived at the Wilkinson Farm, she set up a temporary shelter for herself and her child. Mary Wilkinson attested that Sarah had asked to build a "hut" which she then lived in "for some time" (Earle Papers 1:4). We do not have any idea what this structure looked like; it could have been a wigwam type structure, or more of a lean-to. It is possible she had learned to make this journey, and build such shelters, on previous trips between Providence and Grafton with her parents, Peter and Sarah. Aaron Whipple was thought to have visited Sarah at the Wilkinson's farm, but he did not live there with her (Earle Papers 1:4). In fact, Israel Wilkinson remembered Aaron Whipple visiting Sarah and "having some difference with her" and Mary also understood that Aaron had come and quarreled with Sarah, whereupon Sarah had come to Mrs. Wilkinson, "complaining of his abuse to her"(Earle Papers 1:4). Mary Wilkinson further recalled a time when she came upon a very upset Sarah. Crying, Sarah confided in Mary that Aaron, "refused to live with me any more neither would he help to maintain

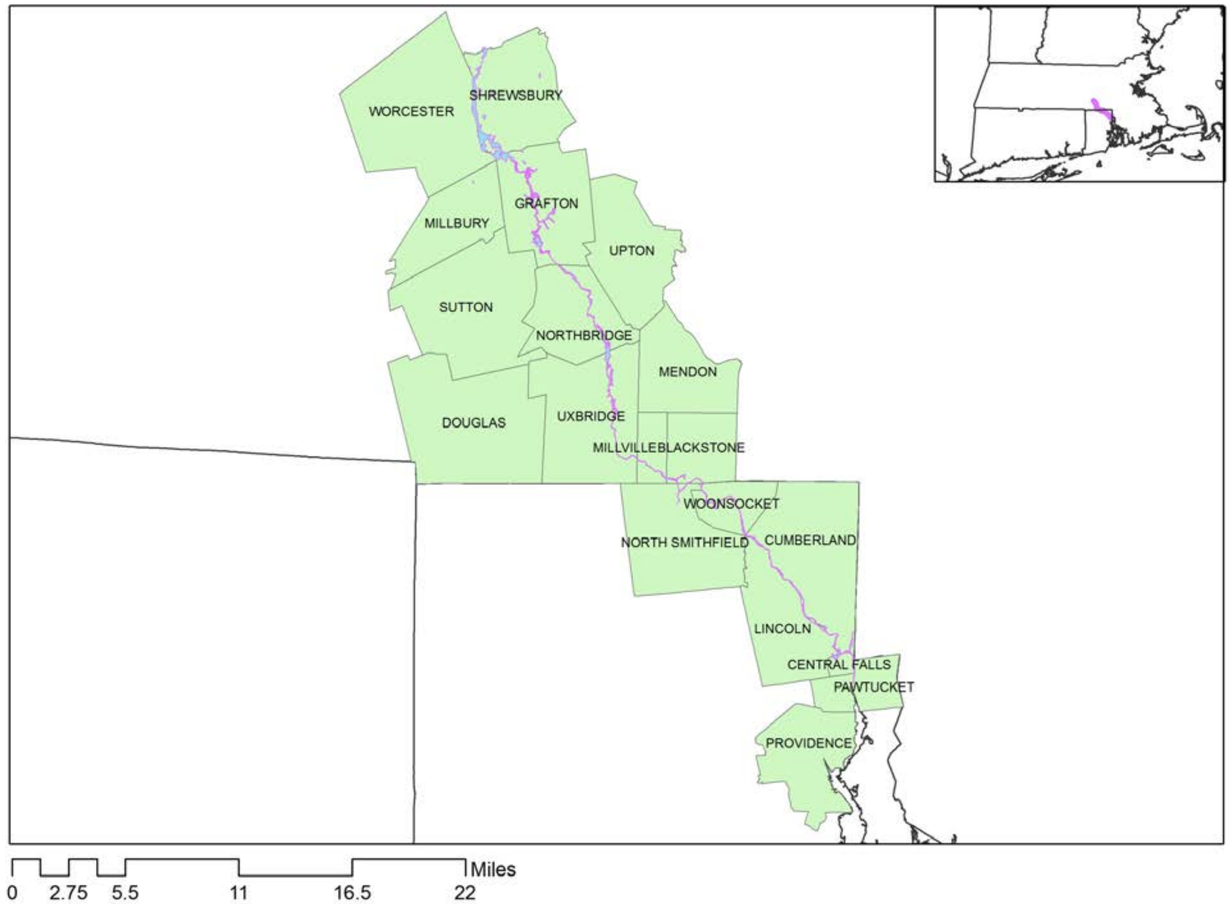

Figure 2-5. Route of the Great Road along the Blackstone River Valley.

the children" (Earle Papers 1:4). Mrs. Wilkinson remembered that Sarah had said, "He promised to do well by me…but he would not" (Earle Papers 1:4). Sarah went on to tell her that Aaron, "further sayeth that he had got another Squaw he lov'd better" (Earle Papers 1:4).

This record of a rocky relationship between Aaron Whipple and Sarah Muckamaug is a unique and important history of a young Indian woman. It speaks to her independence and fortitude, as well as her connection to her family and Native traditions. It also brings to light an important trend of Native/African intermarriage and the tensions it precipitated in colonial New England. Because Native/White and Black/White marriages not only had a negative stigma, but were illegal in the colonial period (Mandell 1998:74), Native/African unions were very common. Given that Native men often enlisted in the colonial militia during the many wars that took place in the mid 18th century, Native women were often left with a dearth of eligible Native men for potential husbands (Mandell 1998:77). That, coupled with the fact that for an African American man, a union with a Native American women not only guaranteed the freedom of any of the couples' children, but also often came with the potential for land inheritance (Mandell 1998), made unions of Native women and African men especially common. In a setting where land ownership was so directly tied to quality of life, social status and legal rights, the advantages listed above were not small considerations. The economic and social motivations behind this demographic are especially important to acknowledge, considering the fact that African American intermarriage was perhaps the single most referenced attribute in the institutional delegitimization of Native identity in New England (Baron, Hood and Izard 1996).

At the pace Sarah was traveling, it would have taken her three days to reach her mother's home on Keith Hill in Grafton. After her stay at the Wilkinson farm, she would have continued her journey along the course of the Blackstone River on the Great Road, stopping for the night again somewhere near Uxbridge and then crossing over to the eastern side of the river maybe closer to Grafton at one of the bridges built by Elisha Johnson in the 1720s (Brigham 1835:13), or at Andrew Abraham's "fordway" at the confluence of the Blackstone and the Quinsigamond Rivers, where she would connect to the Mendon Road that would take her right to the base of Keith Hill.

Sarah Muckamaug and baby Joseph returned to Hassanamesit around 1741 (Mandell 1998). Within three years of her return to Hassanamesit, Sarah Muckamaug had met African-American Fortune Burnee (Mandell 1998:97). We know very little about Fortune's history: where he came from, or where Sarah met him. We do know that he was a freeman. They had a daughter on Nov 27, 1744 (Rice 1906: 29). In the family tradition, Sarah and Fortune named their child Sarah. With this name would come the responsibility to uphold the family land. Sarah, thusly named for her power of inheritance, exemplifies Nipmuc matrilineal "willing" of land proprietorship and the powerful connection between these Native women's identities and their land. In considering Sarah Muckamaug's choice of names for her other daughters, it is interesting to note that it was not her first-born girl, but her last, the only child born on the family land, who received the honored name.

In 1749 Sarah Robins died and left her daughter the family property. The trustees recorded in their account books: "May 7, 1750 – Sarah Burnee only Child of Sarah Robbins alias English enjoys what was her mothers the mother being Dead & in a single Home" (MAC Vol. 32:237). That same year, Sarah Muckamaug sold the first parcel of her family's land. She petitioned the General Court for herself and her husband, asking for permission to sell some land that was "distant and remote from the homestead," a "full three miles" (MAC Vol. 31:694). It is interesting to note that Sarah dismisses land that is 3 miles distant only 10 years after walking from Providence to Grafton, a distance of about 40 miles. Sarah hoped to fetch 200 pounds for the sale of her land, with which she and Fortune wanted to build "a house on the homestead" and maybe even buy "a cow or two"(MAC Vol. 31:694). The petition was accepted and the land was sold in two pieces one year later. Hezekiah Ward bought 46 acres of Sarah's land for 30 pounds and Abraham Temple bought 30 acres for a mere 4 pounds (MAC Vol. 32:247) for a combined total of 34 pounds, or about 1/6th the price they had hoped for. A portion of the money went right back to Hezekiah Ward for his work building a new house for Sarah and Fortune, and for buying "a gown" for Sarah; another portion was given to John Goulding for "shoes;" and still more was lost to the Trustees for the cost of, "time spent in selling the land, executing the deed & expenses for Petition copy" and "Time & expenses in Diewing work settling this account" (MAC Vol. 32:247). In the end, Sarah and Fortune were left with a remainder of a little over 12 pounds.

Unfortunately, Sarah Muckamaug only had a few more years on Keith Hill. She grew ill with a "long sickness" shortly after her mother died (MAC Vol. 32:592). We do not know what illness she struggled with, but common "slow killers" of the time would have been consumption (tuberculosis), dysentery and typhoid fever (Logue 1991: 314; Duffy 1972).

The circumstances surrounding Sarah Muckamaug's death in 1751 illustrate a common problem among Native landholders in the 18th century. As Native people across New England began owning land privately, in the English style, land was also becoming more scarce for everyone. English settlers began targeting Indian proprietors in an effort to acquire their land. Strategies included threatening, trickery, crop sabotage, and perhaps most often, placing Native people in situations where they became financially indebted (O'Brien 1997). There were several ways in which the English would indebt the Indians to them including but certainly not limited to imposing fines and providing services for Native people. Often English neighbors would promise to educate or provide medical care for Native people and expect repayment. The popularity of "caretaking" especially for medical expenses rose dramatically during the mid 18th century, a time when epidemic and disease plagued New England's Native and settler communities (O'Brien 1997). In the case of Sarah Muckamaug, Hezekiah Ward, the same neighbor who had just purchased 46 acres of Sarah's land and helped build her house, took care of Sarah in her last sickness. She was placed in his care by the Selectmen of the Town of Grafton, despite the fact that she had her own house and her husband to care for her. At this point in our research it is not clear why she was relocated by the town. Upon Sarah's death, Ward and the town asked the state for re-imbursement for her care knowing full well that protocol stipulated the further liquidation of Sarah's assets to repay her debt (O'Brien 1997:174). With no other way in which to repay him, Fortune Burnee was forced to sell more of the family's lands to pay for his wife's "long sickness" (MAC Vol. 32:592) and her burial. Payment for funeral expenses also made up the pleas of many English petitions. When those in debt could not pay, all assets were liquidated, often resulting in the loss of large amounts of land (O'Brien 1997). These practices, while quelled by colonial legislation, were widespread during the colonial period and were responsible for the loss of countless Native properties.

Sarah Burnee and Joseph Aaron

At the time of Sarah Muckamaug's death in 1751, young Sarah Burnee, then aged 7, was too young to claim her inheritance. It seems that if Joseph had returned to Hassanamesit with Sarah Muckamaug, it was upon his mother's death that his step-father Fortune Burnee sent him to Mendon to work as an indentured servant to Mr. David Daniels (Earle Papers 1:4). We know very little about Daniels: he probably lived on "Daniels' Hill" in what is now Blackstone, Massachusetts; he stockpiled arms for the Revolution (Teetor 1920:10); and he also owned at least one slave, named Ceasar, who he reported escaped to several area newspapers in 1773 (Newport Mercury Vol. 4, Issue 791). With that said, we do not know how Joseph was treated on the Daniels' farm, what he did for them, or what kind of status he was afforded. We are also unclear on the frequency with which Joseph was able to make the 10-15 mile trip from Mendon to Grafton, but it is clear from archival records that he did visit on occasion. However, it was 17 years before young Sarah would again live with her older half-brother, Joseph. (for a full discussion of Native mobility in the 18th and 19th centuries see Law-Pezzarossi 2014)

After her mother's death, Sarah Burnee lived with her father Fortune Burnee and got what support she could from a network of Native community members who lived on and around Keith Hill. Documentation tells of Sarah's father accepting payment for interest on the land in the name of his daughter for the next 14 years. Sarah Burnee apparently grew up in her late mother's new house as the sole inheritor of the family property (Mandell 1999:81). When Sarah Burnee was 13, Fortune Burnee married another woman from the Hassanamesit community, Abigail Printer. For several years, Fortune Burnee collected interest for his late wife Sarah, and his present wife Abigail.

We do not know what became of Sarah Burnee during her teenage years. Perhaps she stayed on the Printer Homestead, or perhaps Abigail came to live with Sarah and Fortune. She appears in the records of the trustees from time to time. In 1763, when Sarah was 19, trustee and lawyer Timothy Paine sent Sarah and her brother Joseph to the local store with the following note to the shopkeeper: "Let Sarah Burnee have out your shop the Value of Six Shilling and Charge the Same to your Loving Brother" (Earle Papers 1:1). On March 30th of that same year, Sarah Burnee appears in the Trustees records with several, mostly female community members, on an order for Blankets (Earle Papers 1:1). In 1765 at the age of 21, Sarah Burnee began signing for her family's interest payments and as such, took ownership of what remained of her family's land (Mandell 1999:81, Earle Papers 1:3).

After serving David Daniels since the age of 12 or 13 (Earle Papers 1:4), Sarah's half brother Joseph Aaron returned to Grafton three years later, in 1768, resuming collection of the family's interest with his sister. With presumed childhood ties to his Hassanamisco community and family, we assume that Joseph was welcomed back and the siblings lived together on the Muckamaug farm (Mandell 1999: 82). Joseph seems to have either initiated or taken over the cultivation of wheat and rye on the family's 154 acres. We do not know for how long Sarah and Joseph had been raising rye and wheat on the property. Perhaps Joseph learned how to cultivate it when he was apprenticed to David Daniels. It would have been a good choice for the poor and sandy soils on the eastern slope of Keith Hill. The colonial market of the late 18th century would have had quite a demand for both, not only for making bread, but the rye would also have had value for local distilleries (Rothenberg 1992). Growing urban markets such as Boston, were gathering foodstuffs and shipping them through out the Atlantic World. Grains were also used in distilling, with many of Massachusetts' distillers producing both gin and cider brandy in the 18th century (Kelsey 1980). The demand for locally grown rye and wheat continued in New England until about 1825-1840, when the temperance movement decreased demand for spirits and the construction of the Erie Canal made cheaper and better wheat flour available to New Englanders (Kelsey 1980).

One year after Joseph's arrival, Sarah married, appearing as "Sarah Prince" in the accounts of the Trustees (Earle Papers 1:3). Sarah's new husband, "Prince Dam," or "Prince Paine" as he was sometimes called (Earle Papers 1:4), was an African American man from Woodstock, Connecticut. It is possible that Prince served the prominent Paine, or "Payne" family from Woodstock, CT (Paine 1914), but we have no records to support that hypothesis. He may also have had a connection to Timothy Paine, one of the Trustees of the Hassanamisco community in the latter half of the 18th century. The couple was married in Smithfield, Rhode Island, on April 20, 1771 by justice of the peace, Stephen Arnold (Earle Papers 1:4).

Shortly after the arrival of Joseph and Prince, relations in Sarah's household began to sour. Joseph Aaron claimed (in line with dominant Euro-American values) that his working of the land entitled him to ownership (Earle Papers 1:4). Joseph and Sarah together wrote to the Trustees on May 8 of 1771: "We desire you would divide the Land belonging to us as to Quantity and Quality Lying in Grafton" (Earle Papers 1:4). Not long after, Timothy Paine consulted the General Court for a decision on the matter, saying, "I should be sorry if the matter could not be settled peaceably between them, if there is anything they complain of, I hope you will rectify it. I think the son ought to have the preference in the division" (Earle Papers 1:4). The Trustees and the General Court then initiated an investigation into Aaron's claims as Sarah Muckamaug's son. Depositions were taken from several members of the Providence community attesting to Joseph Aaron's relationship to Sarah Muckamaug and Muckamaug's relations with Aaron Whipple. It was eventually decided that Joseph was in fact Sarah Muckamaug's son, a ruling that threatened to sever Sarah's property rights. Prince Dam then initiated a further investigation on behalf of Sarah into the legitimacy of Joseph Aaron's birth. Several depositions requested by Prince Dam attest that Sarah Muckamaug and Aaron Whipple were in fact never married, however another document claims the two were married in the home of William and Mary Page (Earle Papers 1:4). Despite Sarah and Prince's attempts to block Joseph Aaron's claim, the General Court eventually approved the equal division of the family parcel between Joseph Aaron and Sarah Burnee. This division of land seems to have favored Sarah however, leaving her the house, "the olde Barne" and several of the rye and wheat fields that Joseph had worked during his stay with Sarah (Earle Papers 1:4). The court ordered that Joseph deliver to Sarah one quarter of the rye each year after it had been, "Thrashed and cleaned up" (Earle Papers 1:5), and further ordered that Joseph "move oute of the House in three monthes" from June 4th 1771 (Earle Papers 1:5). Being very upset by the division, Joseph Aaron enlisted the help of his former employer, David Daniels. Interestingly, Daniels and neighbor Hezekiah Ward co-signed a document protesting the "unfair" division of lands. Together they claimed, "the Committee [had] overlooked the directions given in the affair" (Earle Papers 1:4). They claimed that Sarah had been given the house and "by far the best part of the present profits," while, "Joseph (who being the Eldest and the Son too)" had never benefited from the income of the estate and was being denied the fruits of his recent labor on the land (Earle Papers 1:4). Their argument revolved around the fact that because Joseph "had been at the sole cost of raising whatever grew there" he was entitled to claim the better portion of the land (Earle Papers 1:4).

This is a very interesting example of colonial tension in which the colonized appropriate the laws of the colonizer to better their own lives. It also sets up a very interesting point of departure in which Native men and Native women are set against each other and new concepts of cultural practice are injected into the situation. The rift between Sarah and her brother represents a conflict between an established Native practice of female land inheritance and the dominant and institutionalized practice of patrimony. The scuffle that ensued because of Joseph and Sarah's differences left a trail of complaints and testimonies that speak to the tension between Joseph and Sarah's contradicting ideas of land rights and entitlement.

On June 3rd of 1771, lawyer and trustee Timothy Paine suggested the two siblings work out their differences and make the best of the land while they had it. It seems the depositions had revealed two more children, those of Sarah Muckamaug's deceased daughter Abigail, who were entitled to their portions of the land as well, should they request it (Earle Papers 1:4). The very next day Joseph and Sarah signed the deeds agreeing to the initial arrangement. After that day they appeared separately in the accounts of the Trustees, each collecting their own share of the family's interest. Joseph Aaron went on to serve in the Revolutionary War, probably in the Navy (Forbes 1889, Earle Papers 1:5, Earle Papers 1:4) and returned to Grafton where he became a trusted and respected man in the Native Community. In an unfortunate turn of events, Joseph and his wife Deborah could not maintain the land they had inherited, nor had they any children who could inherit the property. By the time of Joseph's death in 1808, his portion of the family parcel had been completely sold, reducing the family landholdings by half (Earle Papers 1:5).

The Revolutionary War period marks a time of general discontentment at Hassanamisco. Fortune Burnee, Fortune Burnee Jr. (Abigail and Fortune's son), Joseph Aaron, and perhaps Prince Paine as well, all enlisted in the militia (as did several other men from the Hassanamisco community). This comes as no surprise, as military service was very common for Native and freed African men in the 18th century (Sainsbury 1975). Sarah and Prince had no children before the war, and the only hint we have of Prince's fate is a small obituary for "Prince Paine" in the Providence Gazette on June 21, 1777 (Vol: XIV Issue: 703: 4). Fortune Burnee Jr. and Joseph Aaron joined for eight months' service in Grafton under Capt. Luke Drury and Col. Artemus Ward, one of the three Trustees at the time (Quintal 2005:77). Fortune Burnee Jr. fought at Bunker Hill, and both he and Joseph Aaron eventually returned to Grafton and were remembered respectfully for their patriotism and service. Fortune Burnee Sr. is said to have joined the militia and gone to New York, only to desert and flee back home, after which he left again for Providence, where he was known to have gone to sea and was reported to have never been heard from again (Earle Papers Octavo Vol. 2). At home on Keith Hill, the mostly female community tried to hold things together. In 1776, acting on a petition from the Native community, the General Court found that absentee Trustee Artemus Ward had recently been employed in the "Continental Service" while the other two entrusted Guardians had "neglected to relieve these Indians" (Earle Papers 1:1). As such, new Guardians were then appointed.

Even after the war, the community struggled through the last few decades of the 18th century. In 1785, the community at Hassanamesit was again unhappy with the service entrusted to their supposed Guardians. Together, Sarah Burnee, her father Fortune Burnee, and Sarah's half brother Joseph Aaron, along with three other Native community members petitioned the General Court in Boston for a review of the accounts of the Trustees (Earle Papers 1:5). They claimed that over the past six or seven years they had, "not received one quarter part of [their] interest so due to [them]" (Earle Papers 1:5). A general review of the books was ordered on their behalf, however there is no indication that the records were ever actually presented at Court (Earle Papers 1:1). In 1788 the matter was re-opened, and the Court found that, "said Trustees have done as well in all respects by the said Indians as the nature of the matter would admit of" (Earle Papers 1:1). Although that investigation was inconclusive, John Milton Earle later reported in his findings that by 1841 over 1,300 dollars of the trust fund had been lost, stolen, or otherwise misspent during the years in which the Trustees were responsible for the Hassanamisco trust fund (Earle 1861:96).

In 1786 Sarah Burnee remarried to a man named Boston Phillips. Boston Phillips was a legend in some local lore as being "a real full blooded Indian" claiming descent from "the Great King Philip" (Tritsch 2006). Other accounts describe Boston Phillips as a former slave (Forbes 1889:177), which is a claim that seems to be supported by documentary evidence. There is a record of a "Boston Phillips, alias Philip Boston" who served as a private in the American Revolution for three years between 1776 and 1779. He enlisted for the town of Holden, mustered by the Worcester County Muster Master, and was sworn in at Providence (Massachusetts Office of the Secretary of State 1904:311). This is thought to be the same "Boston" who, in 1754, at the age of 25, was sold by Jonathan Harrington to Nathan Harrington of Holden for 50 pounds (Estes 1894:406). Of course, just because Boston Philips was "involuntarily indentured" does not mean that he was of solely African descent. Native slaves were less common, but many Native captives from King Philip's War, especially women and children, were sold into bondage for a period of time (Lauber 1913: 128). Perhaps he was descended from these captives and sold into indenture himself. There is no direct evidence at this time that he was related to King Philip. It seems that Philip's wife and children were sent away from the colonies, perhaps to be sold as slaves in the West Indies or Barbados (Lauber 1913:128). With the decades of intermarriage that had taken place by the 1750s, there is also no reason why Philips could not have been of both African and Native ancestry.

It is not clear how Sarah and Boston met in the years after the Revolution. Philips would have enlisted as a freeman, and with nothing keeping him in Holden, he may have moved to Grafton after the war. Or Sarah could have met him in her travels, as Holden abuts Wachusett Reservoir, an important landmark and destination for Native people all over Eastern Massachusetts. Sarah and Boston had two children, Ben and Sarah, before Phillips died in 1798 (Mandell 1998). This Sarah would come to be called "Sarah Boston." It is not clear when the children were born. If they were born during Sarah's ten year marriage, Sarah would have been in her early 40s (Tritsch 2006). It is quite possible that Sarah and Boston had been together for some time before their marriage.

In November of 1795, Sarah and Boston built or substantially repaired the house in which they were living. Receipts detail 180 feet of pine boards, 219 feet of clapboards, nails, hinges, spikes and other services rendered (Earle Papers 1:3). Unfortunately, Boston Phillips' death in 1798 put her in a difficult economic situation. Of note is the fact that Boston Phillips was not forced into the care of neighbors as Sarah Muckamaug had been. Instead, Sarah was made to shoulder the financial burden of her husband's death unaided. With two young children to care for and only her interest money as income, Sarah Burnee was forced to sell more of her land in the late 18th and early 19th centuries to cover her debt. In 1797 Sarah petitioned to sell 20 acres in the southwest of the property to pay for repairs to her house and the support of her children (Earle Papers 1:5). As a result, she sold a portion of land the next year to Nathaniel Batcheller, and another bit of her meadow to Silas Fay as well (Earle Papers, Octavo Volume 1). As was customary, she did not receive that money; rather the Trustees took the money, paid her debt, and gave her one year's interest on the sale, keeping the rest in trust. The land sold for $286 altogether; however Sarah only collected around $4.20 per year thereafter as a result of the sale (Earle Papers 1:3). Sarah continued to count on her English neighbors to help repair her house, loan her money, or just buy everyday household needs. Whenever the Trustees ran out of money with which to reimburse her expenditures, Sarah would sell more of her land. Although this trend seemed to have little relief for Sarah, it abated slightly with the maturation of her children, Sarah and Ben.

Sarah Burnee and her brother Joseph were two of the most influential people in the Hassanamisco community in the late 18th and early 19th centuries. Sarah herself was born and raised in Grafton, and based on what we know about her, she likely lived out all 81 years of her life on Keith Hill. When she died in 1824, her death was reported in the *National Aegis,* a Worcester County newspaper. They noted that the widow Sarah Phillips was "the oldest proprietor of the Indians in that town" (Jan 28/1824:4). While Joseph Aaron spent much of his early years away from Keith Hill, in his adult life he proved to be one of the more constant male role models in the community. Despite the great conflict that existed between them, these two siblings did a great deal to hold the Hassanamisco community together, and left a lasting legacy of leadership in the canon of Nipmuc history.

Sarah and Ben Boston

The remaining parcel of the family's original property passed to Sarah "Boston" Philips. "Sarah Boston," as she was locally known, is renowned in local histories as the "last of the Nipmucs" and the "last descendant of King Philip," presumably because of the legend of her father's ancestry. Of course she was not the *last* of the Nipmucs, or the *last* descendant of King Philip, she had two sons and a daughter, as well as many other family and community members who obviously shared her ancestry and carried Nipmuc identity forward into the present through many descendants. She was, however, the last matriarch to reside on her family's plot on Keith Hill, and her visibility, coupled with her children's movement away from Grafton, probably made Sarah seem to local residents like the last of that legacy.

It seems that Sarah made quite an impression on the town of Grafton, so much so that stories about her survived several generations to be written in the Victorian era and even later. Local and published documents alike describe Sarah, retelling anecdotes, describing her house, her physique, even her cooking. The context in which these various histories were written must be taken into consideration. Many of these recollections were canonized in the late 19th and early 20th centuries, a time when imperialism and racism permeated the public discourse and flowed unabated through everyday conversation and popular literature. Many of the historians who recorded these histories were part of a literature tradition popular at the time known as "Local Color" or "Regionalist" literature. Writers in this movement were part of a larger anti-industrial, nationalistic movement that attempted to build America's national identity by idealizing and caricaturizing "quaint" rural America (Howard 1996). As such, these stories were unapologetically nostalgic of the colonial past. The Regionalists' tendency to exoticize local and regional traditions, dialects, and habits also makes it difficult to ignore the heavy influence of imperialism.

So, just as this history will someday be considered a product of its day, so must earlier recollections of Sarah Boston be viewed in the same manner. With that said, these stories should not be ignored, for they hold a great deal of information about everyday life in the early 19th century, stored in the collective memory of a generation, that might not otherwise have been recorded. Sarah's remarkable life and the proclivities of those who remembered her both come into sharp relief when the body of memories is examined as a whole (Law Pezzarossi 2014; Law Pezzarossi in press).

As children, Sarah and her brother Ben lived with her mother, Sarah Burnee Phillips, in their newly renovated home on Keith Hill (Figure 2-6). Local histories recall Sarah in her youth swimming competently in, "the deeper part of Misco Brook" (Tritsch 2006). Several accounts also mention that Sarah learned to practice herbal medicine from her mother. Her brother was known for his fishing abilities (Tritsch 2006).

As Sarah and her brother became older, they were able to help their mother with debt and everyday expenses. Sarah was known locally to have had many jobs. Harriet Merrifield Forbes claims:

> She wandered about the country, in one place helping the farmer with his work, and receiving her pay in cider. In times of extra work she was considered a very desirable "hand," and the heaviest work was left for her to do. In another place she sold her baskets; in another, where there were young people, she told their fortunes, taking each one alone into a closed room, and peering intently into a cup of tea. (Forbes 1889:177-78)

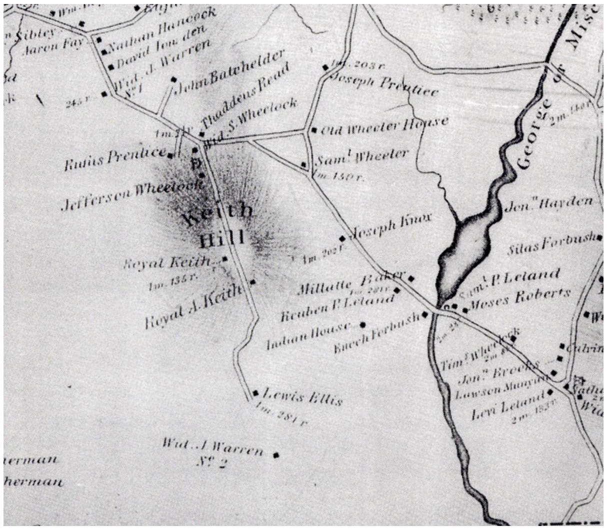

Figure 2-6. 1831 Brigham Map of Keith Hill showing "Indian House" (Massachusetts Archives).

This description of Sarah belies the economic difficulties that many faced in the early 19th century. As land inheritance grew smaller, and space for spreading out became scarce, many families of all ethnicities had to find other ways to make a living. Prude (1999:56) marks a rapid rise in the number and diversity of local businesses in rural Massachusetts from 1810 to 1830, mostly established by newcomers, as people clambered to find trades other than husbandry; "the categories of shops…embraced not only the familiar ventures like stores, taverns, blacksmithies, and nail-making works, but also unprecedented projects: two shoemaking shops, a bakery, a stove factory, chaise and bobbin making manufacturers, and textile machine works" (Prude 1999: 58). Sarah and many of her Native contemporaries all over New England were part of a movement in the early 19th century to establish a trade in basket making, chair caning and broom-making; they sold their wares throughout New England's rural countryside. These practices, while often the root of stereotypes and racial essentialisms, were able to sustain many Native families into the early 20th century.

Native women's abilities to maintain a seasonally mobile lifestyle in order to sustain themselves was unique among women of the time, as traveling for work was considered to be men's business. Unfortunately, mobility as a way of life, or as writers of the day liked to call it, "wandering," or "tramping," was considered to be a sign of the utmost depravity and desperation. Travelling people, specifically Native people, gained reputations in New England as lazy, "shiftless" and lacking in the values and virtues that came from owning property and "improving" it through industry. In a popular text written in 1823, Dwight sets forth his opinion about Native mobility that would come to define public opinion and permeate discourse of the following century:

> The Indian, in a savage state, spent life chiefly in roving; but he roved in pursuit of the deer, the bear, the wolf, or his enemy. A high sense of glory, an ardent passion for achievement, a proud consciousness of independence, and a masculine spirit of exertion were the prominent features of his character… The Indian of the latter character (present day 1823) lounges; saunters; gets drunk; eats, when he can find food ; and lies down to sleep under the nearest fence. Without any present or future object in view, without proposing any advantage to himself, or feeling any interest in what is proposed by others, he leads the life, not of a man, but of a snail; and is rather a moving vegetable, than a rational being. (Dwight 1823: 26)

Native women of the time endured these solidifying stereotypes to continue—in a new way—a way of life that Native people had relied upon for millennia in Southern New England. Sarah Boston specifically, was known to move through several local towns in the Blackstone Valley and Greater Worcester area looking for work and selling her basketry, all the while gaining a reputation that fit within these emerging racial stereotypes and would come to define her and other Hassanamiscos for the century to come. The following is a description from an 1897 paper given at the Worcester Society of Antiquity, meant to memorialize Sarah and her compatriots:

> Debased and dirty, they tramped singly and in gangs through the territory of their ancestors, invariably begging for pork and cider. Almost my first recollection is that of meeting a band of

> some twenty of them who had taken possession of a portion of the highway leading from Grafton to Westboro, and were in truth making "Rome howl." (Crane 1897:108)

Sarah was also known throughout the region as a reliable farm hand. While this practice had been common for Native people within the community of Grafton and throughout Massachusetts for at least a century, Sarah filled the position at a time of increasingly high demand. As stated above, agriculture ceased to be a viable option for subsistence for many of the sons and daughters of local farmers in the early 19th century. As mill jobs and other non-agricultural pursuits often called away permanent help, husbandmen feared for the welfare of the rural New England farming lifestyle. They found it more and more difficult to find adequate labor for the work that needed to be done, and the laborers they did secure required a much higher wage than past decades (Prude 1999:68). Sarah filled that labor demand at a time when the services she could provide were most valuable, giving her the income she needed to supplement her family and her way of life. Although it is known that Sarah sometimes took her pay in hard cider, her labors obviously helped relieve the family's burden in other ways as well. One anecdote in the local histories tells of Sarah calling in a favor from Mr. Batcheller, the local storeowner, and her neighbor. In repayment for helping to quickly unload a cart of hay before an impending storm, Sarah not only took a helping of cider, she helped herself to a bolt of cloth at the store, calling behind her to Mr. Batcheller, "you remember that load of hay?" (Fiske #11 [n.d.]: 28). This story is noteworthy because it shows that although Sarah may not have been working for money, at times she was able to negotiate within the local market to acquire what she needed to avoid selling even more of her family's property.

Sarah Boston gained quite a large stature in her adult life. She was described in local accounts as being "gigantic," possibly reaching 6 feet and weighing nearly 300 pounds (Warren 1922:10). She was known to wear, "usually, short skirts, which once might have been a bright yellow, red, or blue, but which always seemed to have grown the same dingy color before they came into her possession; spencers, the latter being an article of clothing worn by men in those days; men's boots and hats; and if the weather was very severe, a homespun bed-blanket over all (Forbes 1889: 177). Major F. G. Stiles added that she, "carried a gun, wore a man's hat, addicted to the use of liquor and a terror to children" (Collections of the Worcester Society of Antiquity 1891: 261). Another historian recalls, "She was masculine in build… [and] she commonly appeared wearing a skirt, man's coat, boots and a stove-pipe hat, and was a terror to the small boy, and also to some of larger growth (Crane 1897: 106). The same author remembers Sarah and her companions' appearance while travelling the countryside: "The males were dressed in clothes a modern tramp would scorn to wear, while the females adorned their persons with the garments of either sex" (Crane 1897: 106). Historian Alice Morse Earle claimed that Sarah was known for her "powerful feats of strength, such as stone-lifting or stump-pulling" (Earle 1900: 97), and that "her insolence and power of abuse made her dreaded for domestic service" (Earle 1900: 98).

In Regionalist local histories, Sarah Boston and other Native women were placed in a strange position. Laura Thatcher Ulrich (2001) makes a point worth quoting at length with regard to the reputations of women who walked the countryside, selling their wares: "Stories about Indian basket makers describe women who defied white notions of appropriate gender behavior. They were towering figures, outsized in manner if not in body, and impossible to ignore. Molly Hatchet was six feet tall. Lydia Francis carried a large butcher's knife under her shawl and always traveled with 'a big brindle dog, as ugly as his mistress.' Tuggie Bannocks, who 'was as much Negro as Indian and was reputed to be a witch,' had a 'full set of double teeth all the way round, and an absolute refusal ever to sit on a chair, sofa, stool, or anything that was intended to be sat upon.' In white eyes, these women often possessed male attributes" (Ulrich 2001). To understand why Sarah and her contemporaries gained these reputations, it helps to further contextualize the authors of these texts. Many Regionalist historians were predominantly middle-class, rural dwelling, white women whose literature took on the added agenda of critiquing the American sentimental idea of womanhood created in the mid-nineteenth century (Donovan 1983). They achieved this largely by creating heroines who were independent, hard scrabble, and disillusioned by the dainty and delicate version of womanhood imported from America's urban centers. Native women illustrated the power and industriousness that Regionalist historians advocated, but they fell short of the authors' ideal feminine in a very physical way. The physical degradation of Sarah and her companions is what Butler might call "abjection," or the denial of the "viability" of Native women's bodies (Butler 1993). By describing these women against the norms of late 19th-century New England society, Earle, Forbes and other historians of their day invalidated Native women's femininity in the past. They also accomplished this through the absence of Native men. In the regionalist histories, Native men have all but been erased, leaving the women to fulfill both the male and female roles simultaneously, but neither completely (see O'Brien 2010 for a full discussion of Native erasure in local histories). While this literary move may seem to empower Native women, it serves to erase the history of Native families, and allows the reader an opportunity to better believe the myth of the "dying Indian race" that is so prevalent in these imperialist histories. In Sarah Boston's local lore, there is hardly any mention of Sarah's brother Ben Boston, Sarah's partner Otis Newman, or her children for that matter, making it that much easier for Regionalist historians to claim Sarah's "Last of the Nipmucs" title.

When researching the history of Sarah Boston, we cannot ignore the references to her alcohol consumption. Historians remember her as a fierce alcoholic, recalling her drunken exploits as humorous anecdotes. Forbes says, "like all the Indians of that day, she drank whenever she had a chance; and it was a favorite remark of hers, 'The more I drink, the drier I am'" (Forbes 1889: 178). Another historian recalled, "she was easily provoked when under the influence of drink, and on several occasions was engaged in rough-and-tumble contests with those who refuse her her favorite beverage" (Crane 1897:106). He continued, "Sarah Boston was a strong, muscular woman, and the old story of lifting a barrel of cider by the chimes and drinking from the bunghole was credited to her" (Crane 1897: 107). Forbes relays the memory of an elderly local,

> A lady now living in Grafton was an eye-witness of her fury one time, when Capt. Joshua Harrington and Capt. Charles Brigham were riding together on South street in Grafton. She lay in the road, and Captain Harrington suggested driving over her. Captain Brigham got out of the wagon, and moved her to one side. She was not too drunk to resent the proposed injury, and sprang towards the carriage, and would have pulled out Captain Harrington — a man who weighed two hundred — had not the other captain held him in. After this she was a firm friend of Captain Brigham and his family. (Forbes 1889: 178)

While the effects of alcohol addiction amongst the Native population in New England are not to be minimized, we must contextualize alcohol consumption, not only historically, but in the context of the authors as well. In the 18th century, alcoholic beverages like cider and beer were oftener than not some of the only readily available and safe beverages to drink on a regular basis. People of all ages, including children, drank alcoholic beverages that were considered to be fortifying, rather than harmful. It was not until the mid 19th century that the temperance movement associated alcohol consumption with weakness of character, degenerate moral attitudes, poverty, and destitution. Once again, Native people were a target for Regionalist historians who folded memories of Native people into imagery that depicted the racial and social antithesis of their ideal.

Anecdotes about Sarah's home are a bit contradictory, sometimes describing an idyllic country home, other times something more on the margins of "quaint" and "wretched." For instance, she apparently had an exceptional garden, which she took great care in maintaining (Forbes 1889:179). She also owned a handsome cherry tree that grew right by her house. One summer she became fed up with the local boys who would raid the tree. It is said that Sarah chopped down the tree to spite the troublemakers. Sarah cut the tree in its prime, claiming that it shaded the house to the extent that, "she couldn't read her bible" (Forbes 1889:179). In spite of this anecdote, Sarah was also known for her hospitality. An elderly community member recalled a day when he and his mother had visited Sarah's house for tea. They had "hoe cake and pickerel, cooked by the open fire place, and nothing ever tasted better" (Fiske #11 [n.d.]:6). Another local memory describes Sarah's house (with a bit more judgment) in the following sketch: "Low and little, black and old and faced Kittville. The East door above at the end of front. In the middle of the room on the opposite side as one entered was the big chimney with all the things around it, no cupboard, cooking utensils, stools, no chairs. Small loft accessible by ladder. Indians just slept around. Set the table in the middle. Windows faced out toward the valley, and were little. When the door was shut it was quite dark." (Fiske #11, [n.d.] 6). Other locals remembered "where her cellar and doorstone may still be seen, on the farm of Mr. David L. Fiske" (Forbes 1889: 177). For several years in the 1890s, members of the Worcester Society of Antiquity would go on outings to Grafton to see the historical landmarks on Keith Hill. This is an excerpt from their report:

> At the south end of the Hill, the former Indian reservation, which comprised seventy-five or a hundred acres, was entered. And the barge was left in the road while the party explored the region. At some distance the site of the Indian huts was discovered. with the spring of water used by them. A ledge of rocks is nearby, and the place is wild and rugged. Some of the Indians had lived within the recollection of the party. and anecdotes were related of certain marked characters among them, particularly "Sarah Boston." A personage renowned for her great feats of strength. And also her love of fire-water. (WSA 1891:116)

While all of these descriptions of location, architecture and belongings have indeed been helpful in conducting archaeological investigations, it is important to note here that once again, local historians had their own agenda when setting these scenes of Sarah's house so carefully and descriptively. In the process of constructing the local dimensions of a larger cohesive "American history," Regionalist historians made a special effort to set local Native spaces in the past (O'Brien 2010), essentially consigning them to prehistory. They often went to great lengths to layer modern agricultural and industrial landscapes over the top of known Native landmarks, creating a historical discourse that takes ownership of both the past and the present. For example, Harriett Forbes (1889:174) recalls the location of another Native dwelling in Westborough: "Gigger afterwards lived on the "Old Mill road," on the right-hand side as you go from Main street, on land now owned by Mr. Moses Pollard. For many years the hill was called for him, "Gigger Hill." Here he built a kind of wigwam, and lived with Bets Hendricks and Deb Brown. Sarah Boston often visited there" (Forbes 1889: 174). By replacing "Gigger Hill" with current "property of Moses Pollard", Forbes is constructing a specifically Euro-American landscape filled with Euro-American landmarks that in a sense, obscure Native spaces, and make them inaccessible in the present.

Despite the motivations for these kinds of memories, they provide a unique opportunity for archaeologists to further understand the spatial and cultural dimensions of Native landscapes in the 18th century (see Law Pezzarossi 2014). There are some final historical sketches of Sarah Boston that recount interactions she had with her fellow community members in which her reputation or renown had power over the rest of the community. In these examples, Regionalist histories made it seem like even in her own time, Sarah was anachronistic, out of place, and maybe even ghost-like:

> The children in every town were afraid of her. Once she broke up a party of young people at Piccadilly. The father and mother were away, 'and the children were in the midst of their festivities, when in stalked Sarah Boston, attired in her usual boots, skirts, and coat. The young guests scattered to their homes, leaving the hostess to entertain her latest visitor as best she might. (Forbes 1889: 179)

> One night a party of young men, out on a good

> time, were passing the old cemetery in Grafton. Their ideas of wit, somewhat confused by liquor, suggested their knocking loudly on the wooden gate, and calling out: 'Arise, ye dead, and come to judgment.' Slowly from one of the graves the immense form of Sarah Boston stretched itself up. Saying, ' Yes, Lord; I am coming,' she started in their direction. The young men, well-nigh paralyzed with fear, stumbled into their wagon, and, lashing their horse into a furious run, did not look behind them until safe in their own homes. Not many years afterwards she was laid to rest in this old cemetery, to rise no more at the idle call of boys. At the dawning of the judgment day she may be among the first to answer, " Yes, Lord; I am coming. (Forbes 1889: 179-180)

> On one occasion at night she was returning to Grafton from Worcester, as usual well filled with the ardent, and on reaching the grave-yard just outside of the town, she heard someone praying therein. Sarah secreted herself behind a gravestone and waited till the man was through with his petition, then suddenly rose up and exclaimed, 'You've been praying to the Lord, now the devil will answer.' As through the semi-darkness the petitioner got a glimpse of her tall form looming up, he fled in terror from the place. (Crane 1897:106-107)

These related stories correspond to a significant trope in Regional and Nationalist literature of the late 19th century wherein authors engaged in actively building a uniquely "American" national history did so by portraying Native people as ghosts, or spirits in the stories they told. Bergland (2000:16) explains that this trend stems from the tension that all Americans felt in rationalizing the fact that the American Republic was constructed specifically upon the rejection of British colonialism, and yet simultaneously accepted the colonization of millions of Native American subjects in the process of becoming a nation. Part of that conflict was justified by the American philosophy of Manifest Destiny, in which Americans used the concept of social Darwinism to explain the inevitability of Native extinction. This idea had so thoroughly saturated late 19th-century discourse that American authors literally saw living Native people as already dead, yet the unresolved colonial tension haunted their Euro-American subjects.

Sarah Boston's history is unique in that her presence in Victorian memoirs and recollections is remarkable, yet her presence in the official archive is perhaps the weakest of all four Sarahs. We have only a few clues from state records that tell us anything about Sarah's life on Keith Hill. We know that sometime in Sarah and Ben's early adulthood, after the death of their mother, Ben and Sarah split the family land once again, leaving Sarah the house and setting apart a separate parcel for Ben to "improve" (Earle Papers 1:5). Sometime thereafter, Ben's whereabouts became somewhat of a mystery. Legend tells that Ben "thought he killed Bets Hendricks when he knocked her down, so he ran away" (Fiske #11 [n.d.] 7). The story goes, however, that Bets Hendricks and Ben Boston were both drunk at the time, and she had "lain for dead till she recovered consciousness and then was as well as ever" (Fiske #11 [n.d.] 7). Unfortunately, it seems that Ben never returned to Hassanamesit while the land was still owned by the family. A fund was left for him when the last of the land was sold, should he ever return (Fiske #11 [n.d.] 7).

It seems that Sarah Boston petitioned to sell portions of her land three times over the course of her life. It was only after she began to have children that she began having more difficulty supporting herself. Her two boys, Stephen and Joseph, were born in 1815 and 1813 respectively, her daughter, Sarah Mary was born in 1818 (Tritsch 2006). The first time, in 1815, she needed to repair the house (Earle Papers 1:5). The second time, in 1816, the sale was for the repayment of her debts incurred "for her support" (Earle Papers 1:5) and the third petition, filed in 1821 was co-written by "Otis Newman". It asked permission to sell an unspecified amount of land for "their support" (Earle Papers 1:5). Otis Newman is also in the accounts of the trustees as a Native Land proprietor; however it is unclear how the two are connected. Perhaps Otis is the father of Stephen, Joseph and/or Sarah Mary. It does not seem as though the two were married, at least not formally. Not much is known of Sarah Boston's children. Her daughter Sarah

Mary was sent to work in Worcester at an early age; she married Gilbert Walker, a well known man of Worcester who owned a barber shop (Fiske #11 [n.d.]: 7).

From time to time Sarah Boston's name appears in the account books, collecting her dues, appealing for sundry items or medical expenses. At the time of Sarah Boston's death in 1837, her family's original 106-acre plot had been whittled down over the years to less than 20 acres. Stephen collected compensation for caring for her in her last sickness (Earle Papers 1:1). By the time of her death in 1837 she had accumulated a large amount of debt which was passed down to her daughter along with the remaining parcel of land. Sarah Mary held onto the land for almost 20 years after her mother's death, but in 1850 she petitioned through the trustees to sell the final 20 acres of land to pay her own debts and those left by her mother (Earle Papers 1:5).

After Sarah Boston, two more generations of Sarahs manifested this persistent matrilineal naming tradition, although the land rights that came with the name were lost. The female control of this Nipmuc land into the 1850s is of note; however the result is sadly familiar. Sarah Mary sold what remained of the land held by her family in 1854, ending the female Nipmuc control and occupation of the parcel. Interestingly, the documentation relating to Sarah Mary and her daughter, Sarah Ellen dries up at this point, as the colonial scrutiny abated once no more land was held. Having been displaced from the original land parcel meted out in 1728, the Sarahs disappear from the Grafton, Worcester and greater Massachusetts records.

Chapter 3: Methods

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Introduction

The archaeological investigations at Hassanamesit Woods maintain a long-standing tradition of interdisciplinary, multi-scaler research that has been a hallmark of Fiske Center projects (Hayes and Mrozowski 2007; Landon and Bulger 2013; Landon and Trigg 2010; Landon 2007; Mrozowski 2006a; Mrozowski et al 2009). The success of any interdisciplinary research depends on a collaborative environment, an openness to epistemological diversity, and good archaeological preservation (Mrozowski 2006b, 2010). In this instance the scope of our collaboration was extended to the Town of Grafton, Massachusetts, and the Nipmuc Nation. The character of this collaboration (see below) was built on the same kind of epistemological openness that we believe contributes to a sounder, more socially responsible science. Contrary to the thoughts of others (e.g. McGhee 2008, 2010) we do not see the incorporation of indigenous knowledge and scholarship as somehow compromising our efforts (see Silliman 2008, 2010) and indeed see it as appropriate that our overall goals incorporate a desire to aid the political struggles of the Nipmuc in seeking federal recognition (Mrozowski 2012, Mrozowski et al 2009; see also Lightfoot et al 2013; Panach 2013). For us this is no different than according the same level of respect to other, more traditional academic disciplines. In a larger sense this collaborative, interdisciplinary research strategy seeks to place equal weight on both the analytical and interpretive facets of anthropology. The same rigor involved in scientific data collection and analysis must be extended to the interpretation of the results of this research. The multi-scaler character of the project is reflected in analyses that combine a focus on phenomena from the microscopic level, such as paleoethnobotany and micromorphological studies, to the regional (collaborative methods, local history analysis, palynology), to the global (material culture). Each has their own set of methods and these are described in detail below.

Collaborative Methodology

The Fiske Center for Archaeological Research at UMass Boston is committed to the ongoing development of collaborative methodologies for all of their projects. For the Hassanamesit Woods Project, our collaborative strategies have included two main stakeholder groups: first we strive to build and maintain a strong and dynamic relationship with the Nipmuc Nation, who have a profound personal and ancestral connection to Hassanamesit Woods. Secondly, we also strive to consider the questions and concerns of the larger Grafton community. The latter was achieved through early meetings with Town Selectmen and then continuous contact with the Hassanamesit Woods Management Committee, a group appointed by the town and only recently disbanded. Given their investment in the long term preservation of the Hassanamesit Woods property, the town of Grafton is a critical stakeholder in the project. Balancing the substantive involvement of these communities and considering academic pursuits simultaneously has been a challenge, but because we have prioritized the maintenance of an ongoing dialog between us, through multiple channels, and different venues, we have been able to slowly develop a project that reasonably fulfills the expectations of those involved. Of course, this is still an ongoing process, and it will continue to evolve in terms of community engagement, outreach, and education long after excavations have been closed. With that said, our collaborative strategies to date are outlined below.

At the Fiske Center, we recognize that in order to do "Indigenous Archaeology," we must strive to align our own goals with the interests and questions of the communities whose pasts we study, and be sure that our practices and methods strike a balance with the Nipmuc community's own ethos (Atalay 2006: 284). For this reason, we schedule annual meetings with Nipmuc Elders and maintain an ongoing consultative relationship with Nipmuc Historic Preservation Officer, Dr. Rae Gould who is now with the Advisory Council on Historic Preservation, Office of Native American Affairs in Washington D.C. We consult with her most often throughout the year, as she is an archaeologist herself and is cleared by the Nipmuc community to make archaeology related decisions for them that do not warrant the full involvement of the Elder Council. We usually consult with her anytime we want to share information that we have generated from our fieldwork, either in a public or professional setting. Drs. Mrozowski and Law Pezarossi also have a longstanding scholarly collaboration with Dr. Gould. They often appear together in conference sessions where they usually present the findings of the Fiske Center and Dr. Gould's own project, the Hassanamisco Reservation, either in co-authored scholarly presentations or publications (e.g. Law, Pezzarossi and Mrozowski 2008; Mrozowski, Gould and Law Pezzarossi 2015)

Yearly consultation with the Tribal Elders involves meeting with the tribal council to discuss the results of our research and request feedback. These meetings are part of the monthly meetings of the council and often involve a brief presentation of results, a discussion of any specific issues we would like to discuss with the council members, and request the continuing support of the council for the research we are conducting. Maintaining these lines of communication and consultation is a critical component of the project that aids our research in a variety of way. In some instances the issues we discuss with the council or Dr. Gould involve logistical issues, issues of permission and support, or requests for feedback on joint initiatives. Examples of such discussions involve gaining the continuing support of the council for field plans for the upcoming season or longer term consultation concerning the disposition of collections. These same consultations are carried out with the Office of the State Archaeologist, the Massachusetts Historical Commission, and the Hassanamesit Management Committee (now disbanded) and the Grafton Historical Society and the Grafton Land Trust.

There is a second, equally important facet of our collaboration that contributes to the overarching project goals. This involves a continuing dialogue that allows us to join the results of our research with the Indigenous knowledge gained through consultation. These types of exchanges take several forms. Through our project blog, information concerning the project and specific types of analysis are shared, and this has resulted in members of the Nipmuc Nation suggesting refinements or sometime alternative interpretations. The on-going consultation between senior project staff and Dr. Gould provide an important channel for scholarly exchanges on a variety of topics. The most obvious example of this is Dr. Gould's willingness to provide comments on virtually all project related products such as reports, publications, public and scholarly presentations, and research strategies and goals.

As the stewards of the Nipmuc Nation's cultural resources, we recognize our responsibility to work to undo some of the difference and distance that Western archaeological discourse has drawn between the archaeologist and the studied "other" (see Atalay 2006). We try to design collaborative efforts, with either the town or the Nipmuc community, that break with traditional hierarchical dichotomies and blur the lines between the roles of the scholar/subject, western/non-western, amateur/professional.

The Fiske Center has always been committed to pursuing local projects. In the case of Hassanamesit Woods, there is relatively little physical distance between where archaeologists, the Nipmuc community and Grafton residents all work and live. This close physical proximity allows us time to meet together in many different settings, and establish more complex relationships that blur perceived boundaries between the Nipmuc community, local historians, and archaeologists. We extend invitations each year to the Nimpuc and the townspeople of Grafton to visit and volunteer at the site and in the Fiske Center's labs at UMass Boston. In past years we have welcomed high school students from Grafton High out to the site to volunteer after school, and we have also hosted Public Archaeology Days, where the community is welcome to hear us talk, see artifacts first hand, and visit the site. When hosting visitors on site, we encourage volunteers to help us dig, screen, and ask questions. When in the lab we make an effort to display as much of the collection as possible for visitors to see and touch. During the summer of 2012 we welcomed a large group of local Native students from the Native Tribal Scholars Program at UMass Boston into the lab for a tour, an interactive exhibit, and an artifact washing session that showed them first hand what happens to the material culture when it comes into the lab environment. In the fall of 2013 The Fiske Center, the Departments of Anthropology and History and the Native American Institute at UMB cosponsored an exhibition and panel discussion with the Nipmuc and Eastern Pequot centering on the collaborative archaeological process and the results of on-going projects. Labeled Conversations Between Communities (Figure 3-1), this event was just the most recent example of the expanded scope of the collaboration between the different stakeholders. When we organize these kinds of activities, we strive to provide an example of how archaeologists can maintain a scientifically rigorous environment, while remaining sensitive to the concerns, customs, and needs of a local and/or indigenous community.

We have also worked closely with the Hassanamesit Woods Committee, not only to fund and plan the field school's work, but to compile a spatial and historical tour of Hassanamesit Woods for the general public. While we wanted to highlight the Sarah Boston Site and stress her prominent role in the early 19th-century history of Keith Hill, we also had to consider the implications of drawing visitors to the site when we were not there. The resulting numbered tour guides hikers through the Hassanamesit Woods property, pointing out historical and ecological landmarks, but does not reveal the explicit locale of the Sarah Boston Site.

Field Methods

The field methods employed during our investigations incorporated a combination of survey level testing, shallow archaeogeophysics, and phosphate sampling of soils all in an effort to enhance our discovery capabilities. These various methods were used to first identify large concentrations of cultural material linked to habitation sites of both recent and earlier periods that were then subject to larger scale, block excavations. We will discuss each separately including more refined analytical techniques including archaeogeophysics, pollen and macrobotanical analysis, and soil block, micro-stratigraphic analysis. Brief descriptions of each of these analytical techniques is provided below; however, for more detailed discussion of both methods and results see Piechota, Steinberg, and Trigg chapters below.

Shovel Testing

During Phase 1 testing, shovel test pits were used to survey large areas in search of concentrations of material culture (Gary 2005). Shovel test pits, 50x50cm units, were employed using 20 and 10-meter intervals (depending on the context), oriented to magnetic north. Shovel testing was employed during our initial investigation of the Hassanamesit Woods Property in 2004 (Gary 2005), and then again in 2010, 2011 and 2014 at the Deb Newman Parcel and the Lewis Ellis home site. The testing strategy at Deb Newman varied the use of 50, 20, and 10-meter intervals. A 10-meter interval was employed at the Lewis Ellis homesite in 2014.

Archaeogeophysics

Archaeogeophysics, in general, is the application of non-destructive geophysical methods and principles to archaeological settings. More specifically, archaeogeophysics is the interpretation of buried archaeological sites and features based on the results of shallow geophysical investigations. Archaeological features, important subsurface geology, and sometimes artifacts and ecofacts can be located and partially analyzed using geophysical signatures. These surveys have been identified as particularly useful in understanding landscape features such as gardens that cover a large area and cannot be completely excavated (Yentsch and Kratzer 1994). Broad coverage geophysical surveys can also be immensely helpful for investigating broad settlement patterns.

Archaeogeophysics is not an exact science. We have found that small differences in the environment (e.g., soil moisture, surface cover, changes in ambient temperature) can change the geophysical properties of the near surface, and therefore change the nature and shape of geophysical anomalies. A geophysical anomaly is a general term for any structure that exhibits significantly

Figure 3-1. Conversations Between Communities poster.

different geophysical properties from its surrounding environment. Anomalies can be natural (such as a glacial erratic) or artificial (such as a wall). Determining which anomalies are natural and which reflect buried archaeological features can be difficult.

In archaeogeophysics, the choice of equipment, technique, transect direction, transect spacing, and area covered can have as much or more effect on the reliability of the identification of archaeological features as the contrasts between the features and the surrounding matrix. Because the work is non-destructive, surveys can, and usually are, preformed multiple times with slightly different parameters in order to obtain the best results.

In general, interpretations based on archaeogeophysical data are dramatically more accurate when made in the context of archaeological excavations. Even small excavations of targeted anomalies greatly enhance the archaeological interpretation of geophysical anomalies at a given site. Along the same lines, using archaeogeophysical evidence as a guide for excavations makes these excavations considerably more efficient. The reflexive use of archaeology and geophysics can establish a geophysical signature of an archaeological feature. That is, when archaeological investigations are in a feedback loop with geophysical surveys, we can turn a geophysical anomaly into archaeological signature.

There are many important archaeological features that do not exhibit geophysical contrasts that are strong enough to be identified with the methods and post-processing applied herein. It is common for important archaeological deposits to be identified in areas without significant anomalies. We generally use multiple geophysical methods that identify different types of anomalies to try to mitigate this problem. In some cases anomalies that show up with one technique may not show up in another. Sometimes more accurate archaeogeophysical interpretations can be made when an anomaly only manifests itself with one geophysical technique. However, anomalies that manifest themselves in multiple methods are usually substantial.

Archaeological interpretations based only on geophysical tests can be inaccurate. While some anomalies are much more suggestive than others, there are no guarantees of the accuracy for any of them. Nonetheless, even when incorrectly interpreted, the data itself can still provide valuable information especially when reevaluated. Therefore, we make the best interpretations we can based on the archaeological context, the geophysical context, any previous excavations, and comparisons with similar anomalies where those anomalies have been excavated at other sites. Given these parameters, we make the most accurate and specific archaeogeophysical assessments we can.

When performing archaeogeophysical surveys, quality control (QC) is critical and involves constant attention to calibration of instrumentation, consistency in field procedures, and accuracy in locating instrument readings. Therefore, quality control (QC) lines along the northern most transect were used at the beginning and end of each survey. During EM-38 survey, intermediate base readings were also taken to check for instrument drift. All of these QC data indicate that the survey was accurate and reproducible under similar conditions. The most important QC parameter is the accuracy in establishing the grid to be surveyed. Geophysical readings must be associated with a very specific location that is accurate and reproducible for the readings to be useful. Slight differences between the actual location of a geophysical reading and the coordinate assigned during survey can weaken or eliminate geophysical signatures. Inaccurate surveying can also create anomalies where there are none. The effects of inaccurate surveying are magnified when the data are post-processed and filtered.

GPS & Total Station

In anticipation of the geophysical survey, we established four GPS points at SB/SB site using a Trimble GeoXH with a Zepher antenna. In all locations, the points established with over 800 position collection instances in four 200 reading groups, where a GPS position collection point was taken every 5 seconds. These 800 readings were then averaged. All four points were then used as resectioning points for the Topcon GPT9005A robotic total station, which was set up midway between the three GPS points (Figure 3-2). The four

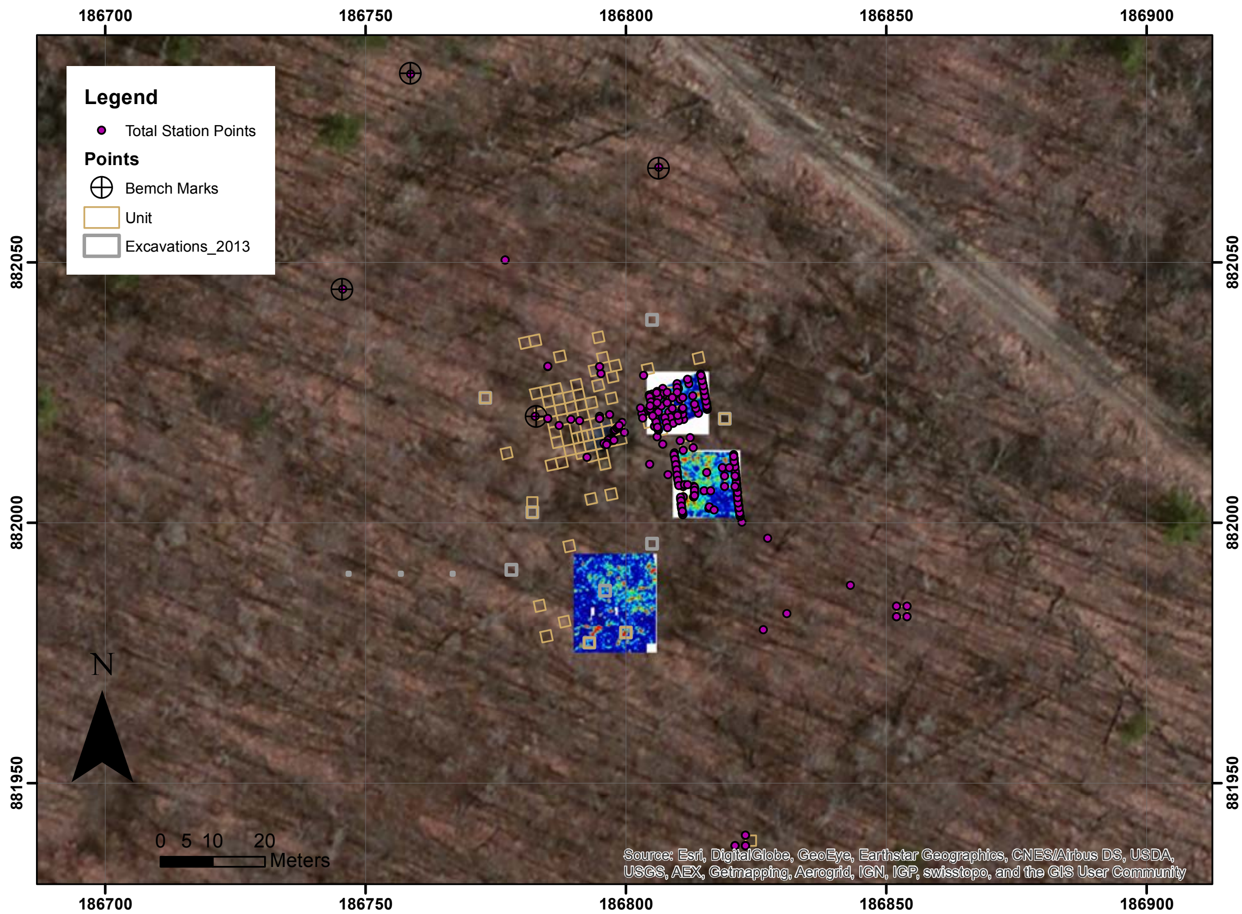


Figure 3-2. Benchmarks for SB/SB site.

Table 3-1. GPS point benchmark data.

	GPS			Final (after resection)		
	Northing (m)	Easting (m)	Elev. (m)	Grid Northing (m)	Grid Easting (m)	Elev. (m)
BIG_GPS	882086.144	186758.679	140.479	882086.315	186758.584	141.489
ROCK_GPS	882044.837	186745.633	144.416	882044.87	186745.463	144.02
RR_GPS	882068.256	186806.37	137.174	882068.047	186806.247	136.753
SB_GPS	882020.446	186782.608	143.075	882020.396	186782.771	142.916

GPS points were then remeasured and now serve as a semi-permanent benchmarks on the Massachusetts State Plane system (Table 3-1).

Originally the site grid was set out using arbitrary coordinates. Once the state plane grid was established, a series of the arbitrary reference points was shot into the state plane grid (see Appendix A, Table A-1). These points allowed the conversation (spatial adjustment) of the arbitrary grid to the state plane system. For the geophysical survey, one Massachusetts State Plane rectangular grid and two irregular grids were established (Figure 3-3). Along the rectangular grid, a tape line was established and each meter flagged with flags of alternating colors (Figure 3-4). In the irregular grids, each flag was shot in individually (Figure 3-5)

EM-38

The EM-38 ground conductivity meter emits

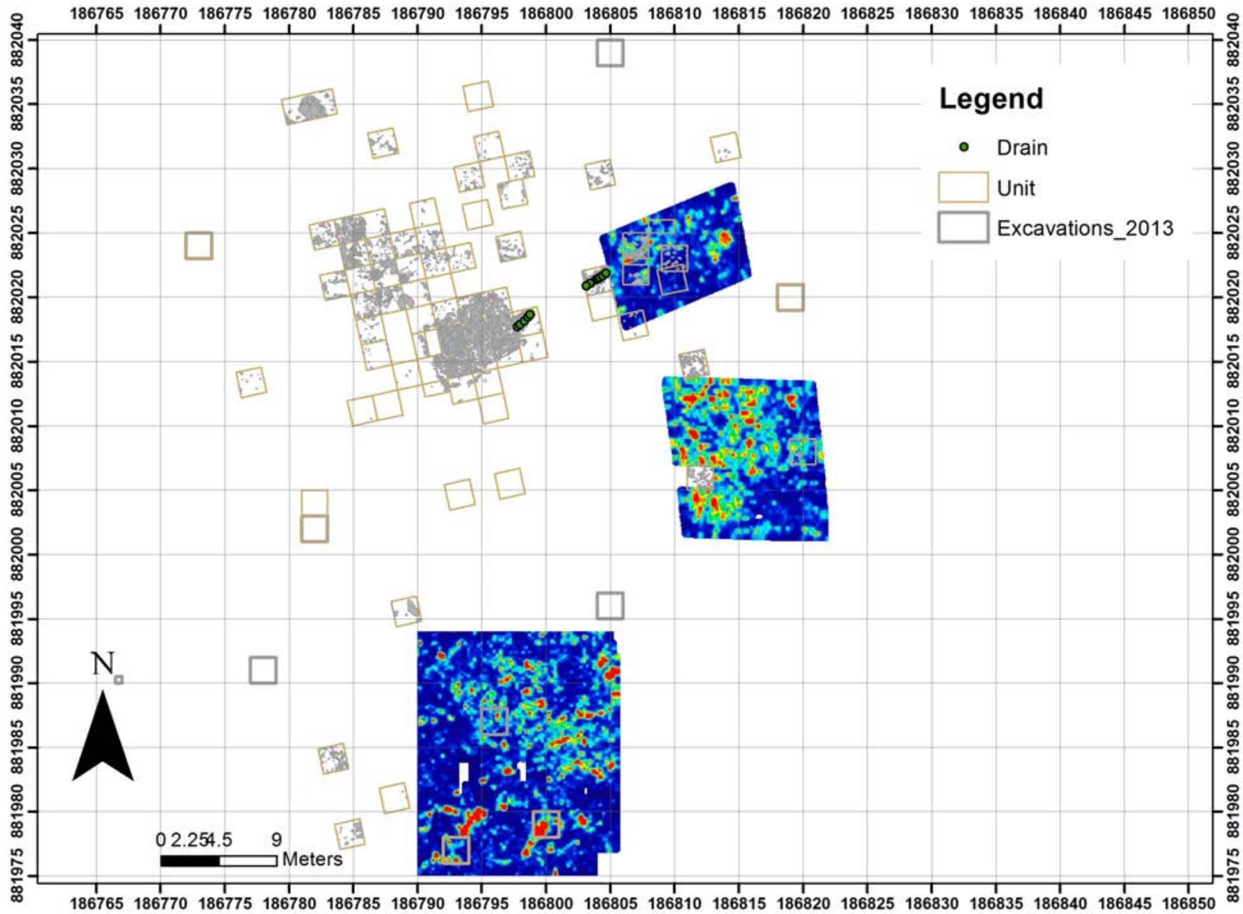


Figure 3-3. Geophysical survey grids.

an alternating current and measures the strength of the resulting magnetic field, which is a measure of bulk conductivity. The unit does not need to be in direct contact with the ground, and therefore, can be used on rough and undulating terrain (Dalan 1991). The 1-m separation between the antenna and receiver on the EM-38 provides for a relatively shallow depth of investigation (10-100 cm) and therefore good resolution of changes in conductivity close to the ground surface. The EM-38 produces readings of the bulk conductivity component of the soil (C for Conductivity or Q – for Quadrature) in milliSiemens per meter (mS/m). MilliSiemens per meter is the inverse of ohm-meters which is a measure of the resistivity of the soil (McNeill 1980). (Resistivity is a complementary method employed on archaeological sites that can produce pseudo profiles of the soil across the site, as opposed to conductivity maps presented here).

We used am EM-38 RT manufactured in 2001 which was temperature compensated by Geonics Ltd. in December of 2009. This modification reduces the sensitivity of the unit to changes in temperature caused by changes in sun, shade, or ground heat. However, some conductivity changes may be a response to taking readings with different ambient temperatures.

The EM-38 RT can also yield the In-phase component (IP) in parts per million. The In-phase readings are similar to those of a metal detector. At Hassasmissit woods, we did two surveys to record both the Q and IP phases in hopes of identifying changes in conductivity associated with garden features and to identify any middens.

In general, clays and salty soils, especially those associated with middens, tend to be conductive. Sandy soils, rocks, dried turf, and especially stonewalls, tend to be low conductivity (i.e.,

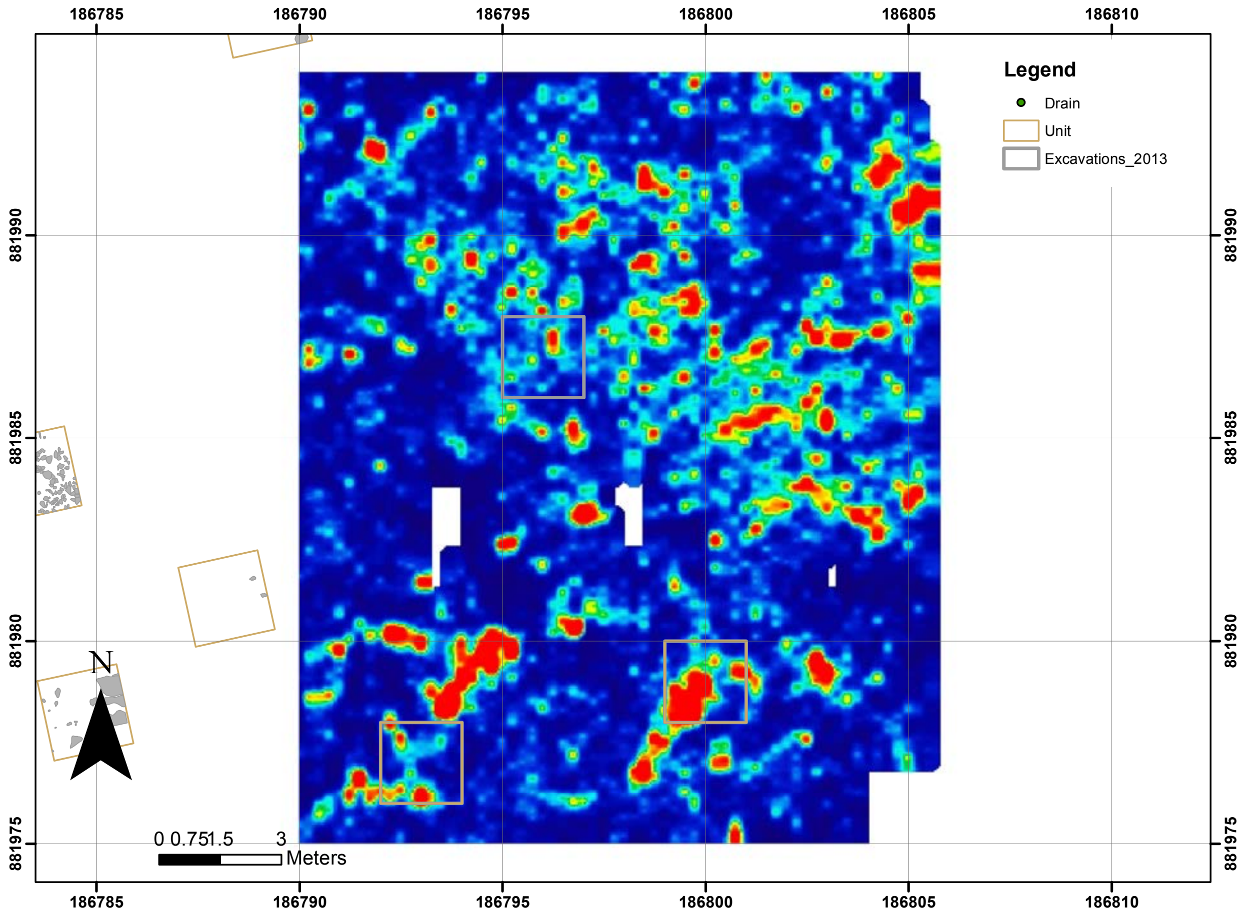


Figure 3-4. Detail of the regular geophysical survey grid, slice 8.

resistive) anomalies. By mapping these contrasts through a series of closely spaced transects, buried and subsurface features can be identified on the map. This identification depends on structures and features that exhibit sufficiently different conductivity from the background that we will be able to identify them in plan.

Ground Penetrating Radar

Ground Penetrating Radar (GPR) has become The Fiske Center's principal archaeogeophysical method for high-resolution mapping of buried architecture and cultural deposits (Goodman et al. 2008; Goodman et al. 2007). A GPR antenna/receiver unit sends microwaves into the ground. Interfaces that exhibit significant contrasts can reflect some of the microwave energy back to the receiver. The longer it takes for the microwaves to return, the deeper the reflector. The more energy a feature sends back, the stronger the reflector. Buried flat rocks, laying parallel to the ground, are some of the strongest microwave reflectors. Salt water absorbs microwave energy and does not reflect any energy back. Therefore, assuming a body does not absorb all the microwave energy, or an interface does not reflect all of the energy back to the receiver, a GPR microwave pulse has information about reflectors over a variety of depths (Conyers 2005).

As the antenna/receiver unit is dragged across a transect, it sends a microwave pulse every centimeter or so. The strength and time lag of the reflected energy can be plotted to create a pusedo-profile of the intensity of reflectors over the depth. A series of these pusedo-profiles can then be "sliced" across the site at a given depth to create a GPR map of the subsurface.

The data from SB/SBS were processed using GPR-Slice software (see www.gpr-survey.com; Goodman, et al. 1995; Goodman, et al. 2008;

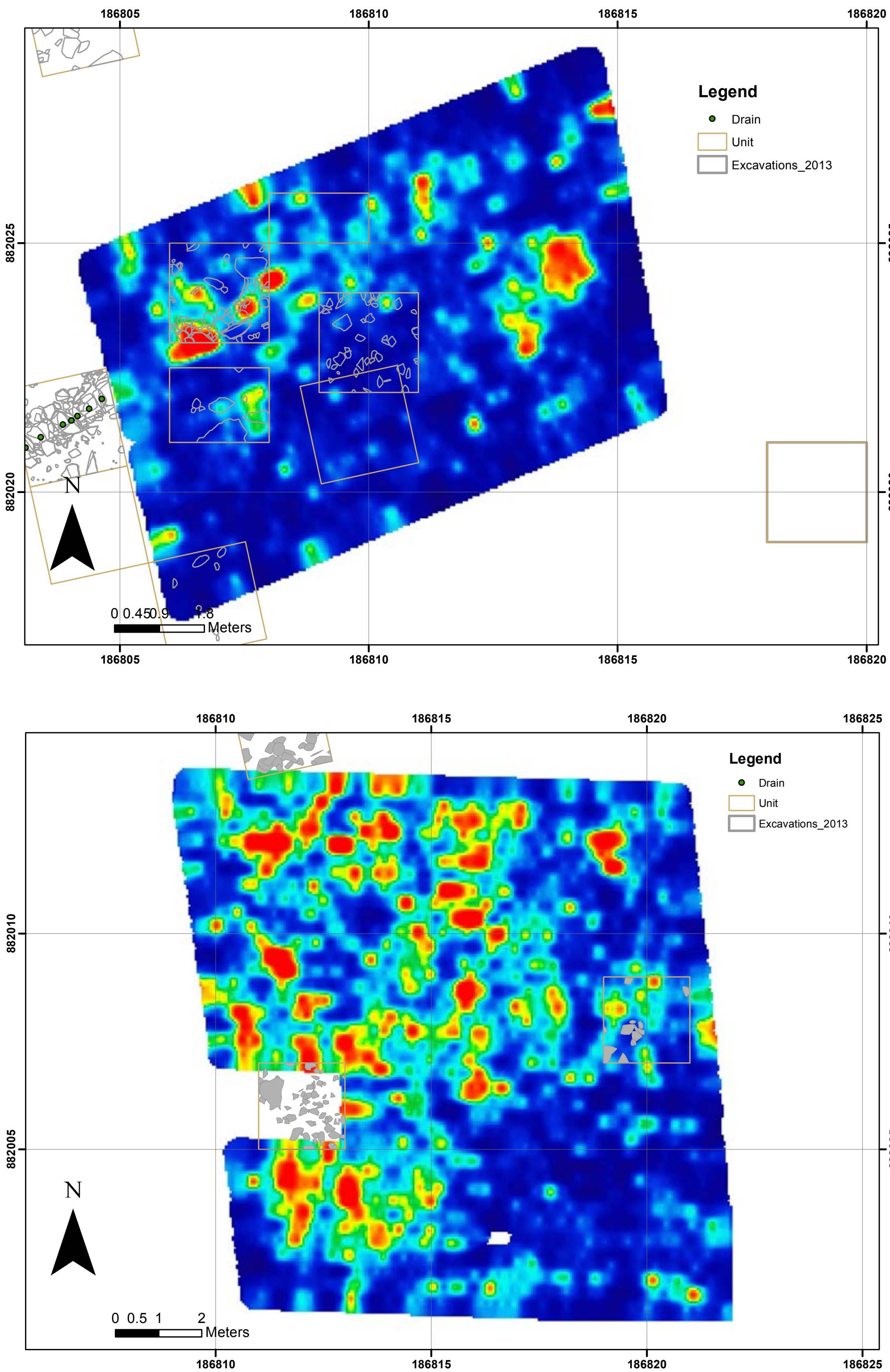


Figure 3-5. Details of the two irregular geophysical survey grids, slices 6 and 10.

Goodman, et al. 2007). The raw vertical scan data were gained, resampled and filtered (background removal, boxcar and bandpass) to produce processed 2-D radargrams. On these radargrams, the presence of strong reflectors is indicated by a black-and-white banding pattern. Note that the raw data were collected in terms of the two-way travel time of reflected energy. To convert to a depth scale, a microwave velocity of 0.12 m/ns was assumed based on standard curve matching of hyperbolas in the data. The processed radargrams were next combined to produce a pseudo three-dimensional (3-D) data set. Horizontal time-slice images were generated for various time (depth) windows of approximately 2 to 4 ns intervals to provide detailed spatial information on the location and depth of reflectors.

Block Excavation

Through a combination of shovel testing and archaeogeophysics we were able to concentrate our block excavations in the area of the SB/SB home lot. This is where the foundation remains were uncovered and where other landscape features were identified (Figure 3-6). Prior to 2012, the Fiske Center based their excavations at Hassanamesit Woods on an arbitrarily assigned 100 square meter grid system, oriented to magnetic north and located based on the area of greatest artifact density. The grid was composed of 10-meter square blocks further divided into 25 2m x 2m excavation units. Blocks were/are referred to by letters and were assigned according to the order in which they are established; i.e.: Block A was established in 2006, Block M in 2011. The units within the blocks were numbered 1 through 25 starting in the northwest corner and proceeded west to east, north to south; i.e.: A1 is in the far northwest corner, A25 lies in the far southeastern corner. In 2012, the old grid system was discontinued and replaced by the State Plane coordinate system. As of 2012, both the Sarah Boston and Deb Newman Sites were re-oriented to the Massachusetts State Plane Coordinate System, which uses the Universal Transverse Mercator System (UTMs). Regardless of the coordinate system, a unit's grid location or coordinates have always been based on the location of the southeast corner of the unit, and this is standardized across the site. The choice of 2 x 2 meter units was predicated on our desire to expose larger subsurface features and architectural remains such as chimney falls, disturbed foundations and activity areas such as yards and middens; and to make it easier to trace site-wide patterns of depositional activity. Furthermore, the 2 meter square unit represents a manageable excavation unit for two excavators to complete in reasonable time (1-2 weeks, depending on depth). This sizing also facilitates partnered learning and mentoring (graduate student/undergraduate student) relationships as part of the field school experience.

Units are excavated using both stratigraphic and arbitrary controls. The benefit of stratigraphic excavation lies in the ability to follow the stratum as they may have been deposited over time, thus allowing for greater control in distinguishing individual depositional events and accurately recording their chronological sequence. Because there is no way to know for certain whether or not a strata is attributable to cultural or natural activity during excavation, we assign strata designation letters to each layer as it is encountered, regardless of the known standard ABC-soil horizons. We proceed from Strata A at the top of the excavation, downward through Strata B, then Strata C, then D, etc. Again, these designations do not have to fall in line with the assumed natural stratigraphic horizons for the Northeast (although, of course, they sometimes do). This strategy allows us to conduct a more objective stratigraphic analysis in the lab based on qualitative descriptions of the soil colors, textures, and provenience, rather than working from judgmental assumptions made in the field. Each stratum is further divided into 10 cm arbitrary levels, which are denoted by a number starting with 1 at the top and working upward as each level is removed. The depths of each Level are measured in the north, south, east, and west corners of the unit from a unit datum, which is a known point nearby, usually unique to each individual unit, but sometimes shared between two or three adjacent units. The purpose of excavating the individual strata in 10cm arbitrary levels is that it allows for tighter control of the provenience of artifacts within each stratum. For example,

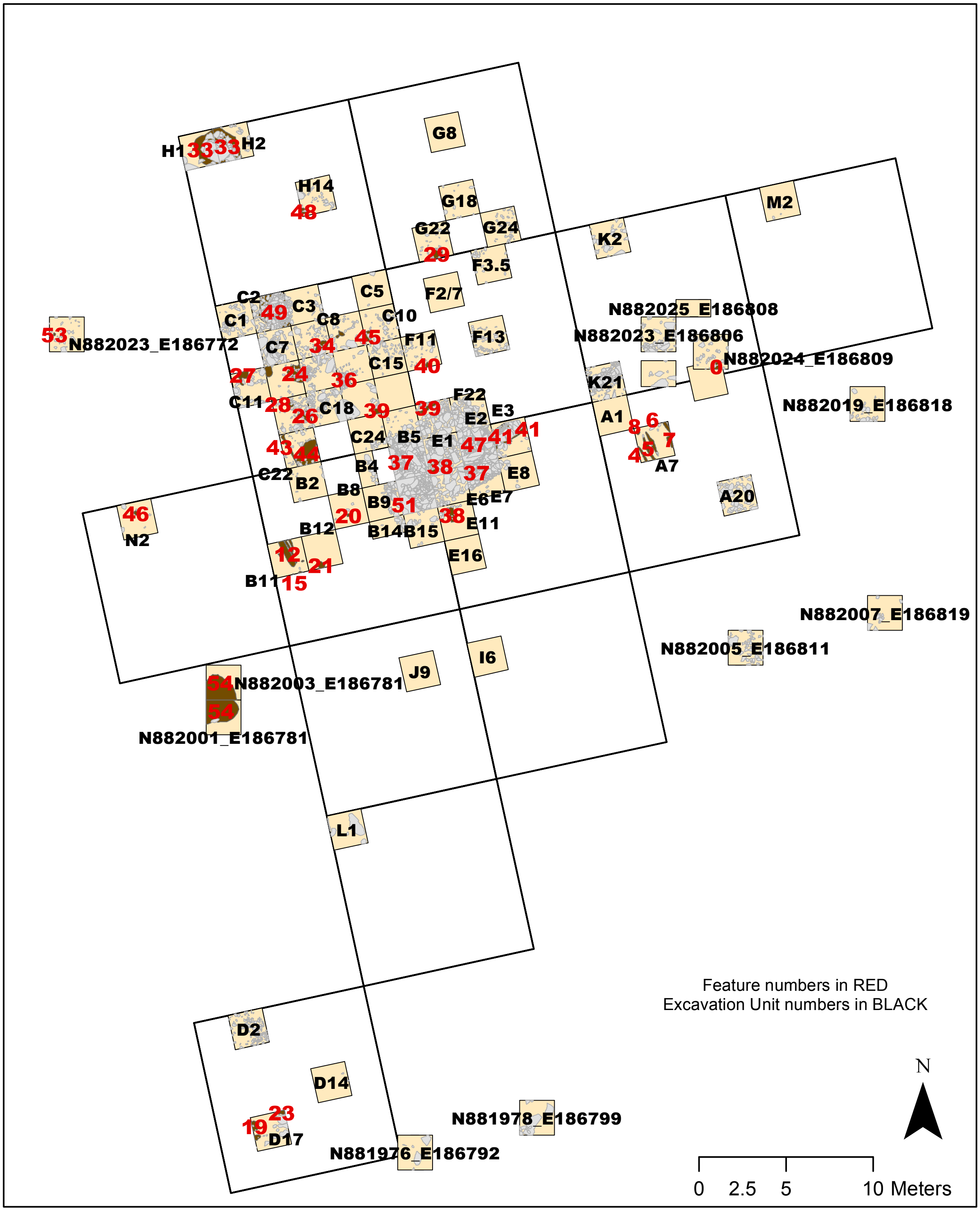


Figure 3-6. SB/SB Home Lot excavation overview showing feature, block and unit numbers.

within any one stratum there may exist subtle sub-stratums that are difficult to detect in the field. By excavating this stratum in 10 cm arbitrary levels; the greater control achieved helps compensate for subtle variations in soil composition or depositional events present within the stratum. Moreover, when analyzing and interpreting material recovered from a stratum, arbitrary levels allow for greater control of the provenience of artifacts within the stratum, enabling the archaeologists to detect subtle patterns of artifact deposition and concentration that may be missed if arbitrary levels are not used (see Hayes 2007). Arbitrary 10cm levels remain the constant throughout the excavation except in the notable case of features when 5cm levels are used. Although each stratum is completely excavated before going into the next, we maintain the 10 (or 5) cm levels regardless of stratum change (see below). Once a new stratigraphic layer is completely uncovered the previous stratum can be closed, however the level continues until the 10 cm mark is reached.

In order to identify and keep track of the stratum and levels (and record the provenience of the artifacts they contain) within the units, each 10 cm level excavated is assigned a unique context number that distinguishes it from the other stratums and layers. New context numbers are also assigned to changes in stratum level, and not solely arbitrary ones. For example, if in the course of excavating Stratum A, Arbitrary Level 3, one encounters an underlying stratum B, the context number currently assigned to Level 3 is closed, and a new context number was assigned for Stratum B, Arbitrary Level 3. Thus stratigraphic control is maintained, while continuing the arbitrary level method that (as discussed above) allows for tighter provenience control. Often an A/B interface is encountered; in this case, beginning and ending depths are recorded, but artifacts are bagged with the Strata A context. Excavation proceeded until encountering sterile subsoil, which is characterized by a lack of material culture and/or features and is usually composed of glacially derived subsoils.

Following the recording of opening elevations, the soil is carefully removed by shovel skimming, in which thin layers of soil no thicker than 2 cm are scraped off the surface. Oftentimes the situation calls for the use of mason's pointing trowels when soil changes are visible, when artifact densities are higher, when rocks and roots inhibit shovel use, or when features are being excavated. Whether excavating with a trowel or a shovel, the loose soil is placed in buckets and screened through ¼" wire mesh. All artifacts (ceramics, faunal material, metal objects, shells, etc.) are retrieved from the screens and bagged according to the context from which they were removed. Information regarding the block, unit stratum and level is recorded directly on the bags allowing for the continued control of the provenience of the materials.

The Fiske Center for Archaeological Research has implemented a procedure for the proper and consistent excavation of features. If a soil change is noted, the excavators define the limits of the feature within the unit. Once the shape and size of the feature has been determined and recorded, and a feature number and new context numbers are assigned, excavators photograph and draw a plan map of the feature and record the boundaries of the feature with the laser transit, if appropriate. Features are then bisected in a manner that facilitates excavation and the collection of data. Excavators remove half of the feature in 5 cm levels and screen through 1/8 inch mesh. After the first half of the feature has been removed a profile of the feature is drawn. Once the profile is completed the second half of the feature is removed as a soil sample.

Sample Collection

The Fiske Center employs a sampling protocol for the consistent collection of soil samples from the field. These samples are processed in the lab for a broad range of bioarchaeological and archaeometric analyses. The following is a list of sample types, protocol and methods for collection.

Flotation Samples

The purpose of taking flotation samples (bulk soil samples) is to recover macrobotanicals and small finds from the excavated sediments. These plant parts may help us reconstruct the diet of the Sarah Boston Farmstead's inhabitants, and identify the construction materials used in building the house, wood used for fuels, and perhaps even medicinal plants. Flotation samples are taken primarily from features. After the first half of the feature is removed and the profile map drawn, excavators take 2-liter flotation samples (or as much possible) from the second half. If the feature is stratified, they take separate samples from each stratum. We try to avoid taking the sample from obviously disturbed contexts. Excavators take the samples early on in the excavation of the stratum so that the samples are not contaminated, and place the soil in a plastic bag labeled with the sample type and usual provenience data. Additional samples, 3 liters if possible, are occasionally taken from other promising contexts.

Phosphate Samples

To survey the SB/SBS farmstead for phosphate levels we collected soil samples in transects in three areas: the houselot, the pasture and Swago. In Swago and the pasture we collected samples every 10 m along an east-west transect in each area. In the houselot we conducted three transects, which ran roughly north-south, east of the house. A small punch auger was used to collect about 15 g of soil from just above the A/B soil horizon. In addition to these transects, we collected samples around a rock alignment in the pasture during the 2012 field season. We collected and analyzed a total of 129 samples.

Pollen Sampling

The pollen sampling program consists of two protocols. The first, the pollen core, is designed to provide a general view of the vegetation surrounding the site. The Fiske Center's archaeobotanical specialists take core samples (Dr. Trigg or one of Dr. Trigg's graduate students). Sediments from each excavation area are cored using PVC piping, which is first sunk into the sediment, then dug out and sealed off at the top and bottom. This technique ensures that the sample will be preserved, uncontaminated by modern pollen, until the core is processed back at the lab. This kind of pollen sampling and analysis help us determine the types of plants that were growing on the landscape during the late 18th and early 19th centuries and help us better imagine how the flora on the Eastern Slope of Keith Hill has changed over the past several hundred, or perhaps even thousand years.

The second protocol is designed to identify the pollen spectrum in localized activity areas; therefore, additional small judgmental pollen samples will be taken when a sealed context is identified during excavation. Dr. Mrozowski, Dr. Trigg, or the director's assistants decide when to take these smaller, judgmental pollen samples. To take this type of pollen sample, we scrape the sediment to provide a freshly exposed surface, clean a trowel or spoon with distilled water, and then scoop enough sediment to half-fill a small whirl-pak. We select dirt from several different areas within the feature. If possible, we take the dirt from under large impervious objects such as bricks, rocks, large sherds, or metal, but avoid taking rocks as part of the sample. We label whirl-paks with the sample type and provenience information. Since pollen is normally present in the air and dirt, we take precautions to avoid contaminating the archaeological samples with modern pollen. We try to take samples when there is little wind (such as early in the morning), we work quickly, and keep sample bags closed when not adding dirt.

Hand Samples of the Soil/Sediment for Micromorphological Analysis

Hand samples are small oblong undisturbed blocks of soil or sediment cut from the sidewall of an excavation pit. They are taken to study the composition and micro-structure of soils and sediments in areas of human occupation. Such microscopic analysis can give an indication of the cultural and natural processes at work in the past. They usually vary from 10 to 20 centimeters in length, width and height though they can be larger or smaller depending on the range of particle sizes in the soil block. The locations of the hand samples are documented photographically and with measured profile drawings.

Once freed from the sidewall by careful excavation the hand sample becomes a portable representation of a small area of the sediment and must be prevented form breaking apart. They are wrapped in a soft and easily conformable paper (usually toilet paper) to begin the process of making them robust enough to transport from the field to the laboratory. They are then tightly wrapped multiple times in common package sealing tape to create a solid which will resist deformation during transport. Care is taken to label all the faces of the hand sample with top/bottom and cardinal directions so that it can be oriented with respect to its origin in the sidewall.

The hand samples are then transported to the laboratory where they are oven dried at 60ºC for up to a week and then vacuum impregnated with a thermosetting polyester resin. Once the resin is hardened, the faces of the hand samples are sawn with a diamond-edged geological rock saw exposing the soil/sediment layers.

At this point the hand samples are permanent resources and can be archived for future study of the soil/sediment micro-structure. Portions of a hand sample are cut into 1 ½ to 2 cm thick vertical slices to prepare them for thin sectioning.

A thin section is a 50 x 70 mm section cut from the vertical slice of the hand sample that has been ground down to a 30-micron thickness and mounted on a glass slide. These thin sections are then petrographically analyzed, that is, the mineral constituents of samples prepared this way have been thinned enough to allow light to pass through them. This and other petrographic techniques allow identification of the constituent minerals and characterization of the sources and processes that brought them together.

Field Conservation

Sensitive artifacts uncovered in the field are brought to the conservation lab at UMass Boston where they receive treatment. The conservation methods employed in the field however, are very important and significant to the later treatment of artifacts. The goal of the conservation procedures described below is to ensure the safe recovery and transport of artifacts, from the ground to the Fiske Center for Archaeological Research's Conservation lab. Based on the environment at Hassanamesit Woods and the close observation of artifacts previously recovered, certain artifact types have been determined to be sensitive including metal objects – iron, lead, copper, tin, etc., faunal material, uncharred organics, and ceramics sensitive to deterioration including Native ceramics and tin glazed wares such as Delftware. Iron artifacts are bagged separately and then kept cool and damp as much as possible until they can be transported to the Fiske Center's iron treatment room. Organic materials, such as textile and small wood fragments are photographed in situ and kept in matrix to prevent fragmentation and then bagged in plastic or placed in a film canister and brought to the lab.

Field Documentation

Documentation of excavation at Hassanamesit Woods takes many forms. This process begins with the assigning of context numbers, as discussed above, that allows for control of provenience. The excavation is further documented via the use of excavation forms, on which excavator's record "standard" information about the strata or feature being excavated. This information ranges from context numbers assigned to individual units, to types of artifacts encountered, number of arbitrary levels excavated in one unit, unit depth, depth of different stratums, soil composition descriptions, features encountered within the unit and other information deemed important for later interpretations (See Appendix B for an example of Strata and Feature forms). All paperwork is collected and reviewed at the end of each day by the field school's teaching assistants. This ensures that the forms are being used correctly and that field school participants obtain a clear understanding of the forms and ultimately the excavation process. We also keep logs for contexts, samples, conservation, photos and artifact bags that track all the data that are brought back from the field each day and allow for easily referenced information in the lab. The final layer of documentation on the site consisted of student and crew excavation journals that contained daily entrees by the excavators detailing what they worked on, what they found and how they interpreted it. These journals provide an outlet for personal opinions, explanations and interpretations of the ongoing project by the people doing the excavation. The insight provided by journals such as these help to fill in some of the gaps that will arise when interpreting the material culture from the site, as they provide "on-the-ground" information of what was seen and done by the excavators.

Excavators make drawings to record stratigraphy or locations of features (both in plan and profile) within a unit for later interpretation in the lab. Both soil profiles and plan drawings are eventually digitized using ArcGIS back at the Fiske Center's Digital Archaeology labs. Plans are always made at the interface of A-horizon and B-horizon, and also where changes in stratigraphy and/or locations of features are denoted. The Fiske Center's protocol for plan mapping and digital photography (see below) at Hassanamesit Woods has been developed in response to the challenges inherent in mapping surface and subsurface features that often consist of rock-filled pits and the large foundation of the SB/SB site. As part of the plan mapping of the units, soil descriptions are recorded for every distinct stratum, feature and other anomalous "lens" of soil that differs from the surrounding strata. Using a Munsell color chart, the soil is assigned a color and a description of its composition. The Fiske Center for Archaeological Research usually produces profiles for chosen unit walls in order to illustrate feature fill or unit stratigraphy. Unit profiles are usually drawn when excavation is complete; feature profiles are drawn after the feature has been bisected and the first half of the feature fill has been removed.

Photographs are taken unit by unit at each stratigraphic interface, when features become apparent and generally any other time when a drawing is called for. We also use photography to record the ends of levels when drawing another map might prove too time consuming or redundant. Each photograph makes use of a menu board that provides information on the site, feature (or excavation unit plan or profile) and the date when the photos were taken. Each photograph also includes a scale and north arrow. Shots are taken in flat light (shade) and excavation surfaces are misted with water if necessary, to reduce sun glare and heighten the visibility of soil contrast, respectively. These record shots are supplemented by overall shots of excavation in progress and specific, in-situ shots of artifacts. We also take great care to get as much of a 'full-site' shot as we can at the end of each field season. While overhead tree cover prevents us from taking images from far above, we use a wide angle lens to capture as much of the work area as we can. The Fiske Center takes great care in producing these images, cleaning the entire site, removing debris, and waiting for ideal lighting conditions to ensure as crisp a photograph as is possible. All photographic images are recorded in the site photo record system.

Site photographs are also regularly taken for the Fiske Center's blog; they usually document field school students in the learning process, as well as help illustrate our findings to our blog audience. We occasionally choose significant features to model in 3D, both for the blog and for the lab's records. New photogrammetric software, widely available and often catering toward specific archaeological applications, can allow 3D manipulation of features, including views from above and even below, giving the archaeologist views of the site from perspectives that are not possible in the field. Photogrammetry can also provide a resource for extracting archaeometric data from the site, even after the field season is over. The Fiske Center is committed to keeping current on new developments in this burgeoning subfield, and will continue to experiment with new technology and photography techniques as they become available.

The Blog

We started a blog for the Hassanamesit Woods Project in 2011. The blog is available under the category of 'The Hassanamesit Woods Project' within the larger and pre-established 'Fiske Center Blog' which is maintained by senior staff at the Fiske Center and administered by the College of Liberal Arts and Sciences at the University of Massachusetts, Boston (see http://blogs.umb.edu/fiskecenter/). We started it to encourage Nipmuc community interest in the Hassanamesit Woods Project by providing a place where people could not only see what kinds of things we do in the field and in the lab, but also offer comments and questions on the content they read and get feedback from the Fiske Center staff. Our blogging efforts have succeeded in opening up the lines of communication with the Nipmuc community and boosting interest in the Hassanamesit Woods Project in general. This format works so well because it allows us to get our ideas and findings out quickly and provide that information in an easily accessible and appealing format for a general audience. It allows community members--who might not have the time to volunteer or might live too far away to visit—a chance to still participate in the project, and gives the public a chance to teach the archaeologist something, instead of the other way around.

The blog is updated regularly during field school (approximately 2-4 posts per week in the month of June) and intermittently during the off-season, with posts composed of images and text regarding the Hassanamesit Woods Archaeological Project. Posts are focused primarily on the archaeological process and historical background of the Hassanamesit Woods Property. Appropriate topics may include:

- Highlighting tribal and community involvement in the project;
- Showcasing innovative archaeological field methods;
- Describing the daily activities of archaeologists and archaeology students and the logistics of field school;
- Discussing the development of, and issues surrounding archaeological methods;
- Illustrating the possibilities and questions associated with on-site archaeological interpretation;
- Sharing developments in documentary and oral historical research;
- Explaining and illustrating the procedures associated with lab work;
- Discussing the role of photography in archaeology and experimenting with new approaches to photographic representation.

The Fiske Center strives to cover all stages of archaeological research in the Hassanamesit Woods Project blog from planning, to excavation, to analysis and interpretation. Creating this deliberately broad scope facilitates the inclusion of many voices in all stages of the archaeological process (Silliman 2008:3). While we look to the tribal elders for definitive decisions, we understand that not all Nipmuc opinions are represented by the council. The blog has helped us to hear many Nipmuc voices, not all of whom are in agreement, or have the same amount of influence in the tribal community (Silliman 2008:8; Ferguson and Colwell-Chanthaphonh 2006), but who have all helped us to better understand the complexity of the issues we address.

As with any archaeological project, there may be some sensitive information related to our work that should be limited in public exposure. As such, there are a few things we try to avoid in our blog posts, as per our agreement with the Nipmuc Tribal Council. In an effort to maintain the integrity of the site and the broader aims of the project, posts do not disclose or provide information that might reveal the exact location of archaeological sites on the Hassanamesit Woods Property or elsewhere in either images or text. And while we do occasionally show images of artifacts like ceramic sherds or metal fragments for purposes of illustration; we try not to highlight or sensationalize specific artifacts that might be deemed valuable by a general audience. While we had considered making the blog only semi-public, and including more information accessible only to the Nipmuc Nation, presenting our findings in this way leaves the difficult question of "who is a stakeholder?" up to the reader. It allows the reader to decide whether or not they will participate and at what level. For those who have more of an investment in the project, lab and site visits can provide the community with the specifics about space and material culture that the blog cannot. Comments are encouraged from all interested parties; however all comments are screened by the blog administrator to meet blog guidelines prior to public posting. The blog does not discuss the personal issues of bloggers or their colleagues, nor is it ever used for financial gain.

Using the blog and our other collaborative events, we aim to create a relationship of "mutual education" (Watkins 2000:171) wherein the archaeologists communicate what they do, "with, by and for" (Nicholas 2010) the community, and stakeholders have a chance to educate archaeologists on local and indigenous knowledge, oral history and the appropriate way to behave when dealing with their heritage.

Lab Methods

Artifact Processing

When artifacts are brought into the lab, they are kept in labeled boxes in the bags they were collected in, until they can be washed. Washing is usually done as soon as possible after field work concludes for the summer. This work is done by undergraduates, volunteers and graduate students as part Graduate Assistantships, Independent Studies, or the Summer Lab School that follows the Hassanamesit Woods Field School. The Fiske Center teaches the least destructive and most effective technique for washing each type of material. Ceramics, glass, pipe fragments, brick, and shell are washed with water and a soft bristled brush. Most faunal specimens and metals are dry brushed to avoid the breakage and disintegration of fragile bones and prevent the further corrosion of metal. After artifacts from a single context have been cleaned, they are placed on a screen with the bag they were in (which includes context information) and left in the drying rack for at least 3 days.

Once the artifacts are dry, they are counted and bagged in plastic bags separately by artifact class (see Appendix B for preliminary inventory form). At that time, the artifact counts for each context are recorded in a preliminary inventory and the entire context is bagged together and stored until it can be catalogued in a more in-depth manner. The preliminary inventory insures that we have a quickly generated and readily available basic catalog of all the artifacts that come into the Fiske Center. These counts help generate rough spatial data to further inform excavation, or to make general observations about the collection that we may then test later with the more detailed catalog.

Artifacts recovered from Hassanamesit Woods are stored at the Fiske Center for Archaeological Research at UMass, Boston. They are kept in archival boxes in 503 McCormack Building and organized first by year of excavation, then by block, then unit. They will be stored at the Fiske Center facility until the Nipmuc Nation reclaims them to store at their own facility. Cataloging at the Fiske center is done by staff and graduate and undergraduate research assistants. We catalog by hand onto catalog sheets (see sample cataloging sheets Appendix B) first. This analysis is performed at the Fiske Center utilizing the Center's material culture reference library and comparative collection of historic material culture that aids in the identification and analysis of the Sarah Boston Site artifacts. The results of these specific material culture analyses will be covered in detail in the later chapters of this report. Once the contexts are cataloged, graduate students check the work, assign record numbers, and enter the information into our master database (FiskeCAT) in FileMaker. Record numbers allow us a unique number for each artifact within the Hassanamesit Woods Project database, and are more specific than context numbers, which simply identify the spatial location of a group of artifacts. This database was designed by Fiske Center researcher Dr. Christa Beranek and is used for all Fiske Center Projects.

Iron Conservation Method

Ferrous artifacts are frequently recovered as wrought iron building hardware and implements, cast iron kettles and sheet iron. Unless the metallic core has corroded away they are very unstable especially wrought and sheet iron which if untreated can disintegrate irreparably over a period of a few years in storage. One way to preserve them requires vigorous brushing of tannic acid. The goal of this chemical treatment is to stabilize the metallic iron under the corrosion layers by reacting it with the tannic acid which makes the metal inaccessible to air or moisture, a process called passivation.

The treatment begins with soaking the artifact in distilled water to desalinate it prior to treatment. Then several brush applications of the tannic acid solution are applied during which time the worker removes the disfiguring soft outer layers of rust to reveal the thin harder inner corrosion layers. These layers often conform to the original contours and hold the original surface details of the iron artifact. By selectively preserving some corrosion and not stripping it down to bare metal a more interpretable artifact develops through treatment. Finally the method imparts a blue-black surface appearance to the artifact that highlights the appearance of future outbreaks of rust. After three applications of tannic acid the artifact is allowed to rest for seven days. If new rust develops the process is repeated until stability is reached. The procedure is described in greater detail in the standard reference (Logan et al 2013).

Phosphate Analysis Laboratory Methods

We analyzed the phosphate samples using

two methods: Eidt (Eidt 1973) and Mehlich II (Mehlich 1984). The Eidt test is a rapid assessment of the available soil phosphate. It gives qualitative, relative data about phosphate levels rather than a quantitative assessment of amount of phosphate per volume of soil. We followed the procedures outlined in (Eidt 1973). In addition to this qualitative analysis, we performed the Mehlich II (Mehlich 1984) test on the same samples. This test is designed to give a quantitative assessment of phosphate levels. While Eidt tests can be conducted in the field, we analyzed the samples for both methods in the Fiske Center labs. Eidt tests were conducted by several graduate students participating in the field school, so there may be some inter-observer variability, but the Mehlich tests were conducted by a single analyst.

In Eidt tests, a small amount of soil is placed on filter paper; reagents are then added to extract phosphates, the quantity of which is subjectively measured by the bluing on filter paper. Following protocols outlined in Eidt (1973) we recorded the time that the reaction became visible, the length of blue lines, and the proportion of filter paper surrounding the sample where the reaction is visible. In Mehlich tests, phosphates are extracted from sediments using a series of reagents; phosphate levels are read in a colorimeter. We recorded phosphate levels, percent transmission of light and absorption of light through the supernatant.

Flotation Sample Laboratory Methods

Each flotation soil sample was processed with the Fiske Center's Dausman Flote Tech A1. Following Toll's (1989) methodology, we quickly scanned some samples to assess their potential. For most analyzed samples, we scanned the light fractions for charred seeds, related plant parts and wood. The samples were scanned under 10 to 40x magnification using a binocular dissecting microscope. All charred seeds, related plant parts, and botanical tissues (excluding wood) greater than 2 mm in size were removed and identifications were attempted. A grab sample of charred wood greater in size than 2 mm was collected from each scanned light fraction, and identifications were attempted with the low power dissecting scope. When necessary, the charred wood was viewed under a compound microscope at 200 to 600x for more thorough identification. Wood and seeds were both identified as specifically as possible. Botanical materials were identified using published references (Cappers et al. 2006; Hoadley 1990; Martin and Barkley 1973; the United States Department of Agriculture plant database (http://plants.usda.gov), and the University of Massachusetts Boston's comparative collection.

Both uncharred and charred seeds were noted, but because the seeds did not come from a protective preservation environment, such as a waterlogged deposit, inside a closed structure, or a privy, we were skeptical that the uncharred seeds were associated with the archaeological deposits, and considered them more recent contaminants.

Chapter 4: Archaeogeophysics, Phosphate And Excavation Results

Heather Law Pezzarossi, Stephen Mrozowski, Heather Trigg and John Steinberg

The initial investigations at Hassanamesit Woods had identified several areas that contained cultural material resulted from an occupation that has been fairly continuous for at least the last 4,000 years and probably earlier (Bonner and Kiniry 2003; Gary 2005). The area of highest concentration of material was located in what we now know to be the home lot and dwelling of several generations of Nipmuc households (Law, Pezzarossi and Mrozowski 2008). The area designated the home lot contained a dry laid foundation and associated yard space that was the primary focus of our field investigations between 2006 and 2013 (Figure 1-2). The focus on the cellar hole and yard was complimented by continuing efforts to gain a better understanding of the remaining portions of the Home Lot as well as the South Pasture and Swego through a combination of geophysical testing, soil chemistry transects, and surveys of vegetation as well as additional test pitting and block excavation. Given the year-to-year changes in focus and evolving picture of the property as a whole it was decided that the presentation of excavation results would be best summarized through a series of field season descriptions. These are brief, but detailed enough to provide the reader with a clear understanding of how field decisions were made and the questions that have driven the excavation strategy over the past 9 seasons. These are preceded by discussions of both the archaeogeophysics and phosphate soil testing regimes since these aided in making decisions concerning the unfolding of our overall field excavation strategy. Although there is overlap in the use of the different methods over the course of our numerous field seasons it seems most appropriate to discuss the geophysics and phosphate results first since both influenced the choices that were made during our larger investigation of the SB/SB site as well as the larger Hassanamesit Woods Property.

Archaeogeophysics Results

The forested understory, shallow soils, and extensive rock outcrops in the Keith Hill area presented challenges in the use of some of the technologies often employed in archaeogeophysics. Ground Penetrating Radar proved to be the most useful technology. Measuring slight differences in water content, the GPR proved to be effective in identifying stone concentrations and filled cavities such as the foundation of the Sarah Burnee/Sarah Boston cellar hole. The discovery of these anomalies required ground truthing which indicated that while the GPR was effective, it can still be better refined with respect to the particular conditions around Keith Hill.

The first GPR survey at the SB/SB site was an ad-hoc attempt in 2007 to see if GPR was at all effective in the area. A series of test lines, where the data was inspected in real time, suggested that near the lone apple tree (between units B4 and B5 at 186791.2, 882016.5) was a substantial concentration of large and relatively continuous hard reflectors, most likely substantial rocks. This area was tested archaeologically and turned out to be the western edge of the cellar hole.

No further GPR testing or surveys were performed until 2012. At that time a search for outbuildings commenced. On June 8, 2012 Arbitrary RS Grid 1 was laid out and surveyed with GPR. On 6/12/12 Arbitrary RS Grid 2 was laid out and surveyed with GPR and EM. During the next season, as part of a more systematic search for outbuildings, RS Grid 3 was laid out and surveyed with GPR on May 10, 2013 (see Figure 3-3). The search for outbuildings was generally unsuccessful with the exception of the large square-like configuration of readings that appear in the Arbitrary RS Grid (Figure 4-1) that might represent the remains of a barn mentioned in historic documents (see below). Beyond that the only archaeologically confirmed feature identified in a formal GPR survey was the drain from the east wall of the cellar in GPR Grid 2 (see Figures 3-3, 3-5).

At the SB/SB site all GPR data were collected using a hand-towed Mala Geoscience RAMAC

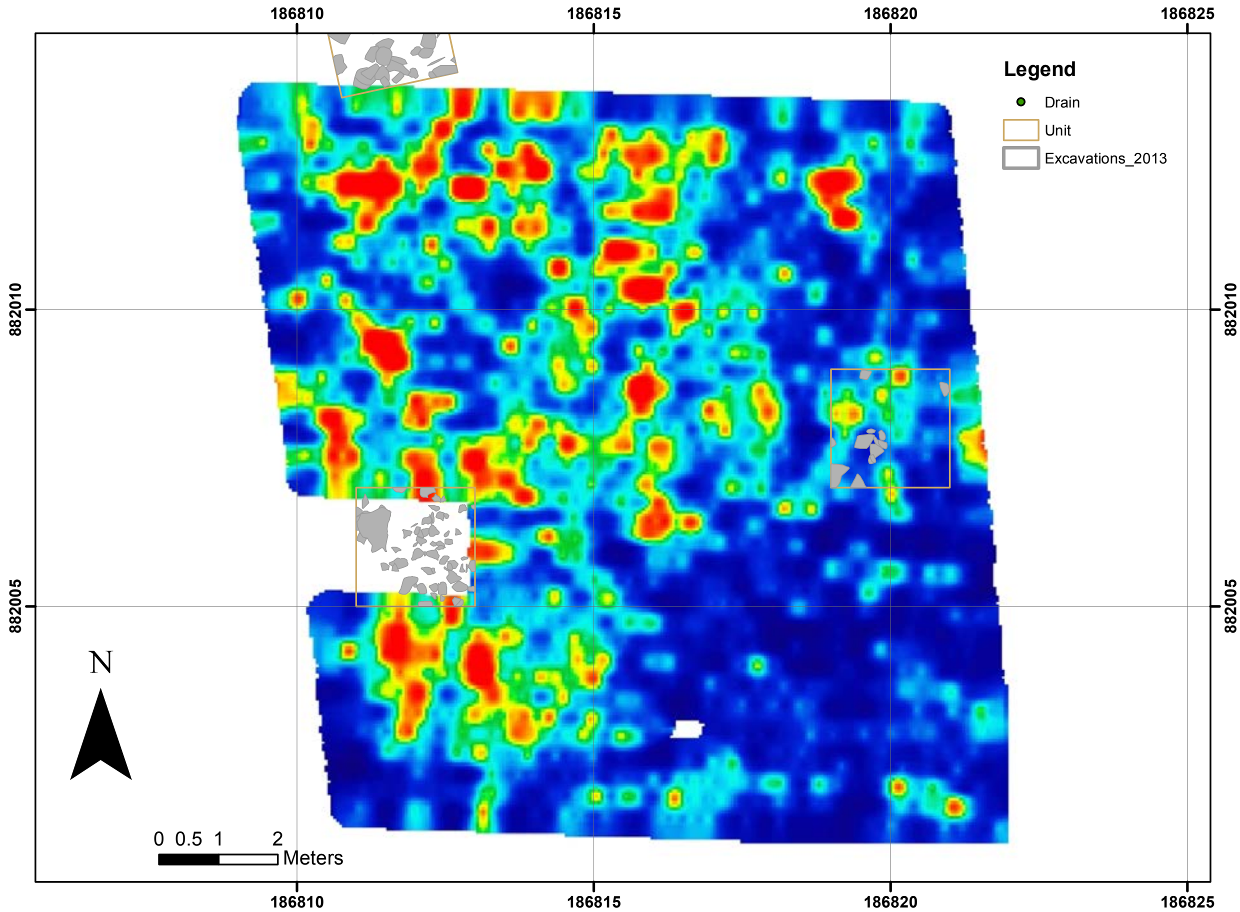


Figure 4-1. Arbitrary RS Grid 1, GPR slice data.

system equipped with an X3M control unit and a 500 MHz antenna. We were able to get reflections from interfaces over 1 m below the ground surface. GPR transects were 33 cm apart across the survey grid. The radargrams were sliced using GPR-Slice and after some experimentation, we settled on using 10 cm slices (20 samples within 1.8 m) in two of the surveys (RS Grids 1 & 3) and 6 cm slices in RS Grid 2 over the drain just east of the cellar hole (40 samples within 1.8 m). Both of these parameters provide significant overlap and continuity between slices, yet give good resolution for all three surveys (see Figures 3-3, 3-4, 3-5).

Arbitrary RS Grid 1 was laid out because the excavation at Unit N186811/E882005 suggested some rock alignments might be artificial. PVC flag rows were placed at the western edge of the unit stretching to a corresponding row 12 m east. Flags were 33 cm apart and each flag was shot in with the total station. RS Grid 1 was bordered to the north by unit A19. Transects were walked unidirectionally from west to east. Based on the results (Figure 4-1) a second unit was placed (N186819/E882007) that yielded little in the way of cultural material. Thus, the anomalies presented in RS Grid 1 (Figure 4-1) are probably natural or a result of bulldozed rocks (but see below).

Arbitrary RS Grid 2 was laid out following the identification of a drain out of the eastern part of the cellar hole. PVC flag rows were placed at the western edge of the K21 unit stretching to a corresponding row 10 m east. Flags were 33 cm apart and each flag was shot in with the total station. Transects were walked unidirectionally from west to east. Based on the results (Figures 3-5, 4-2 and 4-3) the drain has a distinct signature that seems to end 1.3 m northeast of the east edge of unit 186806, 882023. This drain is the only confirmed archaeological feature identified in the geophysics.

Arbitrary RS Grid 2 at the SB/SB site is the

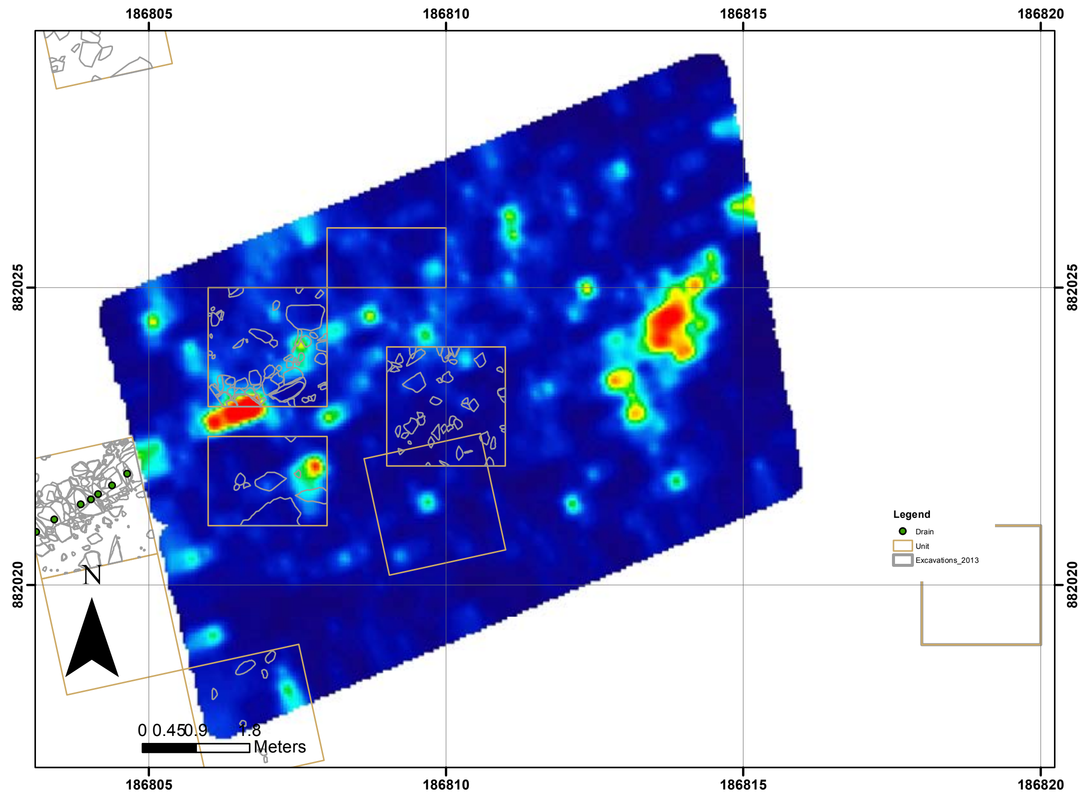


Figure 4-2. Arbitrary RS Grid 2, GPR slice data showing the drain from the cellar hole.

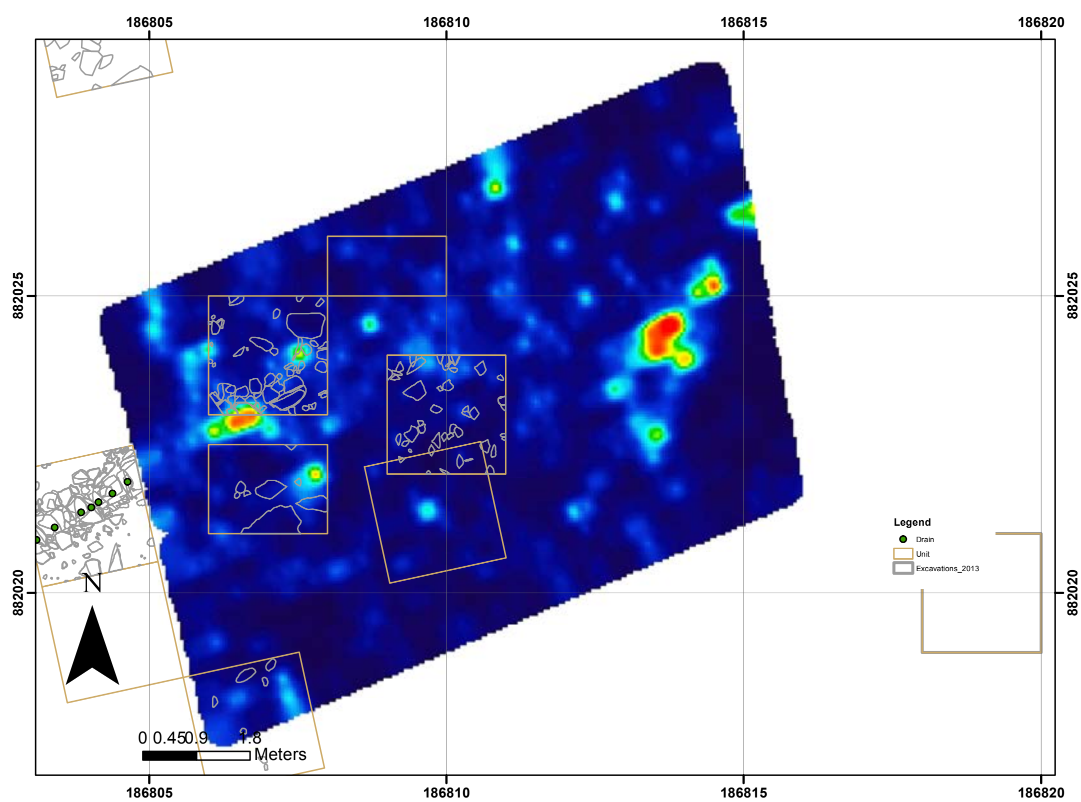


Figure 4-3. Arbitrary RS Grid 2, GPR slice data showing the drain from the cellar hole.

only place the EM-38 was used. Two different surveys were performed, one recording conductivity readings, the other taking In Phase readings, EM-38 Q (Figure 4-4) and EM-38 IP (Figure 4-5) respectively. Readings over the drain area east of the cellar hole were taken every 5 cm east-west, along transects that were spaced 33 cm apart. Conductivity ranged from 80 mS/m to -511 mS/m. The average is about 19.4 mS/m with a SD of 22. The in phase ranged from -15.7 ppt to -6.2 ppt. The average is about 1.5 ppt with a SD of 0.79. There appears to be some metal in the southwest of the survey area (about 186808, 882019). This metal may be associated with an excavation unit. The drain does not appear to be identifiable in either of these two EM data sets.

RS Grid 3 was a systematic grid where flags were placed on tapes stretched between corner flags that were shot in with the total station (Figure 3-4). This survey was preformed as part of a systematic search for outbuildings. Transects were walked unidirectionally from north to south. Three units were excavated based on the most substantial anomalies (N186795/E881986, N186799/E881978, & N186792/E881976). Little cultural material was recovered from any of these excavations, suggesting that the anomalies are primarily a result of natural/bulldozed rocks.

Phosphate Results

In the Mehlich tests, the quantity of phosphate was generally higher than the colorimeter could read and overwhelmed the device (Appendix A, Table A-2). These values are identified in the Appendix as “2.75 Limit.” So we used the absorption of light measured by the colorimeter (ABS) as a proxy for absolute phosphate values. Both Eidt and Mehlich tests identified areas of high and low phosphate levels in the Home Lot. Mehlich tests were generally higher in the house lot than either the pasture or Swego, which may reflect the intensity of activities around the house. Eidt and Mehlich values for the pasture transects were generally moderate, showing little differentiation among samples. The Mehlich tests typically showed absorption levels below that of the highest levels of the Home Lot (Appendix C). Values in Swego were generally lower than the Home Lot. Only one sample had both high Eidt and high Mehlich values.

In the houselot, the Mehlich and Eidt tests were typically not consistent: areas that suggested high levels of phosphate using the Eidt methodology did not necessarily have high levels with the Mehlich test. This is not unusual, and it illustrates the complexity of using phosphate analysis for locating special activity areas. The difference may be the result of several factors. The first is methodological; we had a number of students performing the Eidt test so there may be significant interobserver variability. However, the differences in the methodologies and chemicals used in the tests is likely another source of variation. One test may extract more phosphate than the other. The Eidt test may be more sensitive to recent soil phosphate inputs such as fertilizing or recent human activities. Finally these tests may be influenced by the development of the forest cover.

We plotted the results of Eidt (Figure 4-6) and the Mehlich II (Figure 4-7) tests for the houselot on an aerial photo of the site. Mehlich tests were particularly high in two areas: 1) nearest the house, generally downslope, and 2) adjacent to the pasture wall south of the house. The area nearest the house is generally downslope and may relate to the midden deposits, which are spread in this area. We would expect that human activities around a house would increase phosphate levels. This test may accurately reflect human induced higher phosphate levels. The Eidt test identified two different areas of high phosphate levels: near the pasture wall and along the eastern property boundary wall (Figure 4-6). The Eidt test did not show consistently high areas of phosphates around the house, so this test may not be as accurate as the Mehlich test.

Three areas contained samples that produced both high Eidt and high Mehlich phosphate values. With the hope that the phosphates in these areas might be linked to either a barn or where animals had been kept, three excavation units were completed. These excavation units, designated Soil Chemistry Units 1, 2, and 3 (SC#’s 1, 2, & 3) were located at coordinates, N882005 E186811, N8811982 E186852, N881938 E186823 respectively (see Figure 3-6). Two of these excavation units, SC#1 and SC#3 were associated with depos-

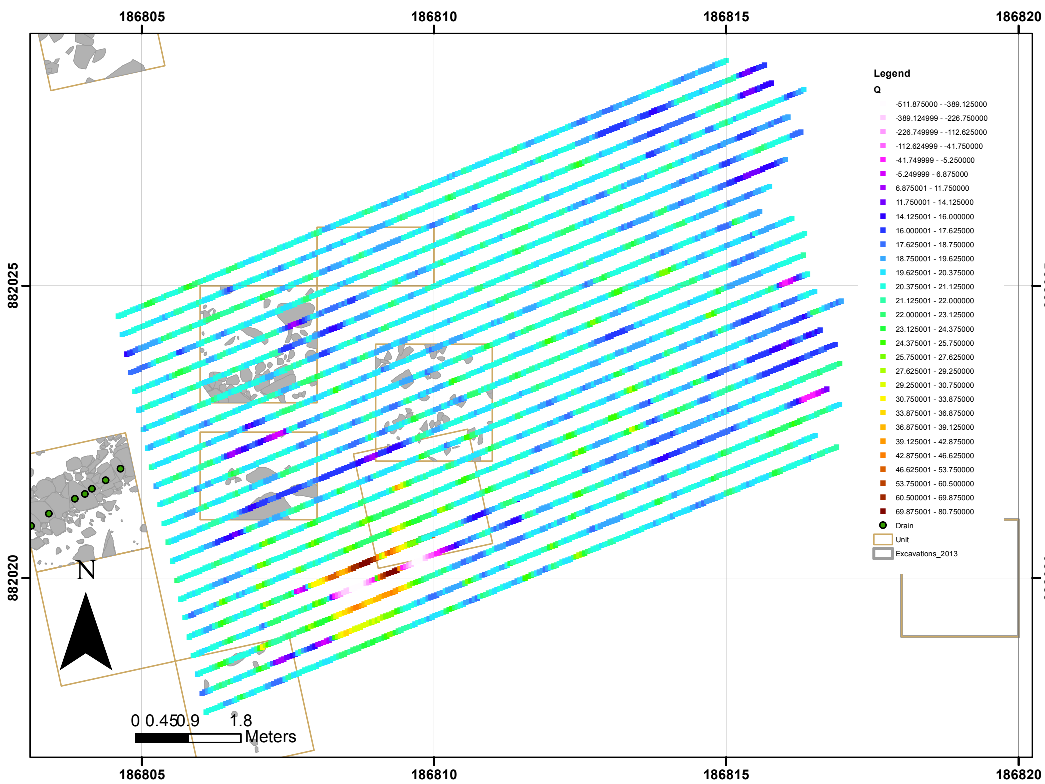


Figure 4-4. Arbitrary RS Grid 2, EM-38 Q values.

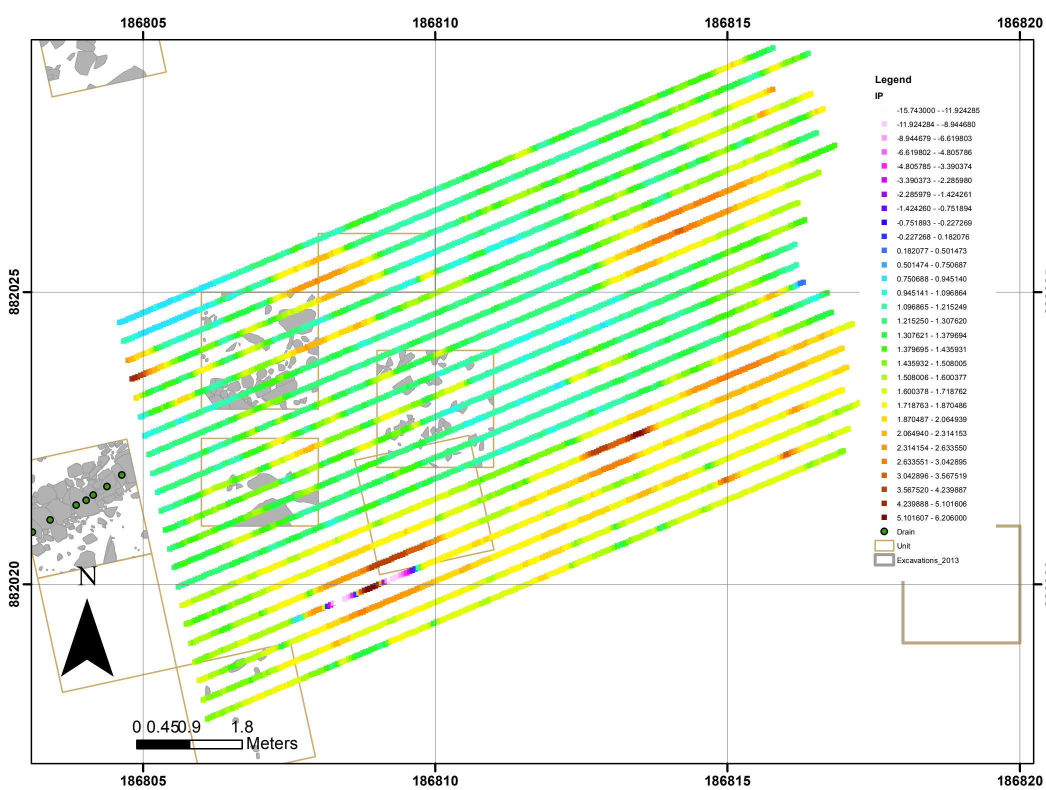


Figure 4-5. Arbitrary RS Grid 2, EM-38 IP values.

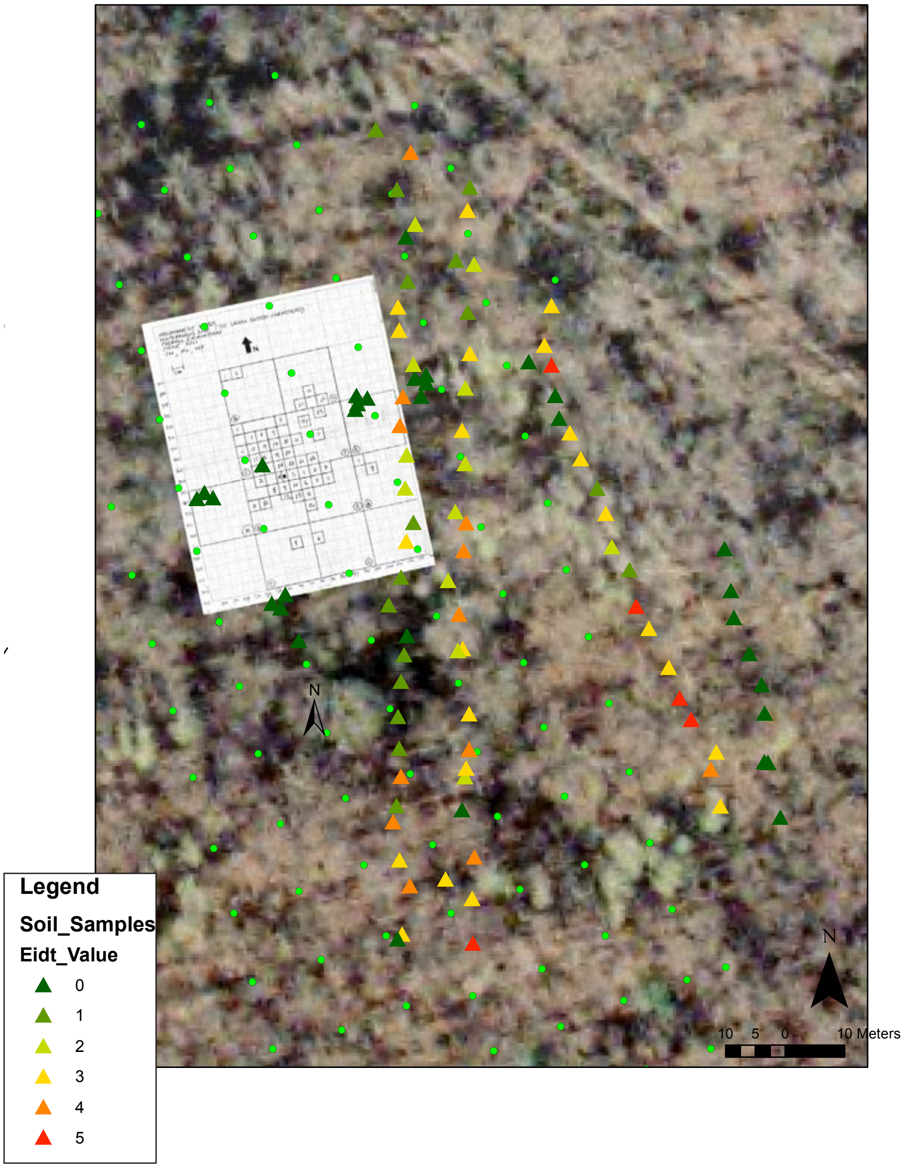


Figure 4-6. Eidt phosphate results.

its of cobbles that appear to be informal pathways. Excavation of the area around SC#2 produced no such results however. Subsequent GPR survey work in the area of SC#1 seemed to indicate a similar concentration of stone near N882007 E186819 (Figure 3-6) that we hoped might provide more concrete evidence of a cartway or barn, but further investigation produced no such results.

Excavation in the area of SC#3, Unit N881938/E186823 (Figure 3-6) did unearth further evidence of what we believe to be pathways for animals. The stone uncovered in SC#1 (Figure 3-6) is seemingly so informal that suggesting it might be part of a barn is difficult. A much more intentional deposit was unearthed in the area of SC#3 (Figure 4-8). The section of the wall that separates the SB/SB Homelot and Pasture in the area where SC#3 is located is noticeably degraded. The presence of a stone laden surface directly north of the wall is, we believe, purposeful and helped with managing muddy areas that were often traversed by animals. It is for this reason that we feel the higher phosphate levels present in both SC#3 and SC#1 are potentially associated with areas of the home lot where animals were present.

The soil phosphate tests did not ultimately

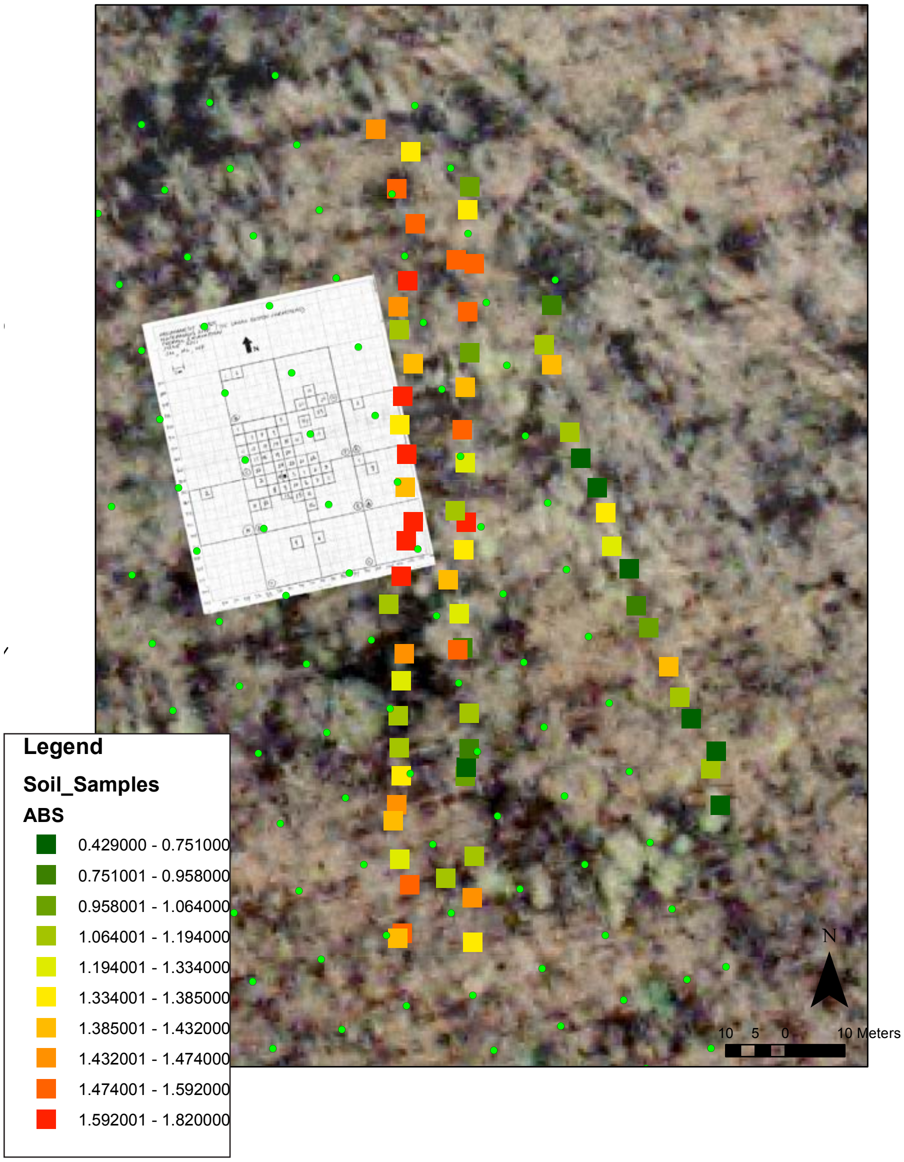


Figure 4-7. Mehlich II phosphate results.

confirm the presence of any distinctive features such as the barn or animal pens; however the high concentrations around the house, associated with the midden, and along the pasture wall all suggest that the tests are successful in identifying areas where human and animal waste appear to have accumulated. The fact that the Mehlich tests did indicate higher phosphate levels around the house near the midden where we would expect enhanced levels of phosphates while the Eidt test did not suggests that the Mehlich will be a better indicator of discrete activity areas of animal husbandry. These results may also suggest their usefulness for identifying similar areas on a site such as the Deb Newman homestead where no structural remains have yet been identified

Excavation Results

2006

The 2006 field season was itself divided into two phases. Intensive excavations began at the Sarah Boston Farmstead Site in 2006 when a small field crew of 5 graduate and undergraduate students from the Fiske Center assisted Jack Gary and Stephen Mrozowski in laying out a grid over

Figure 4-8. Photograph of Soil Chemistry Unit #3 showing stone wall and cobbles.

an area that contained the highest artifact concentration discovered during the 2004 and 2005 STP survey of the Hassanamesit Woods Property (see Gary 2005). This area proved to be the core of the archaeological remains of the SB/SB site. The goal for the beginning of the season was to refine our understanding of the established concentration area, and attempt to zero in on any structural remains. Gary (2005) had collected evidence that there was once a foundation in the area, bulldozed in the aftermath of the hurricane of 1938, but we also suspected other structures that may have pre-dated the foundation and may even have pre-dated Sarah Robins' ownership of the property in 1727, as John Eliot's Hassanamesit Praying Town was reported to have also been located in the immediate vicinity, as well.

A site datum was established using arbitrary coordinates at N1000/E1000 and a subdatum at N 970/E1000. The grid was oriented to magnetic North and composed of 10 x10 m blocks within which lay 25 2 x 2 m units. Blocks are labeled alphabetically and units numerically, proceeding from the northwest corner of the block with A1 and concluding with A25 in the far southeast. The first blocks laid out (A, B, and C Blocks with SE corners at N952/E1008, N952/E988, and N962/E988 respectively) were meant to examine the highest level of refined white earthenware, redware and glass concentrations from the STP survey of 2005 (Figure 4-9), lying in the vicinity of N958/E1000 (Units A1 and A7), N968/E986 (Units C5 and C9), and N958/E982 and N954/E980 (Units B2 and B11 respectively). We also opened a fourth block, D Block, with the Southeast corner at N922/E978, in an effort to further explore a higher redware concentration and the possibility of an older site component on the E972 line in that block. To do that, we first opened D2 at N928/E972.

Even in the early days of excavation, we uncovered consistently dense material culture concentrations in A, B and C blocks, with a consistent late 18th and early 19th century date range. The initial units in C block (C5 and C9) yielded the highest artifact concentrations of the test units, and revealed some large flat fieldstones that were not present in any of the other blocks. The first major feature was uncovered in unit B2; this was a large reddened soil stain with charcoal flecks (see Chapter Five). Plow scars were found at the A/B interface in both A7 and B11. They were consis-

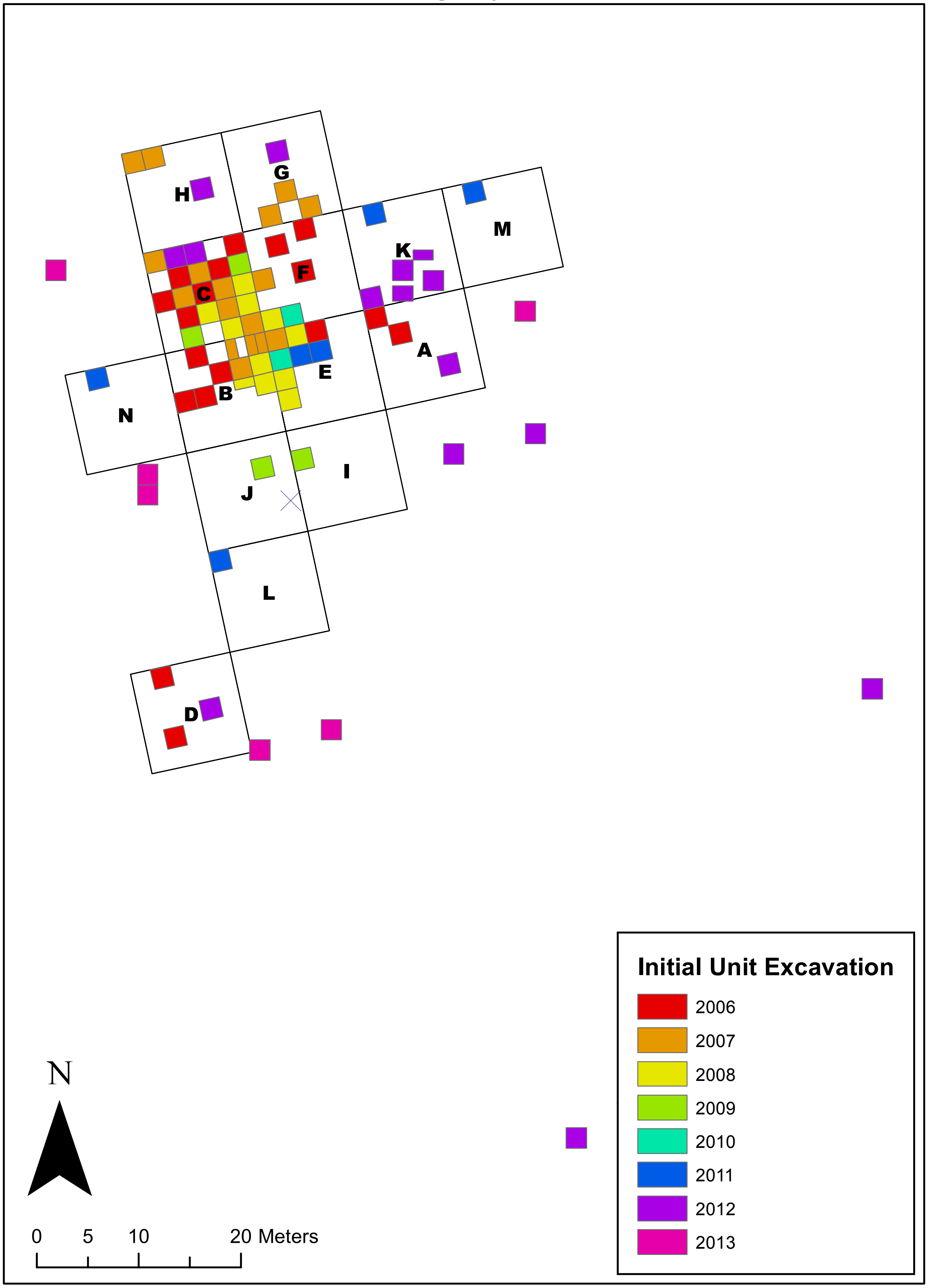


Figure 4-9. Excavation units color coded by year opened.

tently parallel, despite the substantial distance between these two units.

In June the crew was expanded to include the field school through the University of Massachusetts Boston, and we were able to open many more units. The plan was to follow up on the fieldstone and high artifact concentrations in C Block in hopes of finding further evidence of structural remains. We also tested other concentrations of material culture discovered during the STP survey, including the seemingly older assemblage from D Block. Units C13, C7, and C11 were opened in C Block and a substantial stone cobble and fire cracked rock concentration (Feature 24 see Chapter Five) was exposed in C13 that we considered as a possible hearth. The feature itself was preserved until the following season, to allow time to open the neighboring unit and record and excavate the feature as a whole. Every unit excavated within C-Block contained large concentrations of stone that could potentially be associated with a single structure and or depositional episode. C7, C11, C13 and C17 were all linked by similar stone scatters that appear to be associated with one another as potential structural remains. We also opened D17, as findings in D2 corroborated what the STP tests suggested--that the area contained higher quantities of redware and older material--and we hoped a second unit in the area might provide evidence of some kind of secondary barn or dairy structure, or a possible older residential structure. We also opened F block, located to the east of C Block. Because of several large trees in the area we had to alter our system slightly by placing units that straddled different blocks, thus Units F3.5 and F2/7 which yielded the highest artifact concentrations at that point in the excavations. Overall, the scatter of ceramics and other artifacts found in association with the possible structural remains in C Block lent support to the idea that portions of B, C and F blocks represent a yard area used for disposing of trash and other debris.

2007

Building on the results of the excavations from the 2006 season summarized above, a concerted effort was made to further sample and expose C block as well as the area north of unit F3.5 that appeared to show great promise as a midden associated with the habitation of the site. Feature 24 in unit C13 and C12 was excavated and found to be a small rock lined pit with fire cracked rock and calcined bone, perhaps a hearth of some kind. Blocks G and H were opened to the north of C Block to determine the extent of the yard area identified in 2006 (Figure 4-9). Excavations in H1 and H2 revealed little in the way of material culture, but we were able to uncover a large granite quarrying feature (Feature 33) that extended across both H Block units. G Block revealed an initial continuation of artifact concentrations in G22 and G24, but artifact densities dropped dramatically moving north into G18. These results, coupled with the discovery of a large primary deposition area in unit C14 (Feature 36) and the identification of a small portion of a potentially large feature in unit C25 (Feature 37), forced us to shift focus to the area to the west and south of F block, contained primarily within B Block, C Block and a portion of E Block.

Unit C25 was found to contain the edge of a large depression filled with rocks. It was at this point that the initial GPR survey of the site was undertaken. Its goal was to more efficiently direct excavations designed to identifying the remains of the house. GPR testing further supported the contention that unit C25 lay at the boundary of a larger subsurface feature that potentially represented the remains of the foundation and filled cellar hole that extended into B and E Blocks and was thought to be approximately 1-1.5 meters deep. After further testing, this anomaly was assumed to be the filled in cellar hole of the Sarah Burnee/Sarah Boston house; it was designated Feature 37. Time constraints curtailed the complete exposure and subsequent excavation of the cellar hole and thus efforts were made to at the very least identify the limits of the depression. Units B4, B5, B9 and E1were all excavated as part of an attempt to delineate the extent of F37, and all contained at least a portion of the feature, represented by a dark organic fill with large fieldstones and generally heavy artifact concentrations. Units B4 and B9 contained the western edge of the feature, and Unit C25 seems to represent a northern edge. Compared to other excavation units and features previously encountered on the site, F37 represented the deepest cultural deposits anywhere on the site (74 cm below surface in B5 and upwards of 84 cm below surface in E1). It also contained a large number of architectural remains (large pieces of brick, nails, iron accoutrements of the home) and larger sized artifacts consistent with a primary or secondary depositional episode spared the tertiary disturbance of plowing.

2008

With the partial exposure of the northern and western edges of the cellar feature late in the 2007 season, one of the major focuses for 2008 was to further delineate the boundaries of Feature 37, both horizontally and vertically. Several units suspected to contain the perimeter of the foundation were only excavated to the top of the feature fill, to expose the outside wall edge. Unit C24 was opened to reveal the northwest corner of the foundation feature, and an obvious edge running across the northern half of B15 and the northwest corner of E11 marked the southern wall boundary (Figure 4-9). The northern half of unit B14 was then opened to expose the southwestern corner of the foundation feature, and unit F21 was excavated to reveal more of the northern edge. In the process of delineating these edges, we noted complex stratigraphy in the soils directly outside the walls of the cellar. In some units, like C24 and C25, we noticed an indistinguishable mix of A, B, and C horizon soils, in others like E11, B15 and F21 we began to distinguish a distinct line of rust colored soil that we assumed might represent some kind of sill stain (Feature 38). Micro-morphological Sample Blocks were removed from B15 and E11 to determine the depth and profile of this stain (see Chapters 5 and 6). This complex stratigraphy triggered a long-standing inquiry into both the construction technique and the direction from which the foundation was destroyed by the bulldozer.

To better understand the stratigraphy associated with the cellar feature, we chose several of the units running through the center of Feature 37 to attempt to reach the cellar floor. We chose these to avoid the risk of damaging any intact walls near the sides of the cellar. Feature fill consisted mostly of large fieldstones, loosely packed mottled A/B horizon soils, and rodent burrows. Early on in the excavation of the cellar feature fill, we decided on a somewhat stratigraphic excavation strategy, whereby soil and small, cobble sized loose stones were removed in 10 cm arbitrary levels from around the larger displaced building stones until a layer of those larger stones were completely exposed. Those stones were then recorded in both plan and photographs before being removed and starting the process over again on the course of stones below. Only stones in their original stable construction position were left in situ. We continued to excavate E1 and B5 in this manner through several layers of loosely piled stones within the cellar fill. Based on the interpretation that the cellar may have been dug into the slope of the hill, we also opened units E2 and E3 in the hopes of finding an intact eastern wall or some profile of a builder's trench. While no intact wall was recovered in these units, E2 provided a profile of the west wall's builder's trench and at the interface of feature fill and sterile C-horizon soils in E3 (at a depth of 86 cmbd). We exposed a fieldstone capped, vertically lined channel that we identified as a drainage feature running the width of the unit and down slope from the western foundation edge (Feature 41).

We also continued to define the North Yard, with new units placed to delimit the boundaries of the C14 sheet midden in C15. Another goal was to further understand the boundary between the cellar feature and the yard, with the excavation of unit C18.

2009

The 2009 crew was especially small, with 6 graduate students and 1 undergraduate. As such, we chose a few modest, but significant goals for the season. Because we were unable to definitively reach the bottom of Feature 37 in 2008, the first goal was to identify the cellar floor and follow through to sterile subsoil in either unit E2 or B5. As we had hoped, the levels closest to the bottom contained a higher concentration of artifacts with relatively more structural integrity. As the season progressed, we recovered many larger ceramic vessel sherds in both E2 and B5. We also encountered very high concentrations of zooarchaeological remains and charcoal in B5, along with several

Figure 4-10. Stephen Mrozowski removing an iron kettle lid from unit B10.

nearly intact cast iron cooking vessels (Figure 4-10) (see Chapter Five). We interpreted these findings as refuse from a nearby hearth somewhere in the northwest corner of the structure. We had hoped to find an intact living floor surface from which we could remove a sample block and send it back to the lab for micro-stratigraphic analysis, but mixed sand, charcoal and C horizon soil deposits, within the A/B horizon feature fill in both E2 and B5, lead us to think that the floor was mostly destroyed in these units when the stones from the walls were pushed inward. We were still able to recover intact portions of what seemed like hard packed, highly micro-stratified soils, especially in E2. Interestingly, we continued to find cultural material in E2 several centimeters below the depth of the adjacent drain feature in E3, which lead us to believe that the capped channel may have continued into the cellar itself and been part of a larger sump mechanism involving the collection of water inside the cellar with the slightly raised drain acting as an outlet only when the water reached a certain level (Figure 4-10)

We also set out to further explore the area to the south of the foundation, which we realized had been under sampled as of 2008. We hoped that units I9, I6 and J10 (Figure 4-9) would allow us to assess the activities that took place in the southern yard area, if any, and provide a better understanding of the area between the house foundation and the D Block units to the southwest. Other than a few possible post holes that may represent some kind of fencing, these units yielded comparatively little material culture or distinguishable features, forcing us to concentrate our attention back on the activity in the North Yard area.

The final goal was to answer some longstanding questions about the North Yard. As part of this goal, we opened unit C22, the unit directly north of Unit B2 which was opened in 2006. B2 contained a large reddish soil stain feature that left us perplexed. The exposure of the other half of the feature in C22 answered few of our questions. We were however, able to take pollen and geochemical samples of this feature and locate more plow scars parallel to the foundation and matching with those in B11 and B12, leading us to wonder if the Northwest yard may have represented a garden area. We also excavated C10, another unit adjacent to the sheet midden, in the hopes of finding more of a steatite bowl that we found in C15. We had hoped that the steatite bowl's location might lead us to an earlier, possibly pre-colonial site component. Earlier site remains were encountered, but this was not clear until post-excavation analysis of lithic and Native pottery distributions was completed (see Chapter 8).

2010

In 2010 we expanded the project to include the possible site of one of Sarah Burnee's contemporaries, fellow Nipmuc community member, Deborah Newman. She was reported in local histories to have lived on a plot of land across Salisbury St. from the Salisbury cellar, a known historic site that we believe to be the home site of Amos Ellis' son Lewis Ellis (Figure 1-1). This project expansion was accompanied by an important shift in field recording. All site information was now linked to the State Plane Grid rather than the magnetic north oriented, floating grids that had been used at the SB/SB site. The goal at the Deb Newman Site was to conduct an STP survey over the area we had isolated using our historic map analysis and local historical research. We hoped to find domestic remains, or at least to find the remains of an historic period road that ran across the power line easement, which would help us triangulate her house location more accurately. We focused in on one area enclosed by stone walls, and surveyed the area using 50 x 50 cm test units at 10 m intervals While material culture was not abundant, it was consistent. We found creamware and other late 18th-century ceramics in small numbers at regular intervals, leading us to believe that we may have been close, but had not yet located the locus of the site. We conducted a series of arrays at 5 and 2.5 m around STPs with the highest concentrations, but were still unable to locate any undeniable material culture concentrations or archaeological features. We excavated two 1 x 2 m units at the location of the highest artifact concentration in the plot, but found little to suggest we had isolated the location of the Deb Newman domicile. We thought it more likely we had run across the roadbed, or roadside. In a pedestrian survey we also found a small enclosure, sheltered by a ledge and abutting a wetland area. Two judgmental STPs were placed in this vicinity and we recovered two substantial iron artifacts, one iron ring, and one kettle foot. Based on these results, we considered this location to be the possible site of an old animal pen, or perhaps a temporary dwelling place. Additional field work at the Deb Newman site carried out in 2011, 2013 and 2014 are discussed briefly below; however, as mentioned earlier, the results of our investigations at the Deb Newman site as well as those at other site locations along Salisbury Street will presented in a subsequent report.

At the SB/SB site, we were primarily concerned with determining the exact shape of the foundation and isolating any separate construction episodes, possibly extending back to 1750, when the earliest known house construction took place. To do that, we first had to reach sterile subsoil, which we finally achieved when we hit glacial sand in unit E2 at a depth of 173-175 cm below datum. Based on those findings, we decided to also pursue the cellar floor in unit E1 and the north half of B10 in order to increase our chances of not only finding some further sections of intact floor surface, but to further understand the nature of the drainage feature as it extended inside the cellar. We also opened units F22 and E6 on the edges of the feature, with the goal of exposing the top of the feature fill, to give us a better understanding of the shape of the structure and look for evidence that might support the possibility of two different construction episodes. The excavation of F22 quickly revealed the northeast corner of the foundation, and neatly illustrated how the trench was filled with small fieldstones after the construction of the wall. The eventual excavation of the southern half of F22 also yielded our first intact wall section of the entire excavation. The exposure of the southern wall and builder's trench quite deep in E6 revealed more about the shape of the structure and hinted that the bulldozer may have damaged the wall to a greater depth on that side (Figure 4-11). Brick concentrations in B10 and E6 above heavy domestic artifact concentrations suggested the possibility of a brick chimney base, or hearth, pushed into the cellar hole. Several iron cooking vessels were recovered in this area of foundation along with large stoneware, redware and pearlware ceramic sherds recovered just above the floor in both B10 and E1. These gave us hope that there may be intact living surfaces below. At the end of the season we were

Figure 4-11. Stratigraphy of unit E6.

able to isolate 20 cm of floor deposition in E1, over the same glacial sands found in E2. We preserved some of this surface in E1 and E2 and were able to take two sample blocks back to the lab for micro-stratigraphic analysis (see Chapter 6).

2011

In 2011, we again split our time between the Deb Newman site and the SB/SBS. We began at the Deb Newman site with a plan to determine the significance of the low but steady artifact count in the 2010 test area. Dr. John Steinberg at the Fiske Center designed a sampling strategy that encompassed a much broader area at a 50m interval to see if we could determine the limits of the concentration. Dr. Heather Trigg extracted a pollen core sample (the results of which are not discussed in this report) from the wetland directly west of a small stone enclosure associated with the Deb Newman site (Figure 1-1).

At the Sarah Boston Site we had all but a few questions answered regarding the foundation. We still needed to determine the exact footprint of the cellar and specifically we needed to see the southeast corner. We opened E8 to find just a small section of the corner, and opened E7 to find the top of the feature fill, which appeared in this unit as a reddish brown A/B horizon mottled mix, laying above a thin, darker organic layer, which itself overlay the topmost portion of the remains of the southern wall. This stratigraphy is difficult to interpret which may indicate some bulldozing from the southeast. Interestingly, these units had many fewer artifacts than the others associated with the foundation, which led us to wonder if there was an ell that extended out to the south, with no cellar underneath. Because we had yet to see an inside corner of the foundation, we also decided to excavate the southern half of unit B10 down to sterile subsoil, maintaining a section of the roughly 20cms of floor deposition for micro-stratigraphic sampling, if needed.

Outside of the foundation, we were interested in finding one or both of the barns listed in historical documents. To this end, we designed a soil chemistry survey to assess the phosphate levels in soils both inside the Sarah Burnee/Sarah Boston Home Lot and South Pasture, described earlier in this chapter. We were interested in any samples with elevated phosphate levels as an indicator of the presence of animal waste, which might direct us to an area to concentrate our 2012 excavations.

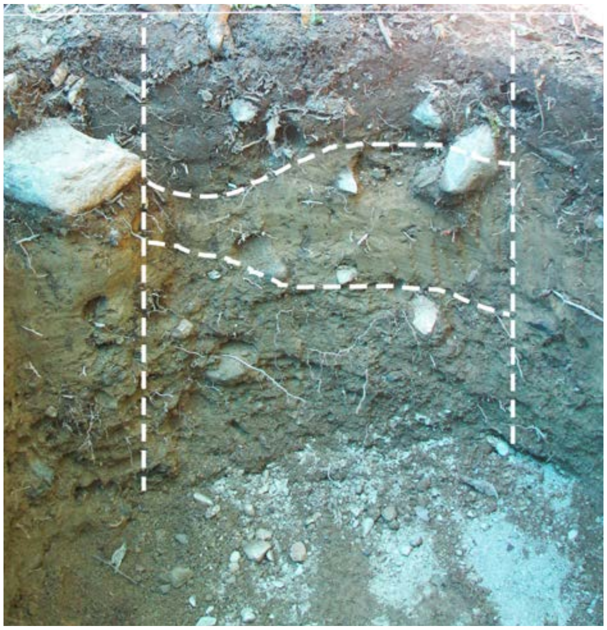


Figure 4-12. Water sorted deposits in unit K21.

We were also looking to sample some of the previously under-represented areas in our excavations to date. We excavated unit K2 and M2 to the east of F Block to ascertain the extent of the midden there and found a substantial amount of material culture in K2 and slightly less in M2 further east, presumably due to their lower positioning on the down slope. We also opened unit L1 between B and J Blocks and D Block, and found little to help us draw a connection between the main concentration and the slightly older concentration in D Block to the southwest. Lastly, we opened N2, to the west of B Block, which confirmed what we had already suspected: there is little evidence for a barn or any other structure to the west of foundation feature (Figure 4-9).

2012

In 2012 our work focused on the SB/SB site and larger home lot (Figure 4-9). The 2012 field season also saw a continuation of the expanded use of the State Grid system while continuing to use the original grid established in 2006. That grid was geo-referenced to the State Grid to improve the overall spatial control of project field activities. This use of both State Grid coordinates for excavation units is most evident with regards to the excavation of three 2 x 2 m units (called SoilChem1, SoilChem2, and SoilChem3) that were numbered according to their grid coordinates rather than the block and numeric system that continued in the area of the foundation and yard of the SB/SB site. These excavation units were chosen because of the elevated phosphate levels recorded at these locations as a result of the soil chemistry field collection process (see Chapter 3). While no obvious structures were confirmed, it seems that the phosphate survey did successfully detect areas that had concentrations of cobbles sometimes appearing as rough surfaces. These cobbled surfaces were subsequently investigated through a combination of GPR and Electro Magnetic survey of a large 10 x 16 m area southeast of A Block (Figure 3-3) to try to trace the outlines of the cobbles. We considered that these roughly cobbled surfaces might provide traction for animals on the hillside or for farm machinery during the orchard period. High phosphate levels and the same kinds of cobbles were also found up the hill to the southwest, near an opening in the stone wall, leading into and out of the houselot (Figures 3-6, 4-8). An auger test confirmed that these cobbles are isolated to the area around the stone wall entrance. Perhaps these cobbles were meant to provide traction for livestock, or perhaps they helped to shore up the stone wall and prevent mudslides down the hill to the east.

The primary focus of attention in the area of the foundation was an effort to trace out the drain feature (feature 41) found in 2008 in unit E3 in order mark its terminus. We had thought that there might have been a cistern that collected the overflow from the cellar, so we tested unit K21, to the east and directly downhill 4 meters. As expected, the drain continued down the hill and away from the house, but an additional GPR survey showed that the drain might bifurcate just east of K21. Further testing has revealed evidence of water sorted deposits in unit K21 that confirm that the drain feature clearly emptied out on to the slope east of the foundation (Figure 4-12). We did not discover a clearly defined drain terminus, which may not have existed or was bulldozed.

Still another priority was to further test an area in the northwest corner of C Block that showed elevated counts of Native ceramics and chipping

Figure 4-13. Overview of the excavation of the foundation and drain in 2012.

debris from our 2006 excavations. We were able to uncover a substantial cobble filled feature (Feature 49) in both C3 and C2. This feature was subsequently excavated and appears to be the remains of a dry well (see Chapter 5).

The final goal of the season was to expose more of the edges of the excavated cellar feature to see if any intact walls (besides the one found in F22) remained (Figure 4-13). If we could see the actual construction technique of the walls, perhaps we could better judge the possibility of two separate construction episodes. This work proved fruitful in E7, and B5, where several courses of intact wall were exposed and mapped. The west wall of B10 also proved interesting, as it provided us with a view the wall that bore the weight of the water and mud that came down the hill. This wall was composed of two enormous boulders, rather than courses of smaller flat fieldstones, and may have purposefully incorporated a channel for water to weep through, allowing water to flow through the cellar and out the drain on the other side. The northern wall in F21 and F22 was uncovered as well, but it appears to have warped and bowed inward, due likely to either frost heaving, or the bulldozing of the cellar in 1938.

2013

2013 would prove to be our last field season at the SB/SB site and much of it was spent finishing up previous features excavations and some last attempts to try and locate the barn that had been mentioned in documentary sources. The extensive use of geophysical testing in 2012 had covered most of the area to the south of the foundation and this had revealed nothing of a structural nature. Although we had unearthed concentrations of stone and cobbles that may have been used to alleviate muddy conditions or been associated with a barn, nothing that could definitely be associated the barn or out-buildings of any kind had been discovered. Therefore it was decided to use a different approach that involved a series of judgmental units that were chosen to cover areas

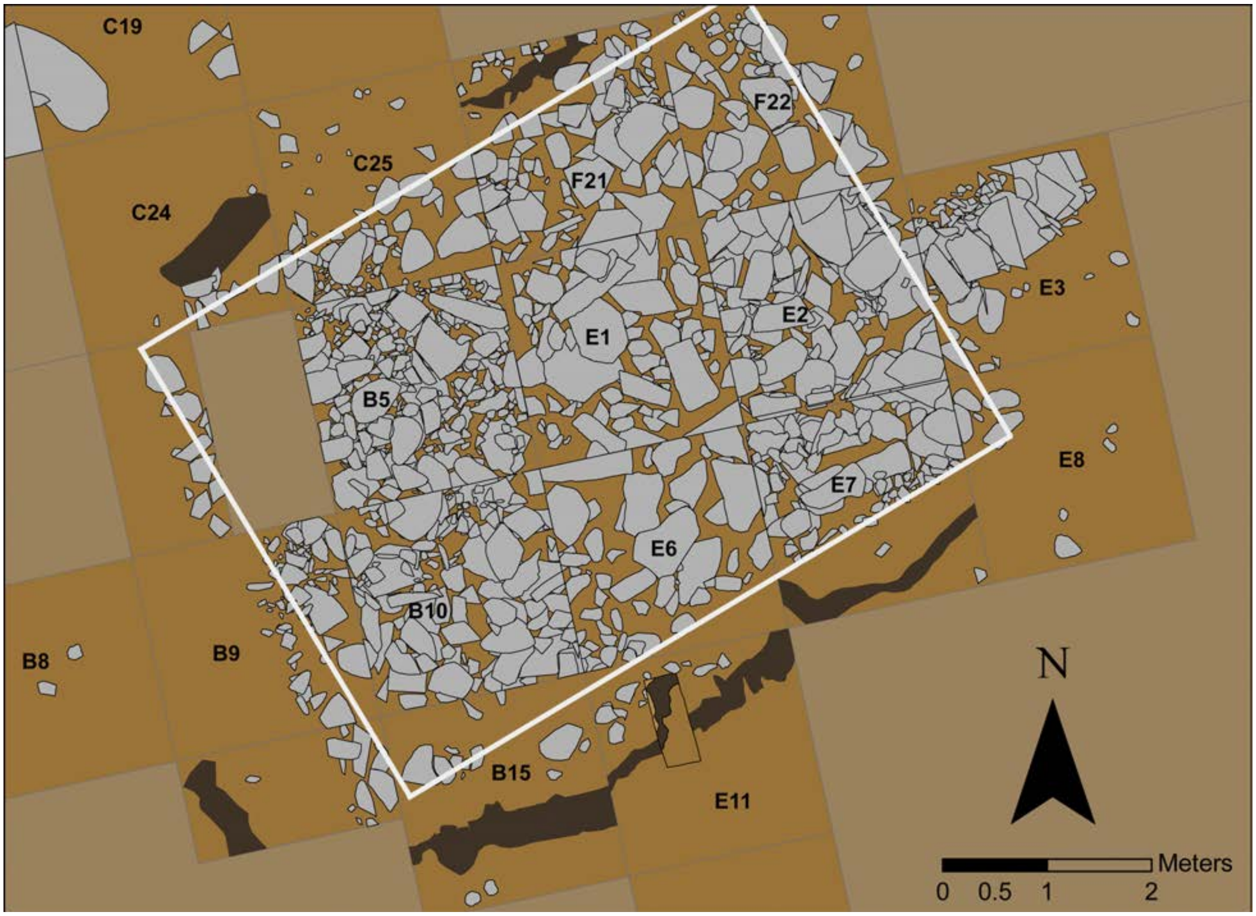


Figure 4-14. Digitized image of the foundation with unit designations.

surrounding the foundation and yard areas that had been most intensively excavated. We placed some additional excavation units to investigate the area between D-Block, where we had always thought the barn might be, and the foundation. A total of 6 such units (see Figure 4-9) were placed to west, south and east of the foundation and yard area in the hopes that they might find evidence of other structures. Unfortunately none of these units proved fruitful with no new features or architectural remains uncovered.

The remaining efforts of the 2013 field season focused on finishing excavations and recording of Feature 37, the foundation. In addition to completing excavations in Units B5 and B10 that comprised the western-most part of the foundation, steps were also taken to clean all of the other units associated with the foundation, in particular Units C25, F21, E6 and E7 (Figure 4-14) in preparation for 3-D photograph recording of the feature. Both of these efforts proved crucial in refining our interpretations of the sequencing and structure of the foundation. Given how few Native dwellings from this time period have been examined archaeologically in the Northeast we felt a particular responsibility to complete our work without having to excavate the entire foundation. Although some questions will remain concerning the detailed character of the architecture of the building that stood above the foundation, we feel fairly confident that our field strategy was more than ample enough in coverage to provide a relatively clear picture of the foundation as a structural feature.

Excavations in Units B10 and B5 did alter our interpretation concerning the configuration of the foundation and the possible location of a chimney or hearth. Once the extent of the foundation and its general configuration were unearthed, it seemed fairly evident that it formed a rough rectangle with oriented along a west/east axis that included

Figure 4-15. Cellar wall in unit B5.

Figure 4-16. Overhead 3D rendering of the cellar foundation and drain, generated from multiple photographs.

a drain running along the same axis. The presence of bricks, ash, and cooking related material culture in Unit B10 suggested it might be the location of a possible interior hearth and chimney in what would have been the southwest corner of the dwelling. Excavations carried out in Unit B5 did, however, determine that the northeast corner of the foundation did not contain a subterranean cellar or was possibly not part of what might have been an original ell-shaped foundation. The presence of the wall remains (Figure 4-15) are clearly visible running diagonally across the unit. Although not visible in the photograph, the wall did have several courses of stone. The difference in soils that is evident in the photograph confirmed that the area to the west of the wall had not been fully excavated to the same depth as the interior area east of the wall. When viewed in 3-D format (Figure 4-16) the overall configuration of the foundation and the wall running through Unit B5 are clearly visible. Based on this image there seem to be a series of possible interpretations including an original ell-shaped foundation that was expanded to the northwest (Unit B5) but without an excavated cellar, or an original rectangular foundation that had only a crawl space in the northwest corner and/or where the northwest corner served as a chimney base (see Chapter 5).

Chapter 5: Stratigraphy, Architecture and Yard Deposits, and Spatial Analysis

Heather Law Pezzarossi and Stephen Mrozowski

Stratigraphy

The Sarah Boston Farmstead is located on the eastern slope of Keith Hill in an area of large outcrops and rather thin soils. Erosion appears to have been a constant problem in the area surrounding the site, which may be one reason that the household chose to construct and maintain a drainage system that was obviously designed to help with runoff created by the location of the house and the overall hydrology of the area. The numerous small streams and springs that cross-cut Keith Hill help with runoff, but they are also indicative of the kind of drainage patterns that characterize the upland areas of Massachusetts where the preponderance of outcrops and thin soils both contribute to poorly drained areas.

In an effort to describe the overall stratigraphy of the site and the surrounding area, it makes sense to focus on the site as a whole first before turning to individual features. One of the questions that was of particular interest to us was whether there was any evidence of temporal differences that could be linked to the succession of households that we believe lived on the original parcel after 1727. In addition, we were interested to see if we could identify any stratigraphic evidence of either an earlier occupation dating to the seventeenth century or even earlier occupations relating to the deeper Native American history of the area. Keith Hill has been the focus of Native American occupation for at least the last 8,000 years, especially several quartz quarry sites including one on the 209 acre parcel of Hassanamesit Woods (Gary 2005; Bagley 2013).

The overall stratigraphy of the Sarah Burnee/Sarah Boston homelot is consistent with the overall soil develop of the larger Hassanamesit Woods Parcel. The deeper glacial history of greater Central Massachusetts has resulted in three basic soil horizons. The upper layer consists of a rather shallow duff layer that consists of decaying organic material that overlays the dark brown soils of the A-horizon. These richly organic soils have been developing over the past two to three hundred years and normally contain archaeological evidence of habitations over the past five hundred years. Like many such rural sites the A-horizon soils found throughout much of the homelot are deeper in areas where plowing or erosion may have contributed to soil development. Some evidence of plow scars was found in A-Block (Figure 5-1) east of the foundation as well as the yard area to the west of the foundation in both B and C blocks. These shallow scars may relate more to gardening activities rather than heavy plowing for which there was no real evidence.

These A-horizon soils normally overlay the red/orange sands of glacial soils designated B-horizon soils. Depending upon local conditions these soils can range from between 10 to 20 centimeters in depth to more than a meter. They are normally comprised of well sorted sands deposited by glacial melting. They owe their orange color to the oxidation that took place in the centuries after their initial deposit some 14-12,000 years ago. These B-horizon soils were found across the Sarah Burnee/Sarah Boston home lot as well as the entire Hassanamesit Woods Project area and Keith Hill as a whole. Their depth varies depending upon very local conditions and pre-colonial, Native American materials were recovered from B-horizon deposits in both the area of the home lot and the larger original Muckamaug/Robbins parcel.

Given the depth of the foundation that was discovered on the Sarah Burnee/Sarah Boston homelot it was not surprising to discover that several architectural features were resting on deeper C-horizon soils. These glacial deposits contain a mix of gravels, sands, and clays, and are poorly drained in comparison to the B-horizon soils that overlay them. The foundation of the Sarah Burnee/Sarah Boston dwelling was built into a cavity of C-horizon soils including instances where clays appeared to have been purposely used to pack stone lined features such as the drain that extended from the eastern side of the foundation down-slope to a terminus that appeared in unit N25/E808. The profiles of the southern wall of the unit (Figure

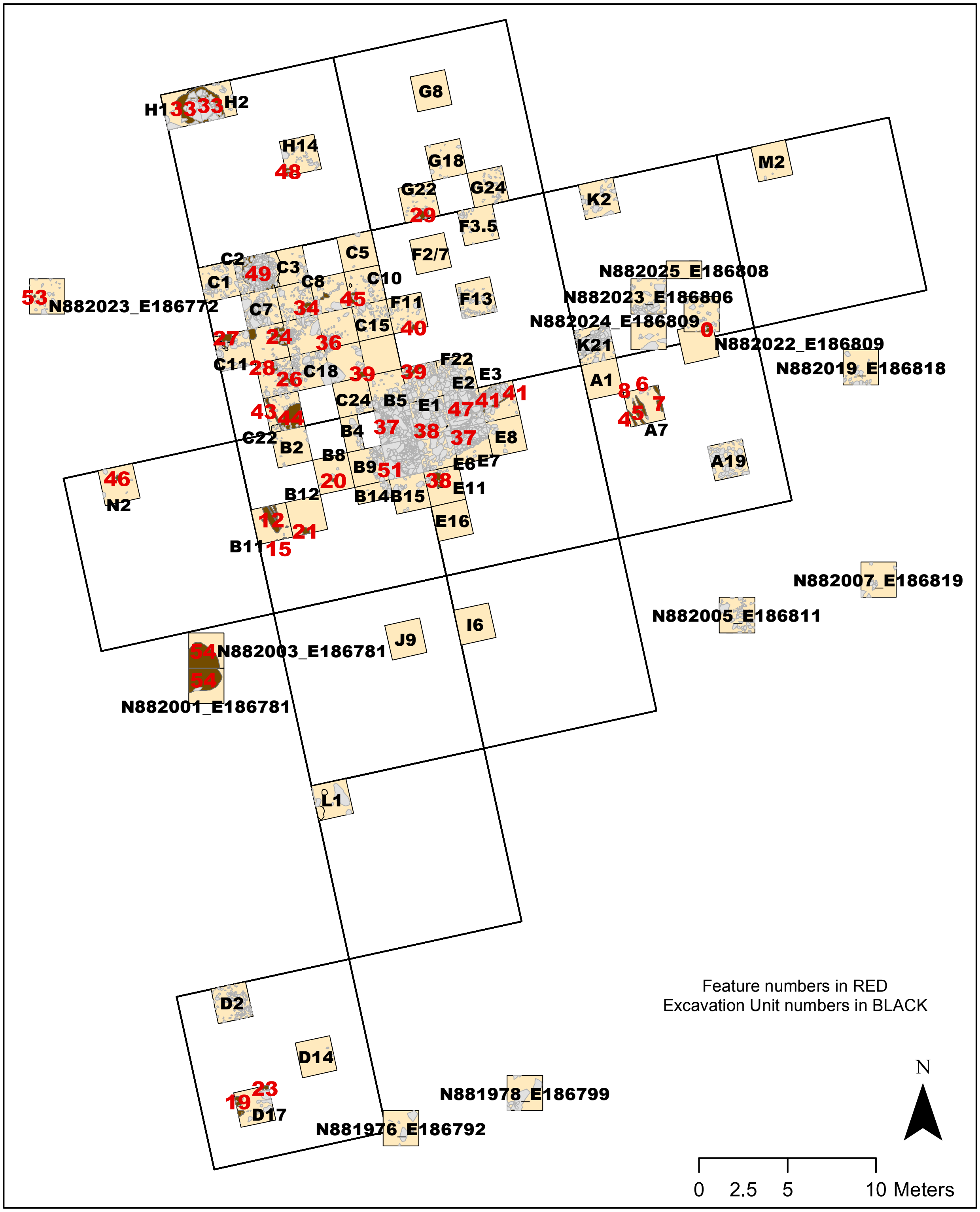


Figure 5-1. Complete excavation including all units and features.

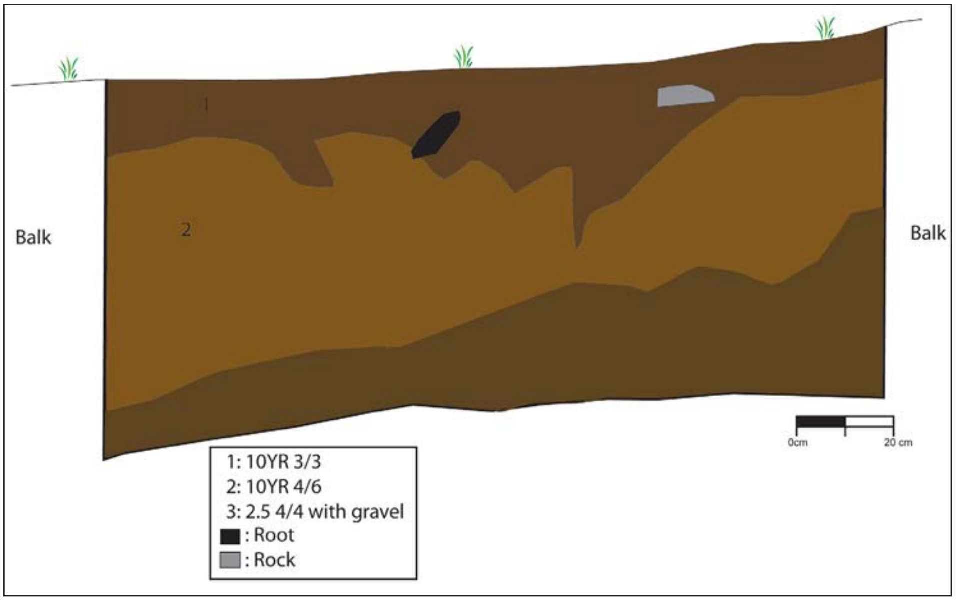


Figure 5-2. South profile walls of unit N25/E808.

5-2) provide a clear illustration of how the water from the foundation drain sorted the A and B-horizon soils on the down slope side of the home lot. The sands have been washed out leaving behind the small pea-size gravel that was a constituent part of the B-horizon soils. The same illustration provides a good illustration of the A, B-horizon stratigraphy that characterized the eastern slope of Keith Hill as a whole.

The chief stratigraphic questions concerning the overall interpretation of the homelot and larger property revolved mainly around temporal issues. The overall soil horizons were fairly uniform across the site. A good representative illustration of the overall site soils is presented in Figure 5-3. This linking of the profiles of the northern walls of units C7, C8, and C9 illustrate four basic stratigraphic levels. Below a layer of duff that was found throughout, the site area was a fairly consistent dark brown A horizon that averaged 25 cm in depth. Below this was a shallow mixed A/B horizon that was strongly linked to the eighteenth and nineteenth-century occupation of site averaged between 5 and 10 centimeters or deeper inside the foundation where it was often thicker. Below this mottled A/B layer was the more traditional orange/brown B-horizon soil. In Figure 5-2 the B-horizon is relatively shallow; however across the site the depth varied between 40 cms to 1 meter in some down slope deposits. Very wet, greyish/green C-horizon soils were encountered primarily in association with either the foundation or drain. Excavating in F and G block revealed deep deposits of what we characterized as B2-horizon soils comprised of gravels and whiter sands. These deposits were found randomly across the home lot especially on the eastern slope below and to the northeast of the foundation where midden deposits were recovered in F and G blocks.

The one other area of the site that uncovered stratigraphy that departed from the norm on the site came from D-Block. D-Block is one area of the home lot that has consistently produced soils and artifact evidence that differs from the rest of the site. Why this is remains unclear. The presence of dark lenses in both units D-2 and D-17 suggests that there may have been some post-depositional processes at work. D-Block is also the only area located within the home lot that seems to exhibit any difference in material culture, although the difference is not stark. There appears to be a higher concentration of course earthenwares and stonewares in D-Block with a lower percentage of refined whitewares. The source of the soil differences remains unclear. It is possible they are linked to bulldozing at the 1938 hurricane, but that is purely speculation. Given these differences, it was decided that area should be examined more

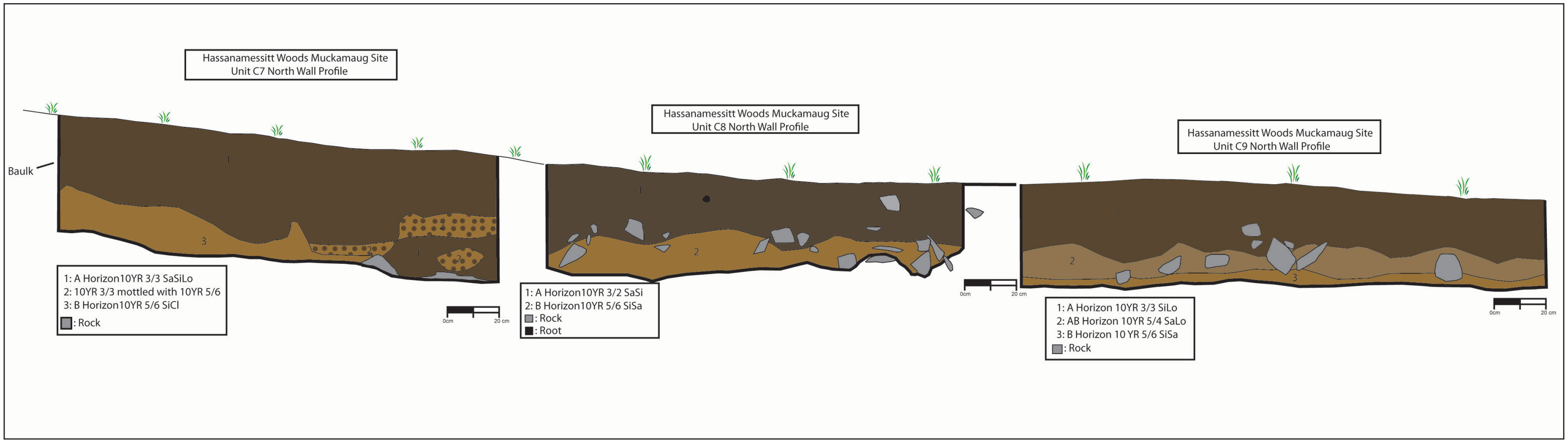


Figure 5-3. North wall profiles of units C7, C8 and C9.

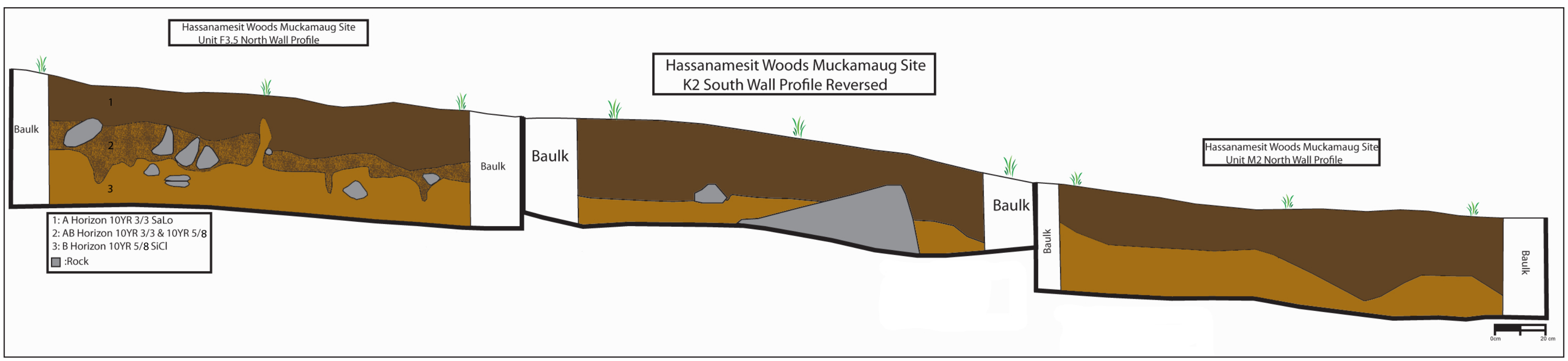


Figure 5-4. North wall profiles of units F3.5, K2 and M2.

thoroughly using archaeogeophysics in order to determine whether there was evidence of a structure, either a barn, other farm related structure, or possibly even an earlier house foundation. These results failed to confirm the presence of a structure.

Most of the excavation units that were located east and northeast of the foundation contained fairly common stratigraphy. Moving west to east between units F3.5, K2, and M-2 (Figure 5-4) one gets a sense of the overall stratigraphy down the lower, eastern slope of Keith Hill within the homelot. As these figures illustrate, there is a deeper A horizon as one moves west to east that reflects the overall effects of down slope erosion.

The overall uniformity of the soil stratigraphy across the site as a whole is also evident in the area of greatest human activity, the foundation and yard areas (see Feature discussion below). This presented certain challenges when trying to determine whether there was any stratigraphic evidence of the different household periods. Analysis of material culture across the site seems to suggest a mixing of the Sarah Burnee/Sarah Boston occupations. The presence of individual artifacts suggests earlier occupations, but these appear to be primarily curated items. A single silver plated spoon (see Chapter 8) that appears to date to the late seventeenth century is the sole artifact that might be linked to the seventeenth-century settlement of Hassanamessit. There is also evidence of much earlier Native American occupations including remnants of a small soapstone bowl, indigenous ceramics, and lithics, including a Stark point that could be linked to use of the area between 6500 and 7000 years ago (Bagley 2013). Some of these items, including quartz chipping debris and the soapstone appears to date to the eighteenth or nineteenth-century occupation of the site (see Chapter 8), although there is extensive evidence of Native American populations that returned to Keith Hill to quarry lithic materials over at least the last 8,000 years (Bagley 2013).

In addition to gaining an understanding of soil formation processes that helped to shape the surficial geology of the SB/SB homelot, there were four primary questions concerning the 18th and 19th-century occupations of the parcel:

1) Was there any stratigraphic evidence that could be linked to the earlier eighteenth century households of Peter Muckamaug and Sarah Robbins, and Sarah Muckamaug?

2) What effect did the 1938 bulldozing of the site have on the overall integrity of the site?

3) Is there micro-stratigraphic evidence that can further refine our ideas concerning the construction and operation of the foundation and drain?

4) Is there any stratigraphic evidence, including microstratigraphic evidence, of different periods of use along the cellar floor of the dwelling?

Temporal Differences

A combination of stratigraphic and artifact analysis were used to determine if any evidence of the first two Nipmuc households on the property was present. Based on our observations in the field, it was not expected that clear stratigraphic evidence of an early eighteenth century occupation would be found. In order to confirm this observation a series of artifact analyses were carried out of specific locations across the site. A cursory review of the data from the site as a whole suggested that no evidence of temporal differences were discernable using either natural strata or the arbitrary levels within any excavation unit, or within the foundation itself. To confirm this observation three units were chosen for more refined analysis. The choice to rely exclusively upon purposely chosen units for more detailed analysis was based solely on the overwhelming evidence observed during the course of 6 seasons of excavation that no temporally diagnostic stratigraphic differences would be discernable. The three units chosen for analysis were C-14, B-5, and G-18. Each of these was chosen because it was believed to represent a different depositional process. Unit C-14 contained the only known primary deposit on the site, a rather small trash deposit, that is believed to be linked to food preparation and consumption activities associated with the adjoining hearth feature (Feature 24) uncovered in units C-12 and C-13 (Figures 5-5

Table 5-1. Mean Ceramic Dates of units C14, G18. and B5.

Unit C14	
Level/stratum	**MCD**
1A	1803.1
2A	1803.7
2B	1802.6
3A	1803.6
3AB	1803.5
4AB	1801.9
5AB	1808.3
Unit MCD	1803.4

Unit G18	
Level/stratum	**MCD**
1A	1802.9
2A	1806.6
3AB	1802.7
3B	1807.5
4A	1802.9
4B	1802
Unit MCD	1803.3

Unit B5		
Level/stratum	**MCD**	**MCD w/o whiteware**
1A	1804.3	1804.3
2A	1802.7	1802.7
3A	1805	1802.9
4A	1803	1803
5A	1802.4	1802.4
6A	1806.3	1802.9
7A	1805.3	1805.3
8A	1805	1803.9
9A	1811.5	1802.3
10A	1810.1	1804.4
11A	1816.1	1805.5
12A	1805.2	1804
13A	1805.1	1801.2
14A	1807.6	1802.3
15A	1801.1	1801.1
16A	1809.9	1803.1
17A	1885	
18A	1820.3	1801.7
19A	1838	1801
20A	1859	1801
21A	1825.7	1801
22A	1848	1797.5
24B	1815	1797.5
26B	1797.5	1797.5
28AB	1817.8	1808.2
Unit MCD	1805.7	

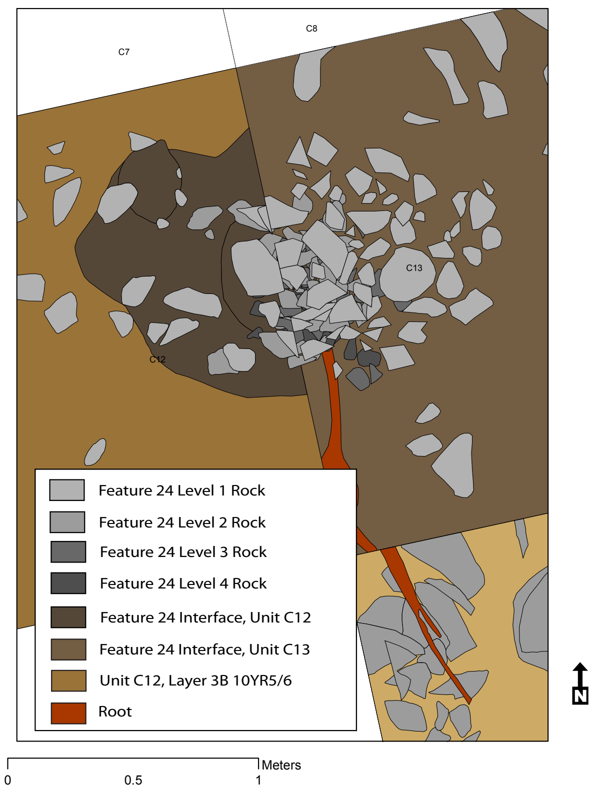


Figure 5-5. Plan of Feature 24.

and 5-6). Unit B-5 was located in the northwestern most corner of the foundation (Feature 37). It contained substantial and deep deposits that seem to be related to food processing and preparation (Figure 5-7). The unit also contained evidence of ash and wood remains, similar to that recovered from adjoining unit B-10 (Figure 5-8), leading to the possibility that the area could contain remnants of an interior hearth or chimney base. Unit G-18 (Figure 5-9) was located in the midden area northeast, and slightly downslope of the foundation and yard area. The overall reason for choosing these three units was the hope that they might contain some of the more intact, deep cultural deposits on the site. Each of them also appears to represent different types of depositional activities.

Using ceramics recovered from the arbitrary levels from each of the three units, mean ceramic dates were calculated for each level. The assumption behind this analysis was that there might be subtle evidence of earlier deposits that might represent episodes of primary deposition related to either the Sarah Robbins or Sarah Muckamaug period occupations. Equally important was whether any actual stratigraphic differences could be discerned that might be linked separately to the Sarah Burnee period of occupation. The results of these three analyses appear in Table 5-1. As the table il-

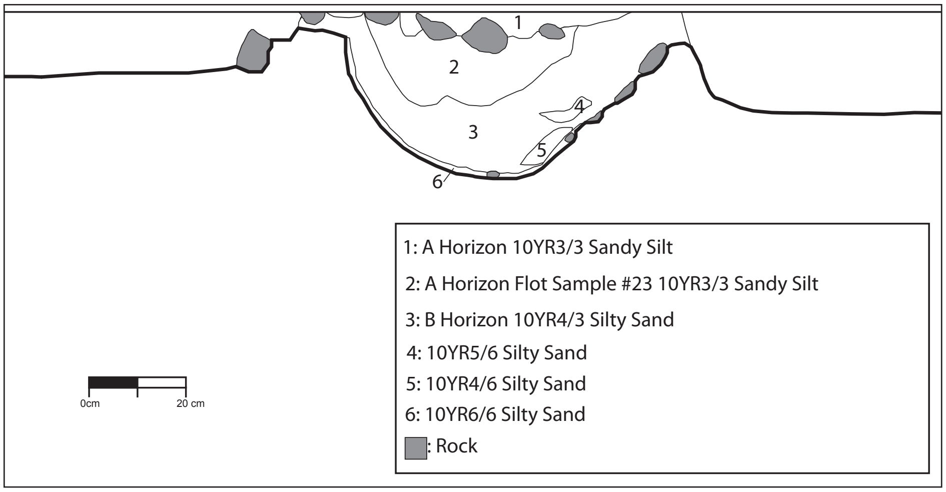


Figure 5-6. Profile of Feature 24, eastern half, unit C13.

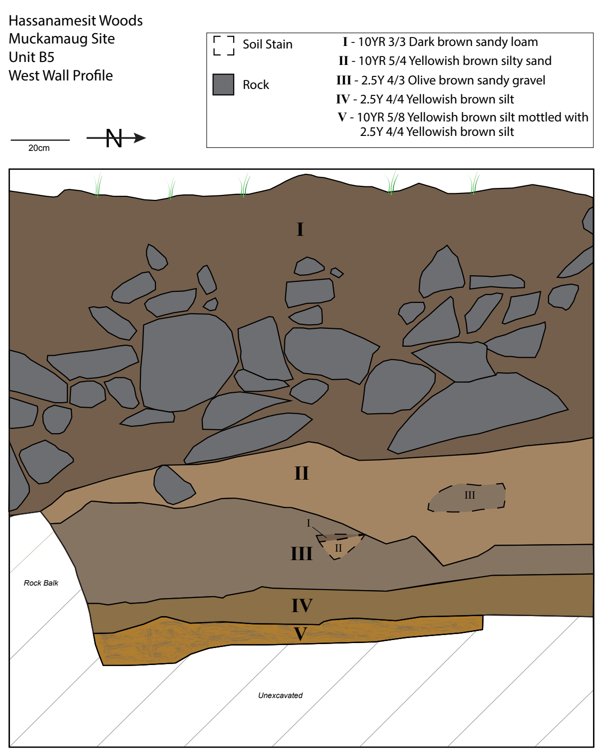


Figure 5-7. West wall profile of unit B5.

lustrates there is virtually no discernable difference between the upper and lower levels of any of these units. Most of the mean dates cluster around 1803-1805. While there are small differences between the dates calculated by level, even these fall quite close to the overall mean calculated for the three units. The only real difference between the three units is evident in the interquartile range comparisons between the three unit assemblages. Where the interquartile range for B-5 is on the order of 34 years, it is only 14 years for unit C-14. Given that the assemblage recovered from C-14 is thought to be one of the few, undisturbed, primary deposits found outside the cellar floor, it makes sense that it might have a more tightly dated assemblage.

The only stratigraphic evidence of an earlier occupation comes from a small assemblage of quartz chapping debris that was recovered from B-horizon deposits in the area surrounding the foundation. According to Bagley (2013; see Chapter 8), these quartz flakes and a small assemblage of 14 fragments of indigenous ceramics represent the only evidence of Native American occupation of the site before the seventeenth century. Beyond this evidence of an early, possibly Late Woodland (circa 1,000-400 AD), occupation, and some possibly curated items, such as the silver plated spoon and soapstone bowl, the overwhelming majority of materials appear to date to the Sarah Burnee/Sarah Boston periods of occupations.

The 1938 Hurricane Bulldozing

After the hurricane of 1938, the standing remains of the house were bulldozed into the cellar (see discussion of depositional episodes in Feature 37, below). As one might imagine, a great deal of thought and analytical effort have gone into to trying to determine the extent of the damage done to the depositional integrity of the foundation and surrounding yard area. Trying to discern strati-

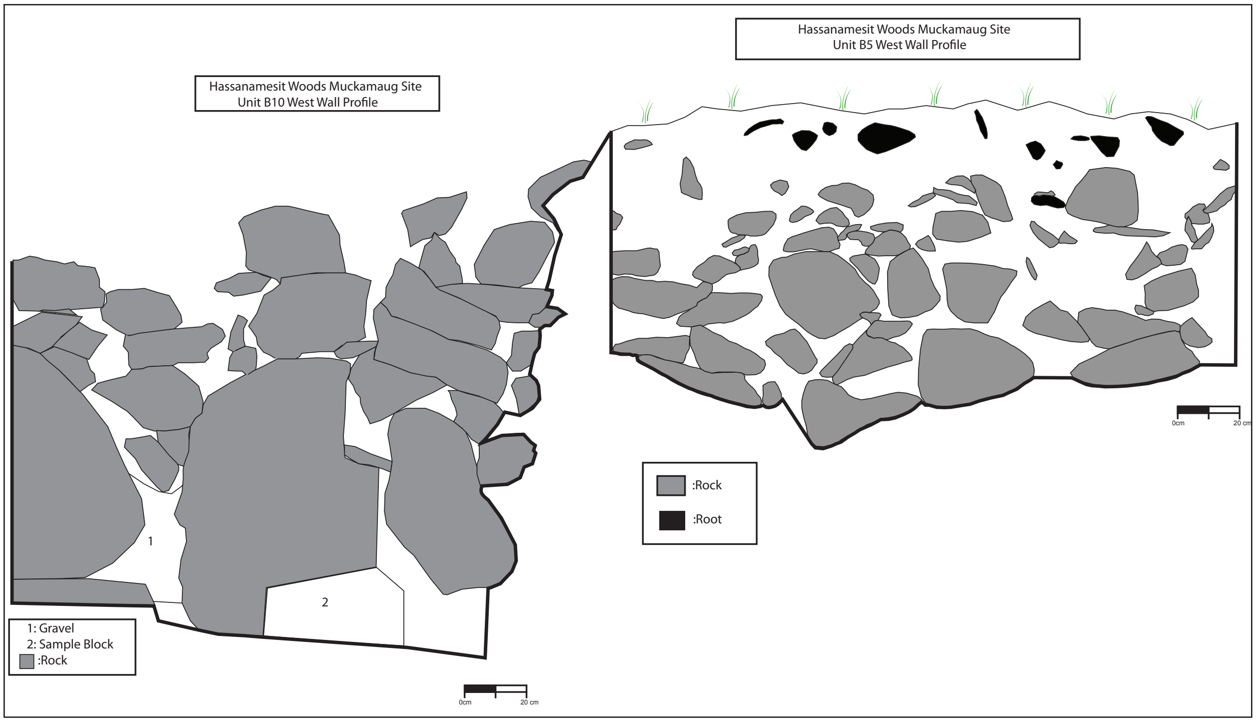


Figure 5-8. West wall profiles of B5 and B10.

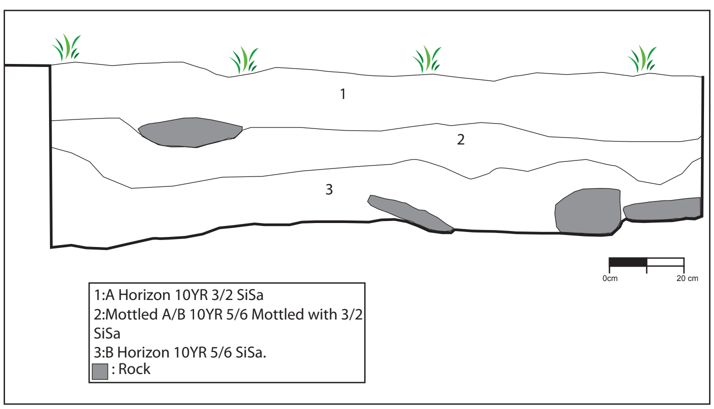


Figure 5-9. West wall profile of unit G18, midden.

graphic evidence of the bulldozing episode was difficult. At the site level, the only stratigraphic differences are those seen in D-Block. There is no clear evidence, for example, of shallow A horizons except for the area directly south of the foundation in E, I and J blocks. Excavation units in this area of the site did have a slightly less well-developed A-horizon and there were far fewer artifacts in this area so it seems like a prime candidate for one area where the bulldozer would have been active. Support for this interpretation also comes from the foundation remains found in units E-7 and E-8 where the southeastern corner of the foundation was uncovered. The upper levels of both units contained evidence of a cascade of rocks that was suggestive of sections of the foundation being pushed in from a southerly and southeasterly direction (Figure 5-10).

Given the presence of numerous archaeological features in the area to the immediate the north of foundation – in what appears to be a yard area – it this does not seem to have sustained as much

Figure 5-10. Photograph of cascading rocks in units E7 and E8.

bulldozer damage as is evident south of the foundation. In addition to features 24 and 49, there are also the midden remains in unit C-14 and the more extensive midden to the northeast of the foundation. There is, however, a small gap between the two artifact concentrations inside the foundation and the north yard that Bagley (2013) suggests is evidence for bulldozer activities and this does seem to be supported by the artifact spatial distributions (see below).

The area immediately east of the foundation is characterized by a rather immediate drop in elevation that probably represents the natural down slope of the hill. Given that the foundation appears to have been built into the more elevated western yard area, it seems to suggest that the terrace-like area that contains the foundation and yard features was at least partially, if not extensively built up by the site's inhabitants. This combination of terracing, and what appears to be intact yard features suggests that the damage done by the bulldozer may have been partially mitigated by the stone and framed structure of the former dwelling having collapsed prior to the filling of the foundation. This interpretation is also supported by the upper levels of units B-5 and B-10 as well as units E-1 and E-6 where the soils were comprised of very loosely packed, highly organic deposits that suggested the slow filling of an open cavity in the middle of the filled cellar hole. The presence of numerous shot-gun shell bases, all dating between 1908 and 1912, suggest that prior to its being filled, the cellar hole may have served as a convenient blind for local hunters.

All in all, the combined stratigraphic and artifact evidence suggest that the 1938 bulldozing episode did not do as much damage to the surrounding yard as might have been anticipated. The sole area that seems to show clear evidence of bulldozing damage is the south and southeastern portion of the foundation and adjoining yard.

Feature Analysis

Architecture

The major archaeological feature unearthed during the excavations at Hassanamesit Woods was the remains of a large, dry-laid foundation (Feature 37) and associated drain/culvert (Feature 41) and its channel contents (Feature 42). Another soil deposit related to the foundation was a dark linear stain (Feature 39) that was found adjacent to the north, south and west walls of the foundation. Although these features are obviously linked to the large landscape of the home lot of the SB/SB site, they will be discussed separately. This

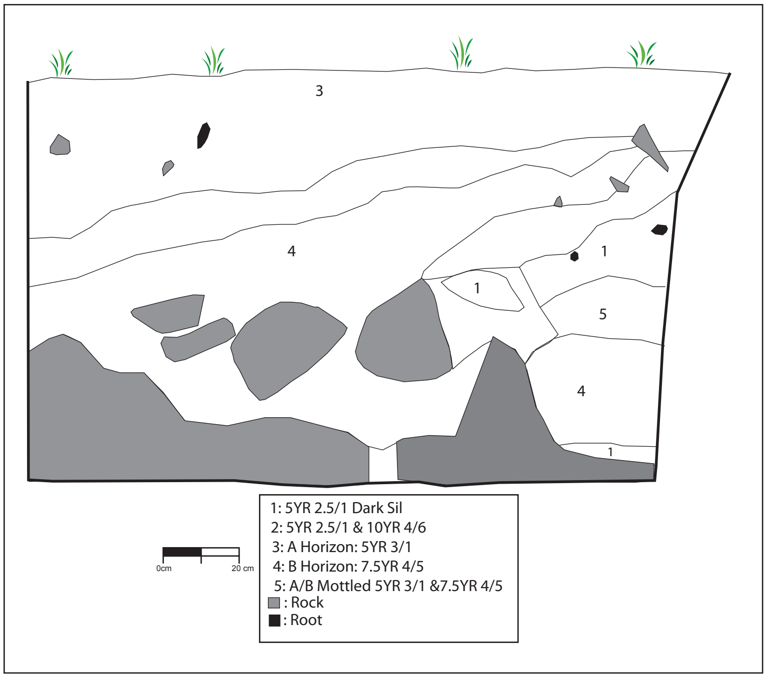


Figure 5-11. East wall profile of unit E6.

will be followed by a summary of what the feature analysis suggests about the architecture of the former dwelling of Sarah Burnee Philips and Sarah Boston.

Feature 37

Feature 37 is the foundation and cellar hole of the only known house on the SB/SB Site. It was first encountered in the 2007 field season in unit C25 as a northern edge to a larger rock-filled feature about 25cm below the current ground surface. GPR data confirmed that the feature located in C25 likely extended well beyond unit boundaries to the east and south, and likely extended 1-2 meters below the ground surface. Several other units were opened that season including units B4 and B9 which exposed parts of the western edge, and B5 and E1, which exposed parts of the center of the feature and confirmed that the cellar cavity itself had been filled in with large fieldstones. We began to excavate into the feature fill in 2007 in E1 and the western half of B5. In 2008, we opened B10, the northern half of B14, and B15 to reveal portions of the southern wall and the southwest corner, and we opened units E2, and F21 to reveal the eastern boundary of the feature and more of the northern edge. In 2009 we did not open any new units associated with feature 37, however we did continue excavations in B5 and E2 in the hopes of reaching a cellar floor level. In 2010 we continued down through the floor to sterile subsoil in B10 and E2 and opened E6 to see more of the southern wall and F22 to find the northeast corner and first intact wall of the feature. In 2011 we began excavation in E7 and E8 to isolate the southern wall and southeast corner and continued to excavate B10 and E1 through the floor to sterile subsoil. With the entire feature exposed, we focused our efforts in 2012 on defining the standing foundation walls. We exposed three courses of stone in E7, the retaining wall in B10, and 4 clear courses of stone on the northern edge of B5 and running diagonally through F21 and F22. Feature 37 is approximately 1.5m in depth and is a rectangular feature oriented roughly toward the cardinal directions. It measures approximately 5 m along the N/S edges and 6.5 m along the E/W edges. The following are descriptions of the strata within Feature 37 from the bottom up.

Initial cellar excavation circa 1750—The foundation cavity for the house was dug c. 1750 to about 170 cm below datum. Evidence of C-horizon soils directly outside of the foundation walls, and the dearth of C-horizon soils at the same

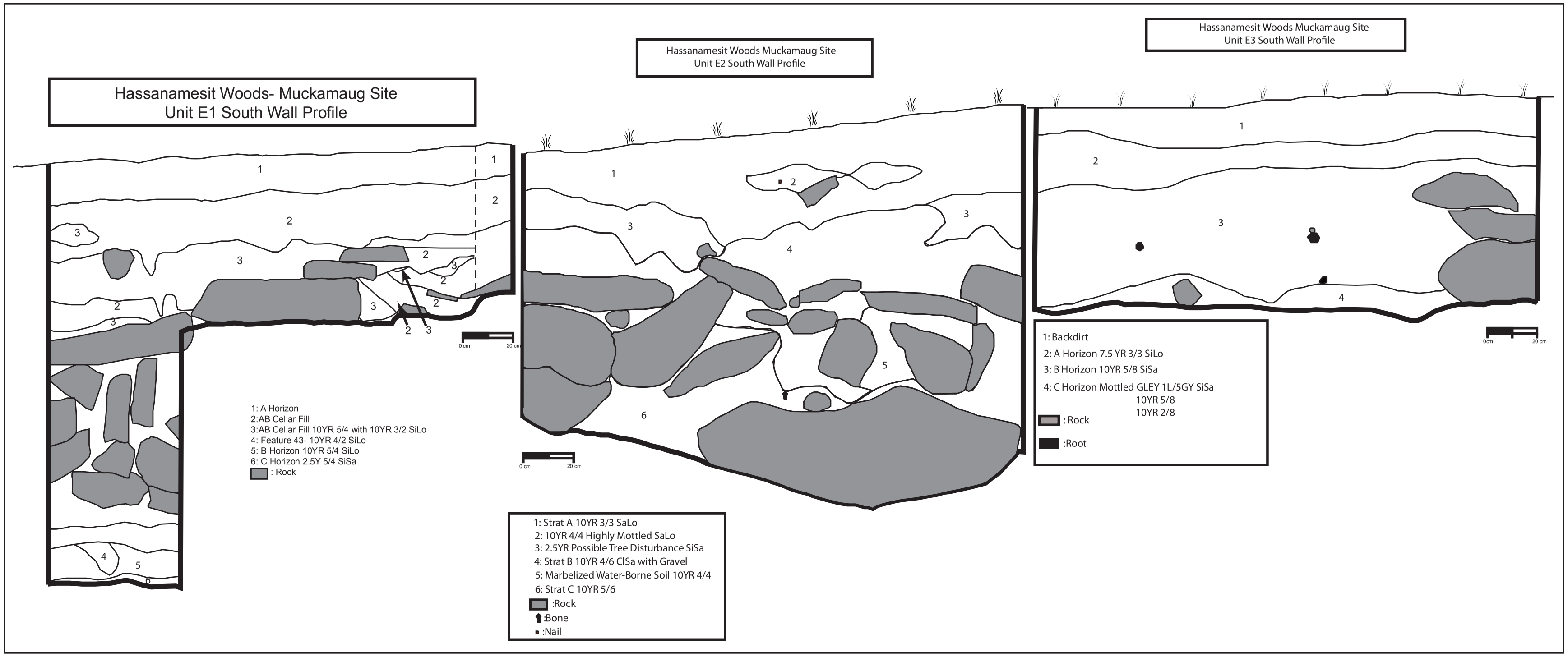


Figure 5-12. South wall profiles of units E1, E2 and E3.

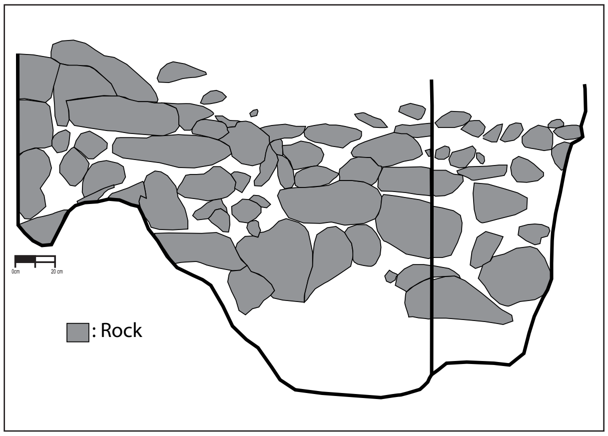


Figure 5-13. North wall profiles of units F21 and F22.

depths inside the cellar suggest that the builders dug down to and penetrated into the C-Horizon in order to lay a sand bed on the cellar floor. The floor was purposely excavated at an angle, probably meant to direct water into the center and out on the eastern side through the installed drainage channel. This is best illustrated in B10, where excavators noted that sterile glacial sand was encountered a full 7cm higher in the southwest corner than the northwest, meaning that any water that flowed through the western retaining wall would then collect in the center of the cellar.

Foundation construction and trench trample (stone walls and dark stain) c 1750—A dry laid stone foundation was installed and a thin dark organic stain accumulated at the edges of the feature, in what Piechota describes as a drip line (see Chapter 6) that served as a catch for general litter (see discussion of feature 39). The profile of unit E6 (Figure 5-11) provides one of the better views of cuts made into the B-Horizon soils during the construction. By linking the south wall profiles of units E1, E2 and E3 (Figure 5-12) a larger picture of the overall foundation cellar profile is visible. One of the better images of the foundation walls itself comes from the digitized profiles of units F21 and F22 (Figure 5-13)

Builder's trench fill (lightest B) c 1750—A light, mostly sterile fill mixed with large stones and cobbles was used to fill the builders trenches. This building strategy is well illustrated in the profiles of E2 and E3 (Figure 5-14), where the linear wall formation is clearly flanked by more haphazardly placed stones around the outer edge. The profile of this stratum and its connection to the rest of the northern wall of the foundation is best illustrated in Figure 5-15 that shows the linked profiles of Units B5, F21 and F22. Figure 5-16 provides yet another image of the foundation wall that links the eastern wall profiles of units F22, E2 and E7

Living floor 1, likely Sarah Burnee Era c. 1750-1820—A gravelly, sandy deposit likely served as a walking and working surface in the cellar after the completion of construction. The gravel aided in the drainage of water down into the sand and out through the drainage channel. Over decades of occupation, this surface accumulated approximately 15 cm of sediment and material culture (mainly faunal remains, ceramics, and glass), the majority of the later of which were trampled and ground into micro-fragments. Micro-stratigraphic analysis suggests that the floor deposit accumulated over time, but was not purposely created (see Chapter 6). This layer was encountered in B5, B10, E1, E2 (feature 47; see below and Chapter 6) and F21 at approximately 155 to 170 cm below datum and was characterized as a compact pebbly mottled matrix made up of a mix of A, B and C horizon soils with brick, charcoal, ash and sand inclusions.

Brick surface living floor, probably Sarah Boston Era—At some point in the later occupation of the house, a brick surface was laid in the basement. We only have real evidence of this surface in B10 and E1, but it may have covered the entire cellar floor at some point and then been ruined during the collapse. We had initially considered that the brick recovered might represent a brick lined chimney, or a brick lined hearth fallen in from the first floor above, but the relative density, integrity and uniformity of the brick layers approaching the gravel floor in B10, E1, E2 and B5 led us to the conclusion that the brick must have been purposely laid on the cellar floor prior to the collapse. Further evidence from the collapse layer seems to support this assumption.

Slow Slump c.1840-1890—In the years shortly after Sarah Boston's death in 1837, the unoccupied, unmaintained house began to slump and warp, giving way to various taphonomic processes. The northern and southern walls each show

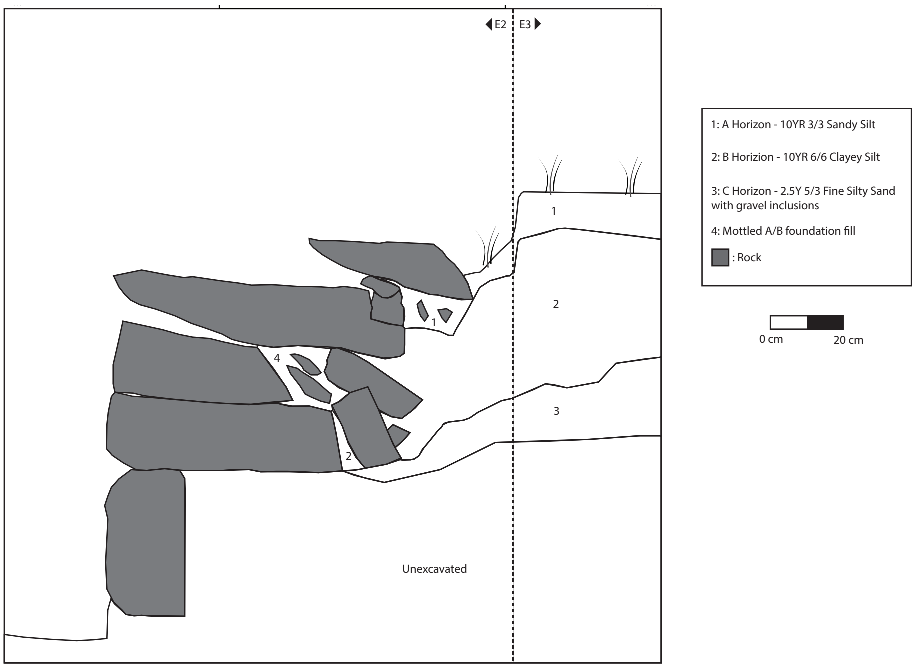


Figure 5-14. North wall profiles of units E2 and E3.

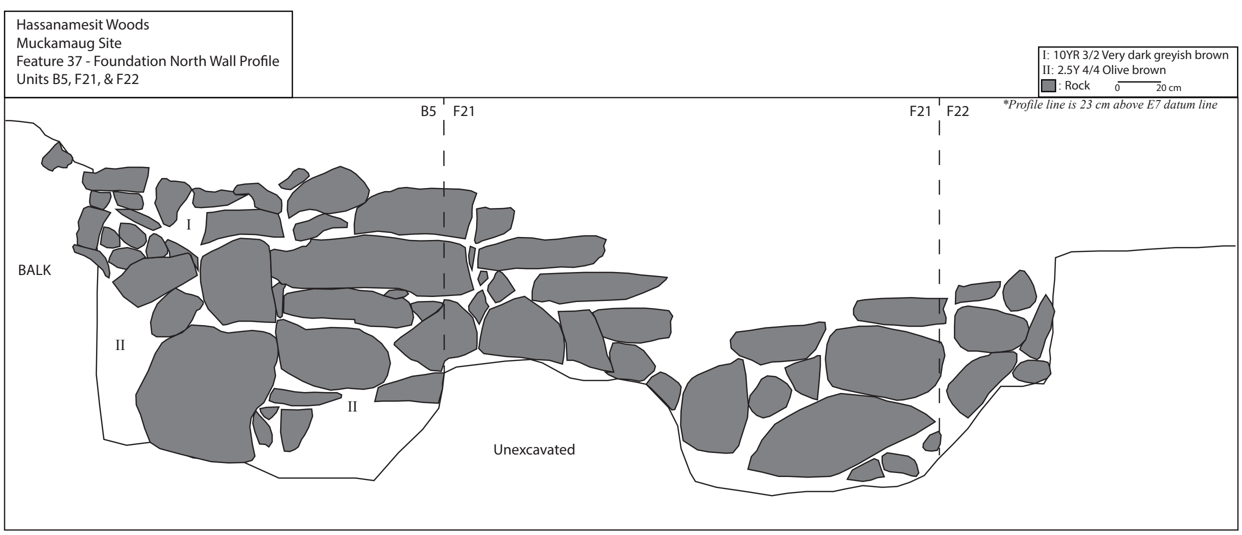


Figure 5-15. Linked north wall foundation profiles of units B5, F21 and F22.

substantial evidence of slumping inward, which probably took place during this period while the relative integrity of the structure would have allowed the wash and erosion to push the fieldstone walls inward into the empty cellar cavity. The depositional effects of this slow slump can perhaps best be illustrated with evidence from the western retaining wall, built directly into the upslope. As discussed above, the western wall was made of large boulders, rather than fieldstones. It contained substantial gaps to allow for water to seep through as it travelled down the eastern slope of Keith Hill. Left unmaintained, this sturdy yet porous wall did not shift, or warp like the northern and southern

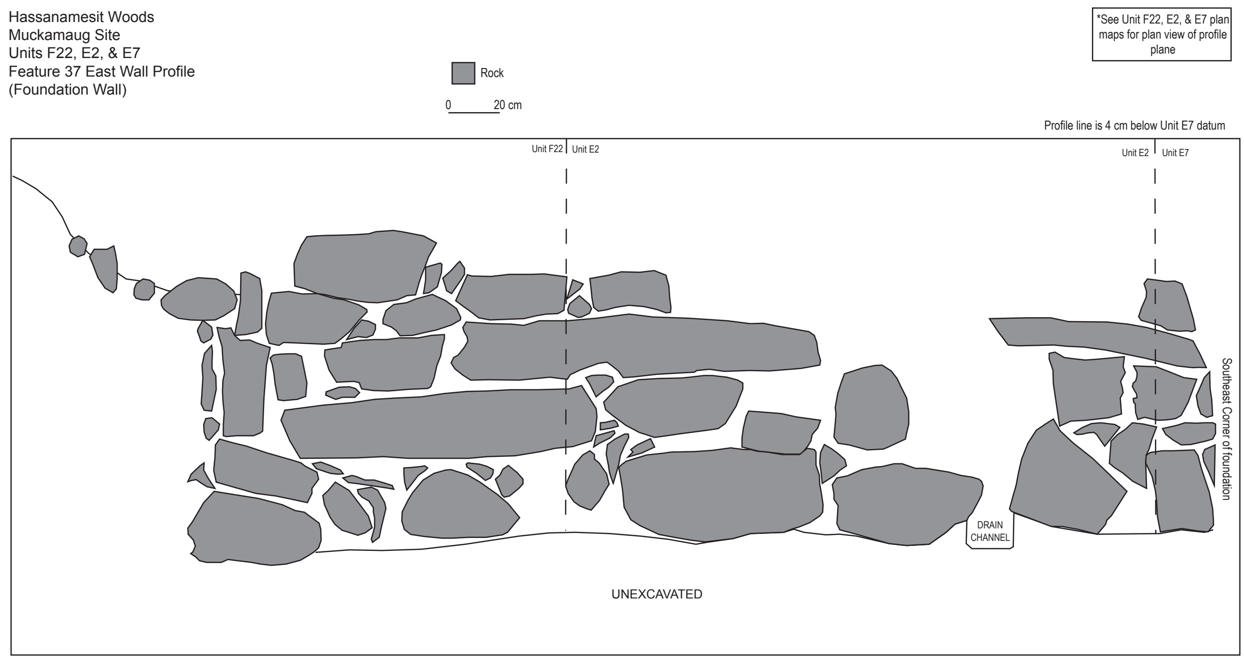


Figure 5-16. Eastern profiles of units F22, E2 and E7.

Figure 5-17. Photograph of bulldozer at work on the SBSB Site.

walls did, but it did allow a substantial layer of mainly sterile silt and debris to gather at the interior base of the western wall and wash downward and inward toward the center of the foundation. This phenomenon can be seen in the west to east sloping B-horizon soils above the brick deposits in both B10 and B5 between 140 cm and 160 cm below datum (Figure 5-8). Meanwhile, the intact floor above kept the rest of the cellar floor relatively protected. These conditions allowed for the relatively good preservation of some of the artifacts that sat on the cellar floor like the kettles and large ceramic fragments found at the bases of B5 and E1.

Collapse 1890-1920—The Burnee/Boston house sat unoccupied and decaying on Keith Hill from 1837 to 1938. Of course, this process probably began slowly, with floor boards rotting away and holes developing in the roof. However the near complete destruction of the brick surface in the cellar hints at least one episode of dramatic collapse before the bulldozing episode of 1938. Likely the roof, floor and possibly the upper parts of the chimney fell inward, creating a deep layer of debris within the cellar cavity, while leaving some standing exterior walls on the surface. Late 19th and early 20th-century shotgun shells found in this stratum helped us to date the period after this collapse and before the bulldozing episode, when the ruins of the Burnee/Boston house must have made an ideal blind for hunters. Archaeologically, this stratum is categorized as a densely packed, artifact rich soil, containing building stones and brick fragments that increase in size correspondent to depth. In some areas, especially B5, B10, and the western portion of E1 these lev-

Figure 5-18. Plan view of unit E7 illustrating A/B horizon soils.

els also exhibited dense deposits of ash, charcoal, bone and fire-cracked rock.

Bulldozer 1938—In the wake of the Hurricane of 1938, orchard employees bulldozed the Burnee/Boston ruins into the existing cellar cavity (see Gary 2005). Figure 5-17 shows a photograph taken on site of the machinery used to do the job, courtesy of the Grafton Historical Society. Given the fact that seemingly all of the stones that once made up the house ended up inside the cellar cavity, we can only assume that the bulldozer pushed the remaining walls inward from all sides, although a few primary deposits survived intact in the North Yard. The bulldozer fill sits atop the collapse layer (above 130-140 cm) and is characterized by very large stones, loosely packed mottled A/B soils, rodent burrows, patches of sand, and patches of artifact scarcity. The perturbation caused by rodent activity was evidenced by the presence of uncharred botanical material being mixed with earlier material culture.

Orchard Period 1938-1954—This stratum is associated with the period after the bulldozer fill. We assume orchard workers allowed the rubble to settle and then further filled the cellar hole with the mottled A/B Horizon soils visible in Figure 5-18. Toward the western half of the feature, in B5 especially, this stratum is also associated with a layer of smaller fist sized stones that we believe

Figure 5-19. Discarded field stones over cellar, unit B5, 2007.

may have been unwanted fieldstones thrown on top of the cellar feature before it was completely filled (Figure 5-19).

Feature 39

Feature 39 was originally designated in unit F21 as a dark linear soil stain separating the feature 37 fill from the sterile B-Horizon soils (Figure 5-20). Similar linear dark soil banding was subsequently uncovered in other units surrounding the foundation feature (B14, B15, E11, and E7), which were also given that same Feature 39 designation. This feature can best be seen on the outside southern edge of the foundation, where it runs uninterrupted for over 6 m (Figure 5-20); however it also appears sporadically on the western and northern outer edges. An initial bisect into this feature in E11 revealed what looked to be a 90 degree turn at a depth of 15 cm below the surface of the feature. When we further investigated the stain in unit E7 in 2011, we determined that the dark line was not a ditch or some kind of sill stain, but rather a sterile dark organic layer that micro-morphological analysis (see Chapter 6) suggests is a drip line created by runoff from the roof of the building in which organic debris collected. The discontinuous nature of the stain along the western wall of the

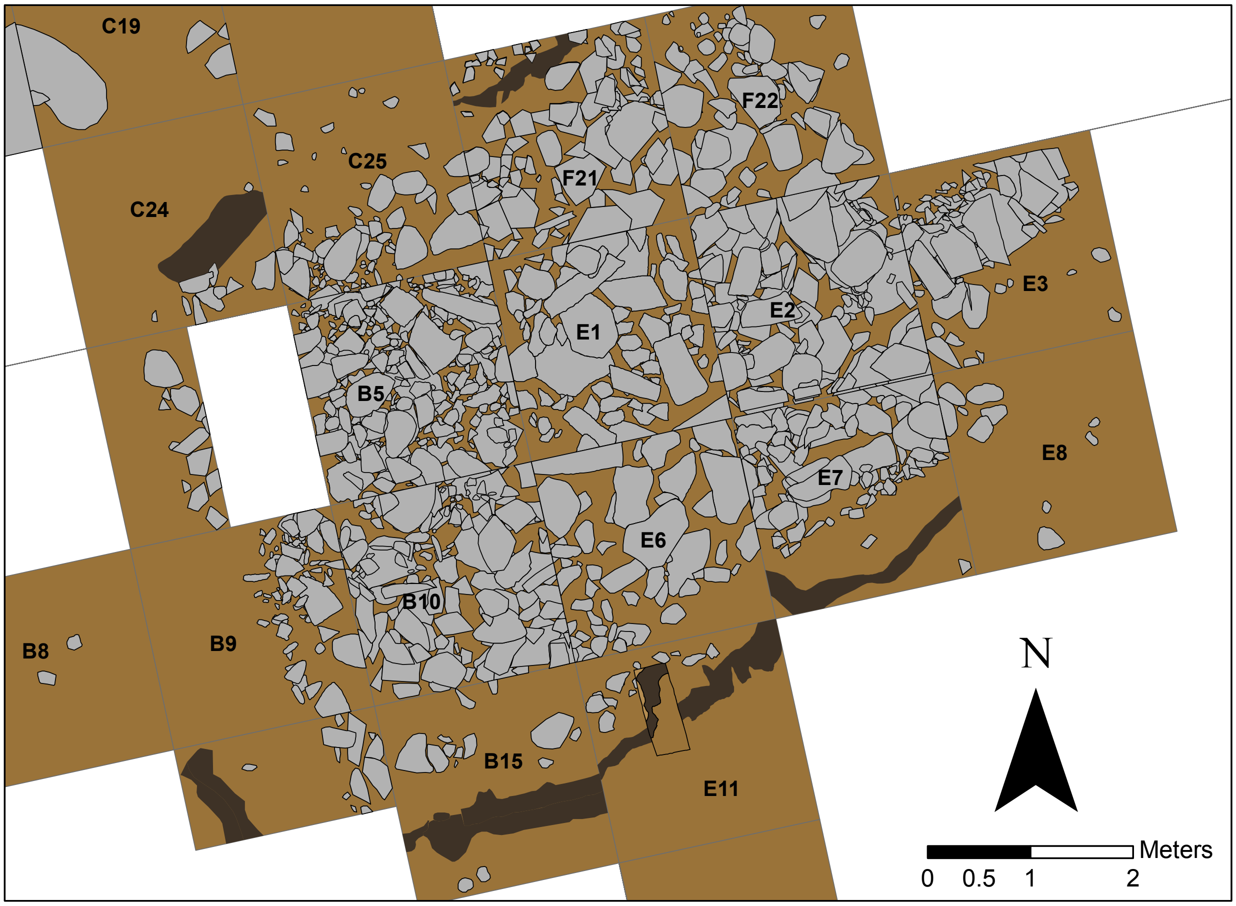


Figure 5-20. Composite plan of Feature 39, soil stain/drip line.

foundation has led Piechota to suggest that there may have been a small lean-to or addition along that wall of the structure (see Chapter 6).

Feature 41

Feature 41 is the stone lined and capped drainage feature that ran from a sand bed under the house, down the hill, to a sump/outwash area away from the house (Figures 5-21). It was first uncovered at 86 cmbd in the west half of unit E3 in 2008. It was originally identified as a linear arrangement of flat rocks that ran southwest to northeast down the hillside slope. It correlates directly with an opening in the wall we assume to be the eastern wall of the house foundation. The same linear drainage feature was also uncovered in 2012 in unit K21. In E3, the drain appears to have been dug into undisturbed B-horizon soils, where a builder's trench was excavated down to the C-horizon interface. The vertical sidewalls of the channel were laid at this level with gravel and cobbles packed into the void between the outside of the channel walls and the edge of the trench. The channel was capped with large capstones, and finally smaller flat stones were placed on top of the capstones in an apparent attempt to cover any cracks that remained exposed. This construction technique was quite popular in 19th century New England and can be found described in Henry Flagg French's popular text, "Farm Drainage" (1850). French said, "many, perhaps most, of the cellars in New England are in some way drained, usually by a stone culvert, laid a little lower than the bottom of the cellar, into which the water is conducted, in the Spring, when it bursts through the walls, or rises at the bottom, by means of little ditches scooped out in the surface." (in Farm Drainage by Henry F. French 1850:119). While we have not found any evidence of "little ditches" in the surface of the cellar floor, it is interesting to

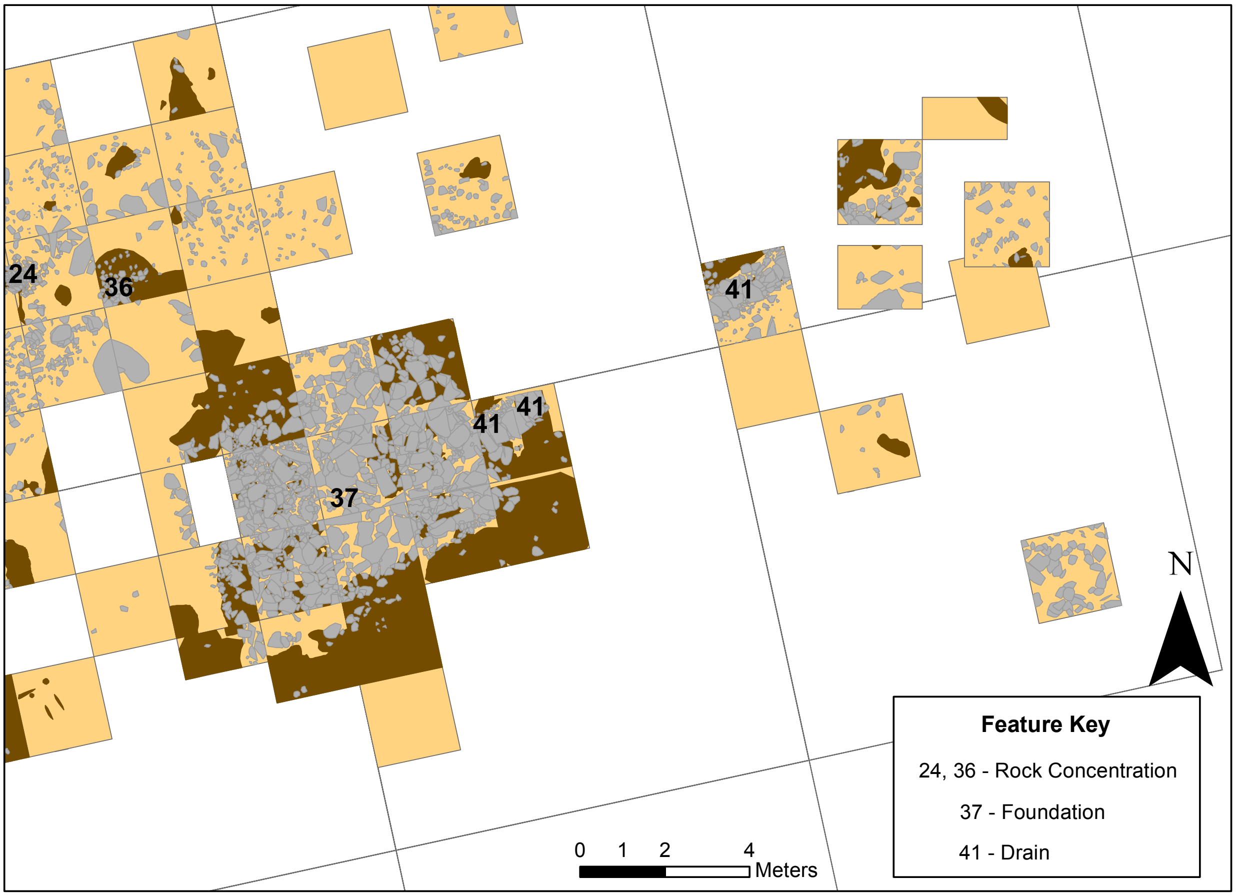


Figure 5-21. Composite plan of foundation and drain.

note that the floor surface itself was sloped inward and downward on the Western side, facilitating the collection of water at the downslope Eastern end of the cellar where the base of the drain (at a depth of 142 cmbd) acted as an overflow for the slightly lower floor surface sending excess water down the hill to the outwash area below, in the East Yard. Feature 41 was subsequently uncovered in unit K21 in 2012 and further attempts to trace the feature downhill to the east to some kind of sump or outwash area resulted in the excavation of what we believe was the drain terminus (see Figure 4-12)

Feature 42

After removing one of the capstones that covered the drain, the team uncovered a channel at 109 cmbd, lined on either side by vertically placed stones. The soil contained within the channel under just one of the capstones of the drainage feature was designated Feature 42. The soil inside was 10YR 4/4 dark yellowish brown silty loam, more gravelly at the top, but became more silty sand toward the bottom. Artifacts were very small, except a few larger pieces of annular ware. Excavators reached the bottom of the channel, recognized as a grey C-Horizon soil at 144 cmbd. The channel was unexcavated in K21.

Feature 47

Feature 47 was initially encountered in Unit E2 as part of the floor deposits of the foundation (Figure 5-22). When it was first uncovered we thought it might be a post hole, but micro-morphological analysis (see Chapter 6) suggests that it represents the remnants of water born activities possibly associated with warm wash water being purposely channeled from immediately outside the eastern exterior wall of the structure into the cellar and out the drain/culvert (Feature 41). For a more detailed description, see Chapter 6.

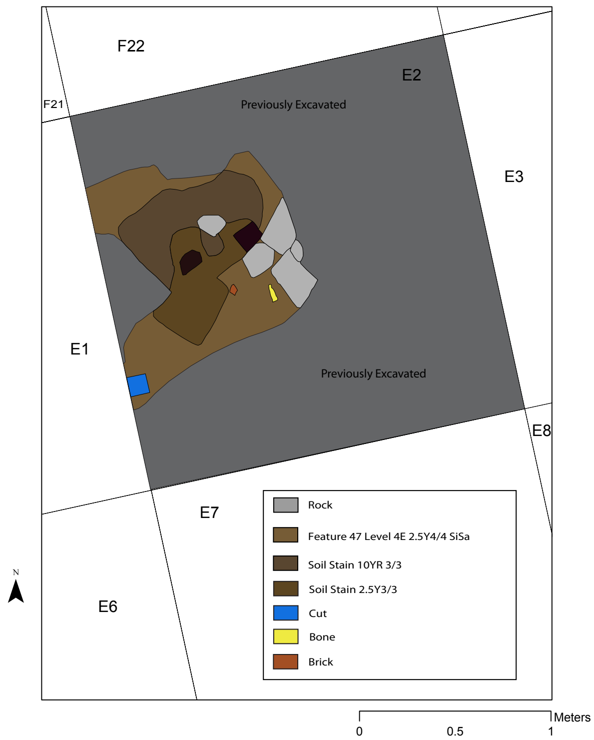


Figure 5-22. Plan view of Feature 41.

Architectural Interpretation

We excavated the Sarah Boston cellar feature slowly, over the course of several years and did so rather exhaustively in the hopes of understanding the shape, dimensions, and other attributes of the house. When our excavations were completed in 2013 (Figure 5-23), we had what we feel was a dry laid foundation that could have had one of two possible configurations. The first possibility is that the foundation began as an ell shaped structure that included a culvert opening incorporated into the west wall of the structure - that is visible in Figure 5-23. If this interpretation is correct than the northwest corner of the foundation represents a later addition that was not underlain by a cellar. This partially explains differences in depth of the west wall profiles of Units B5 and B10 (Figure 5-8). Equally possible is that the foundation itself was rectangular, but the cellar was ell shaped, leaving an uncellared area in the northwest corner. If this possibility is correct then the foundation wall found in the bottom on Unit B5 (Figures 4-15 & 4-16) might have helped in the support of a hearth and chimney base that was also located in the northwest corner of the building. Either of these findings may prove to be very important within the field of Indigenous archaeology, as few Native dwellings from the late 18th and early 19th century have been excavated in New England. While written archival and other historical resources are sometimes useful in understanding Colonial Period Native architecture, they can be contradictory, or slanted toward a specifically Euro-American centered historical narrative, so we must compare this information to our archaeological findings. For example, one description of Sarah Boston's home is as follows:

> Low and little, black and old and faced Kittville. The East door above at the end of front. In the middle of the room on the opposite side as one entered was the big chimney with all the things around it, no cupboard, cooking utensils, stools, no chairs. Small loft accessible by ladder. Indians just slept around. Set the table in the middle. Windows faced out toward the valley, and were little. When the door was shut it was quite dark" (Fiske #11, [n.d.] 6).

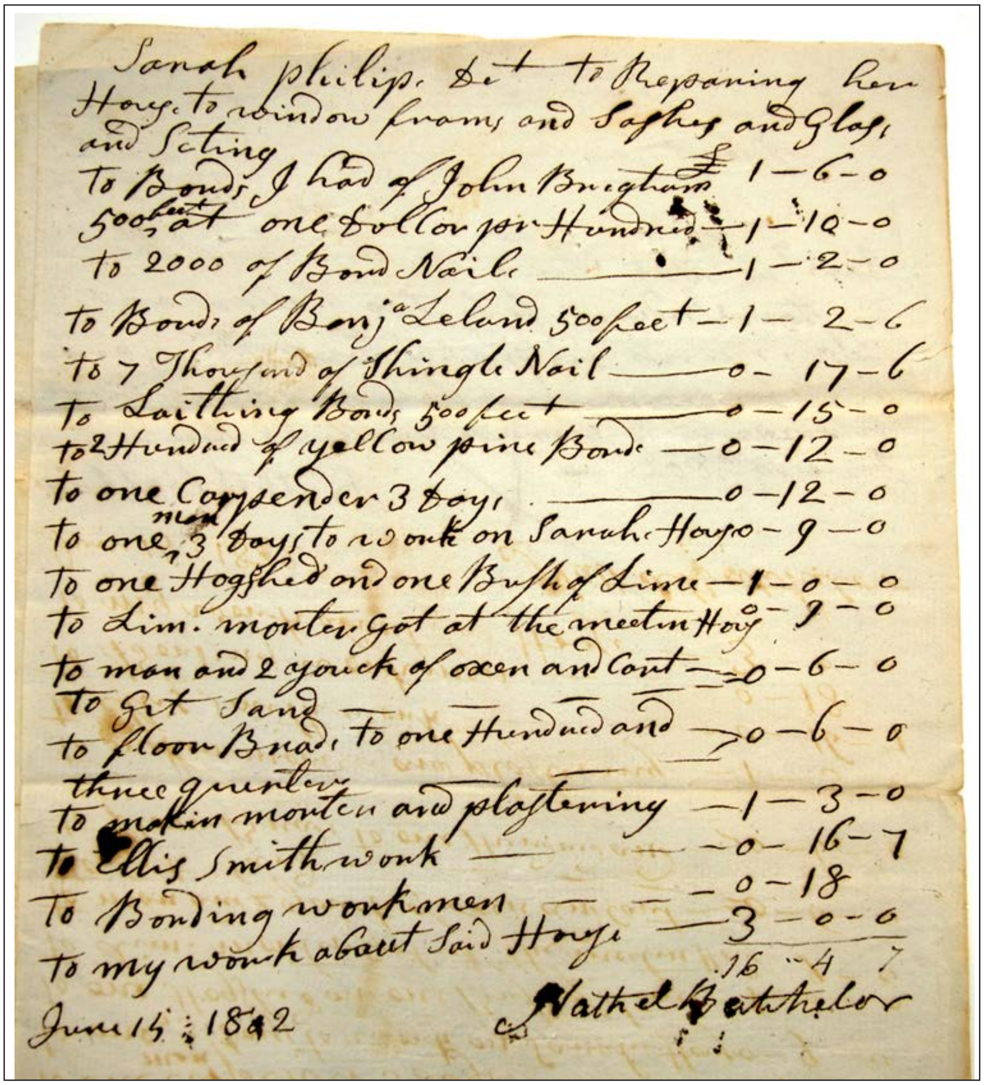
This is a prime example of a local history that incorporates what may be factual details about the structure (such as a loft accessed by a ladder), but which also obviously contains commentary about the house's quality that is part of the larger Euro-American historical narrative that was discussed in Chapter Two. There are other documents that provide written evidence of the materials purchased and apparently used in the construction undertaken by Sarah Burnee Philips between 1799 and 1802. It is a receipt that details the items purchased for the construction (Figure 5-24)

We consulted Eric Fahey, a carpenter by trade and who was a student in the 2010 Field School. He is now a graduate student at UMB. Eric made some interesting observations by comparing the items on the 1802 receipt to the basic dimensions of the cellar feature that we have compiled in our archaeological investigations. He determined that this list is incomplete for building an entire house the size and proportions of the cellar feature, but it would account for an extensive but specific set of repairs. That could mean that the house founda-

Figure 5-23. 2013 photograph of excavated foundation.

tion we are digging now dates from at least the late 18th century, and perhaps earlier. But what did the pre-renovation house look like? What did it look like after? There are a couple of interesting hints to these questions contained within the receipt.

The receipt includes both supplies (boards, "laithing" boards, pine boards, board nails, shingle nails, lime, lime mortar, and sand) and labor (for generalized work as well as the services of a smith and a carpenter). Grouped together on the receipt, Sarah purchased 7,000 shingle nails and 500 feet of "laithing boards," which, Eric observed, would be consistent with replacing an entire 12-pitch roof with one-foot courses of shingles. The only thing missing would be the hand-split cedar shingles themselves, which raises even more questions: Was she cutting her own? Did she trade in kind for her shingles with one of her neighbors? In addition to the lathing boards for securing the shingles to the rafters, she bought enough yellow pine boards and "board nails" to use as trim for trimming around her new roof, and enough plastering material to cover or recover every wall in the house. The 2000 feet of other boards and the services of a carpenter suggest additional construction or repair of flooring or siding possibly.



Sarah philips Dt to Repairing her
House to window frams and Sashes and Glass
and Seting
To Bords I had of John Brigham £ 1-6-0
500 feet at one Dollor per Hundred 1-10-0
to 2000 of Bord Nails 1-2-0
to Bords of Benja Leland 500 feet 1-2-6
to 7 Thousand of Shingle Nail 0-17-6
to Laithing Bords 500 feet 0-15-0
to 2 Hundred of yellow pine Bords 0-12-0
to one Carpender 3 days 0-12-0
to one man 3 days to work on Sarah House 0-9-0
to one Hogshead and one Bush of Lime 1-0-0
to Lim. morter Got at the meetin House 0-9-0
to man and 2 yoke of oxen and Cart to Get Sand 0-6-0
to floor Brads to one Hundred and three quarters 0-6-0
to makin morter and plastering 1-3-0
to Ellis Smith work 0-16-7
To Bording workmen 0-18
to my work about Said House 3-0-0
16-4-7
June 15 1802 Nathel Batchelor

Figure 5-24. 1802 receipt of materials for Sarah Burnee Philips' construction related expenses (Massachusetts Archives).

Using the known dimensions of the interior cellar (approximately 12.37 ft x 16.8 ft x 5.4 ft), in conjunction with calculated estimates for the volume of each of the 4 extant subterranean walls (108.864 cu ft of stone for both the northern and southern walls; and 97.006 cu ft of stone for both the western and eastern walls for a total estimate of 411.728 cu ft of subterranean foundation wall), we were able to calculate an estimate for the amount of stone contained within the cellar void itself. This calculation gave us 1122.21 cu ft of stone, however we had to account for the fact that the stone deposited in the cellar was pushed and collapsed into the void, and would not have the same density as carefully placed stones in a wall. With this knowledge, we estimated a reduction in stone density of about 50% inside the void, and made a final estimate of about 561 cu ft of stone within the cellar feature. While this is purely an estimate, we believe it to be a conservative one, in light of a thorough review of the void space found in the Feature 37 level plans and photographs at our disposal. Using these calculations, it seems that the stone inside the foundation would have provided at least enough building material to double the extant walls, with 150 cubic feet of stone remaining. This raises several interesting possibilities. One possibility is that a portion of the first floor above the cellar level was comprised of stone. This idea is supported to some degree by the placement of the foundation on a downslope with the western wall built into the side of Keith Hill. Another possibility is that the structure was some version of a "stone ender" a common architectural style during the seventeenth century (Cummings 1979).

In terms of the overall shape of the house and cellar it is possible that the house did not start out as rectangle -which we assumed for many years-- in 2013 we realized that the cellar itself actually made an ell shape, with the notch taken out of the northwest corner of the rectangle. In the excavation of the western 1/2 of B5, we found that only 40-50cms had been excavated in the construction of the foundation. We believe that the house shape was still rectangular, as the footprint of the construction still speaks to that. However, we do not think that there was a cellar in the northwest corner of the house. Rather than going down all the way to the cellar floor level in the northwest corner, it seems that the builders dug down about 1/3 of the way and laid down a dense bed of stones instead, possibly as support for the chimney. We encountered natural deposition below that level in the west half of B5, and the typical foundation stratigraphy in the eastern half. A line of large rocks running through the unit marks the border of this stratigraphic difference, and represents the wall that we inadvertently excavated out, before realizing the detailed footprint of the structure. Three remaining thin courses of wall were found at the base of these stones when the floor surface in the eastern half of B5 was excavated entirely, confirming that the rock line through the center of B5 was indeed a foundation wall that we had excavated out unknowingly (Figure 4-15). It is also possible that this wall served as a support for either a chimney base or free standing interior hearth. This interpretation is supported by the notion that house was rectangular in shape from the outset, but merely lacked a full cellar in the northwestern corner.

There are many known advantages to having a dry stacked stone foundation, rather than a mortared one. Firstly, dry stacked stone construction allows for water to flow through it, rather than keeping it out. In terms of drainage, this would have suited the house's position on the eastern slope of Keith Hill. Rather than trying to keep water out entirely, which would have been a hopeless task, the foundation allowed water into and out of the cellar itself with the assistance of the drain. Because of their pourousness, dry laid foundations are both flexible and durable. In fact, in the construction phase, dry laid walls are often built sloping slightly inward, so that when they inevitably settle, they'll actually lock together more, rather than splay apart. We believe that the use of this slightly inward sloping wall-building strategy largely accounts for the fact that all of the corners of the foundation remain intact today, locked together, despite their subsequent neglect, exposure, and vulnerability to various taphonomic processes in the nearly 200 years since the end of the structure's occupation. Due to their pourousness, flexibility and ongoing settling, dry stacked stone foundations need fairly constant maintenance, both to keep silt and sand from collecting in the cellar, and to keep the stones in place. The latter task would likely have been accomplished using chinking stones, found in large quantities inside the cellar feature, and also found in the quarry feature in the north yard (Feature 33).

The chimney likely stood in the northwest corner of the house, in the crook of the ell. Large amounts of bone, ash and charcoal just inside the northwestern wall support this contention. We assume that the chimney was made of stone with a brick fire box or hearth. The chimney would have been mortared, which explains why we have found small amounts of mortar in B10 and B5, and also explains its peculiar absence given the remarkable preservation of the rest of the structure. While the mortar would have done its job initially to keep the chimney airtight, it would have made it less durable in the long run, rendering it unable to shift and settle without cracking and ultimately crumbling, while the dry laid portions of the structure were more flexible and thus able to better withstand the long term effects of gravity, wind and rain. We believe that the remains of the chimney fell, or were bulldozed into the cellar feature sometime after occupation. This interpretation is supported by a wealth of data including the high density of food

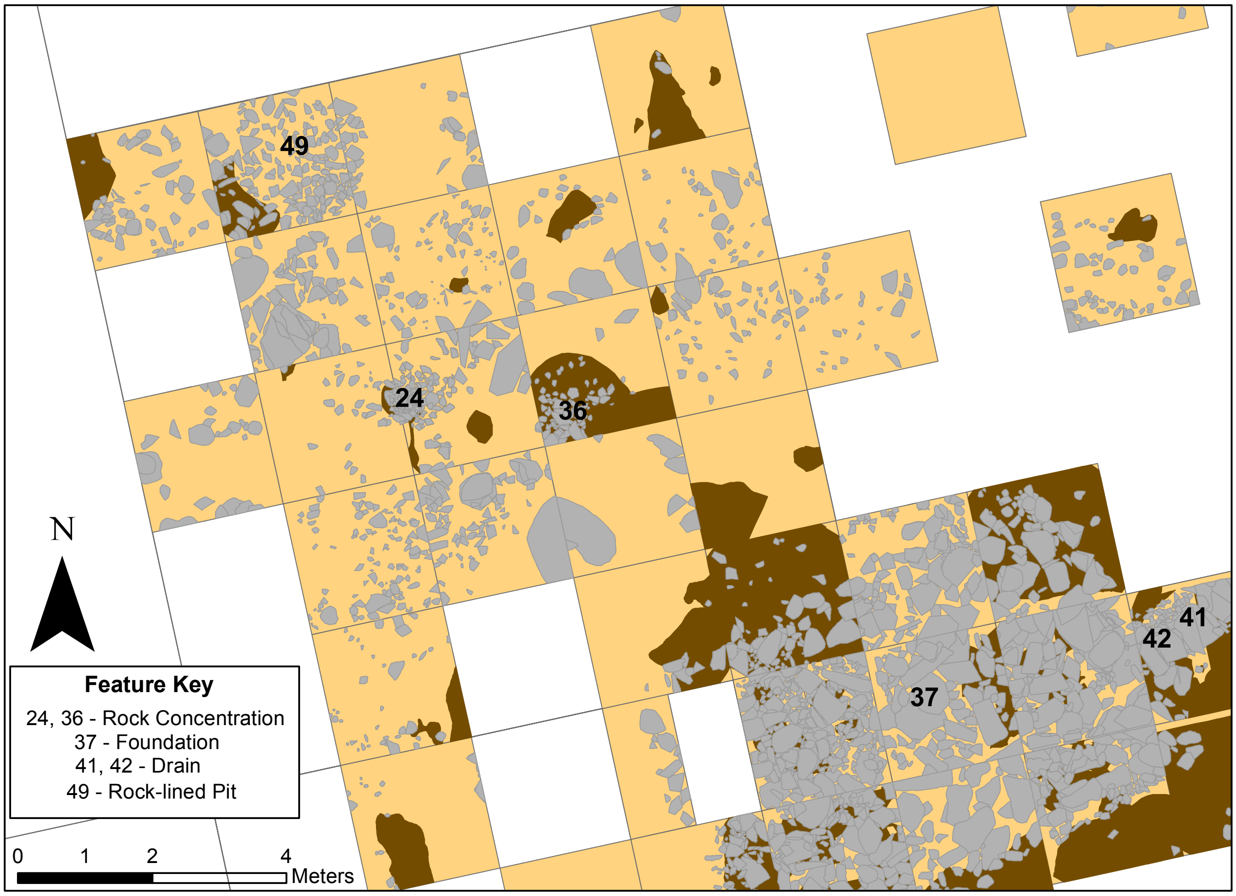


Figure 5-25. Composite plan at varying depths of C Block with feature locations.

remains and cooking vessels recovered from Unit B10 as well as the botanical analysis (see Chapter 7) that's suggests that the fill in this portion of the foundation was loosely packed and contained cavities created by rodents living in what was not a completely compacted feature fill.

In sum, the combination of the archaeological and documentary data suggests that this was a single room house with roughly 16 ft by 21 foot exterior dimensions (roughly 336 sq ft) and a chimney in the northwest corner. The evidence of the drip lines, discussed in detail in Chapter 6, suggests that there may have been a small addition on part of the west end, adding some additional square footage. The undated description cited above, if it is accurate, describes a door on the east side, or maybe at the east end of the long side of the house, opposite from the hearth on the west side. The placement of the hearth and chimney on the west side is also suggested by the archaeological evidence. The written description also indicates that the house had a ground floor and a loft, reached by a ladder; the archaeological evidence adds a substantial cellar to the interior space.

Michael Steinitz's compilation of the surviving data from Worcester County in the 1798 Direct Tax, which assessed buildings based on square footage, number of stories, numbers of windows, and other factors, can be used to put this house in comparative perspective. Data from Grafton does not survive, but information from some nearby towns does. Steinitz found that single story houses were more than twice as common as two story houses. The mean house size, based on exterior dimensions, was 831 sq ft; 14% of all of the houses assessed were less than 500 sq ft (1989:20-21). These data indicate that the SB/SB house was smaller than average but that houses of this size were not uncommon. It was comparable to more than 1 in 10 of the other houses in the county.

Table 5-2. Burned and unburned bone in the hearth and midden units by count and weight.

Unit	Total Bone	Total Weight (g)	Total Calcined	Calcined Weight (g)	% Calcined
Hearth					
C12	30	44.2	21	11.1	70
C13	138	72.51	67	9.5	48.6
C14	308	678	21	5.8	6.8
Midden					
F2/7	157	316.5	43	13.9	27.4
F3.5	231	334.1	76	17	32.9
G22	117	332.4	15	3.2	12.8
G24	162	373.4	15	3.4	9.3

Since this is a single example, it cannot be used to generalize about the size or appearance of other Native houses at the time, but it is still important as a single case study since few Native houses from the time period are are well know. The archaeological evidence from the house itself does not seem dramatically different than Euro-American houses of the same time period, although the placement of the door and possible direct entry into the main room rather than a lobby may be noteworthy. The 1802 receipt indicates that repairs or additions were carried out by skilled craftsmen, a carpenter and a smith, who would probably have also worked on neighboring houses, both Native and Euro-American. Since house framing was a specialized skill, it is quite possible that the initial construction was also carried out at least in part by craftsmen who were probably not Native. Many of the house's features may have been determined by local building custom; the amount of direction from the house's residents is not known. What makes this a Native dwelling is not necessarily how it was built, but how the space in and particularly around it was used, as will be discussed below.

Yard Area

Through a combination of test-pit transects, archaeogeophysical and phosphate analysis we were able to examine the area surrounding the foundation. These yard areas varied in what they contained and appear to have been unevenly impacted by the 1938 bulldozer activities. The portion of the yard to the south of the foundation appears to have received the bulk of the impact from the bulldozer with areas to the east, north and west of the foundation receiving only limited damage. The area of F and G Blocks was where the main site midden was unearthed. This contained a wealth of material culture and other foodways related items (see Chapter 8). Most of the features discovered in the yard areas were found in Block C (Figure 5-25). This area seems to have been a heavily trafficked part of the yard where foods were prepared and consumed as well as other activities suggested by the many tools recovered from the site (see Chapter 8). The individual features are described in more detail below.

Feature 24

To the north-northwest of F37 lies F24, which was partially excavated in 2006 and completed in 2007 (see Figures 5-5 and 5-6). The feature, which straddles units C12 and C13, was composed of an almost complete circle of cobbles and more angular stones that were either collapsed in on each other or purposely piled up and flanked on the NW and the SE by Feature 25 and Feature 31 which appear to be large postholes. The complete excavation of F24, which had begun in 2006, yielded surprisingly little material culture, however the presence of burned (calcined) bone and charred botanical remains, including a single maize kernel, hint at the possibility that F24 served as a cooking area (see Chapter 8). Further bolstering this interpretation is the stratigraphic profile of the feature, which shows a darker organic fill on top, between and below the first few layers of cobbles and angular stones that were encountered. This fill overlays a culturally created cavity in the sub-soil

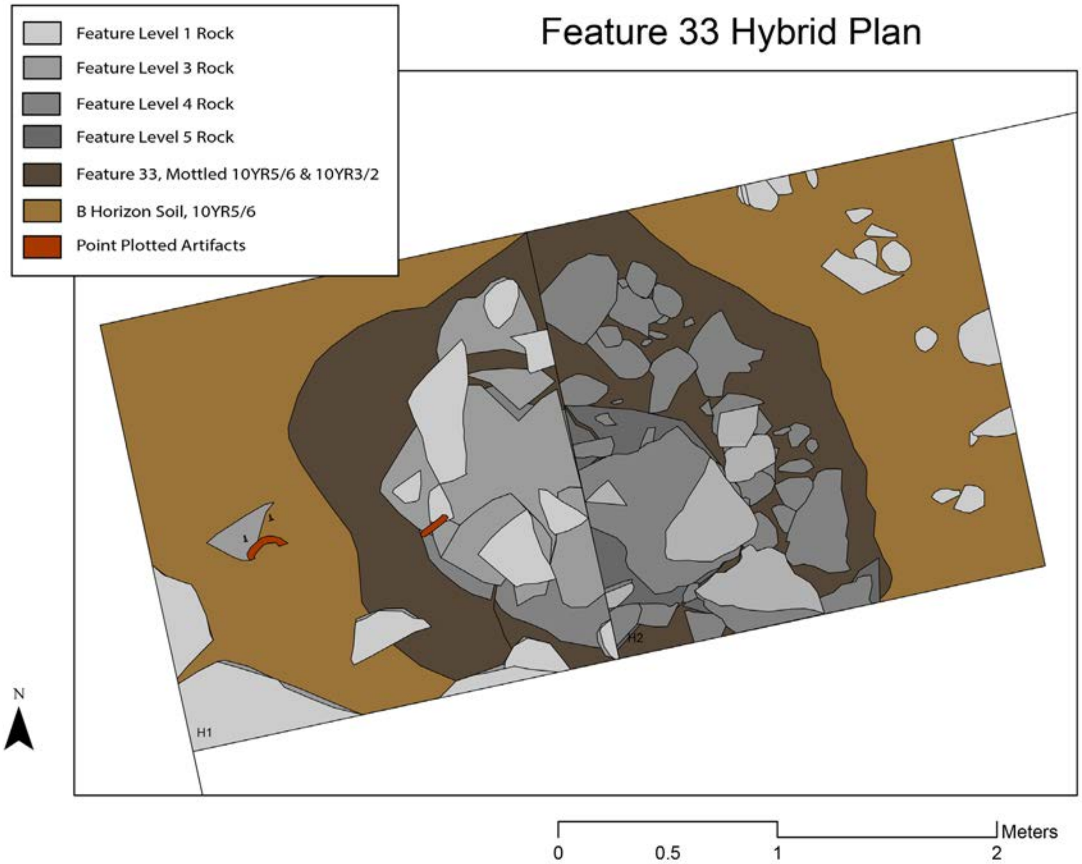


Figure 5-26. Plan of Feature 33.

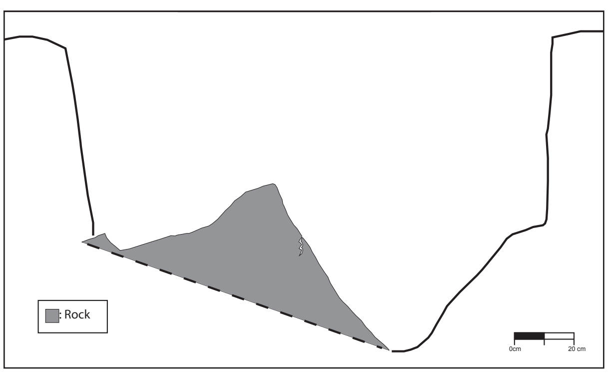


Figure 5-27. Cross section (north bisect profile) of quarry pit associated with Feature 33.

partially lined with rocks and exhibits signs of heating evidenced by reddening of the soil. The botanical materials from F24 are consistent with the remnants of cooking, as is the calcined bone that is similar percentage wise by both count and weight to that recovered from the midden (Table 5-2). Combined, the evidence indicates F24 was an exterior hearth or oven associated with food preparation and possibly feasting, which is consistent with other colonial era Native homesteads (Mrozowski et. al 2005, 2009).

Feature 33

Two units were excavated within H Block, which is located to the northwest of B and C Block (Figure 5-26). Units H1 and H2 yielded very little in the way of material culture, as only 524 artifacts were recovered from both units, in comparison to the 7561 artifacts recovered from unit C14. However, units H1 and H2 uncovered a large feature of approximately 2 x 1.5 meters in dimension, which was designated F33. In a testament to the excavation method employed, excavating stratigraphically allowed the identification of a large pit which appears to have been dug to provide greater access to a outcrop that was quarried for foundation stone (Figure 5-27). This large hole dug into the B-stra-

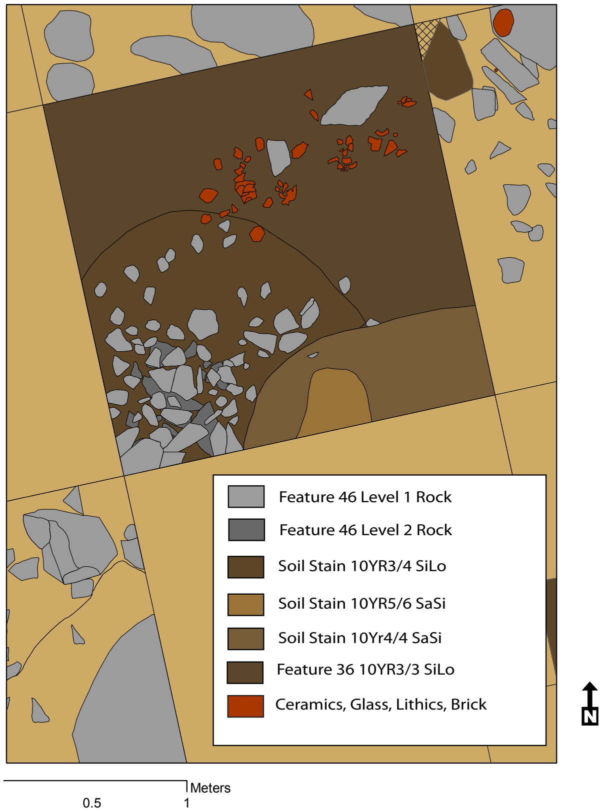


Figure 5-28. Plan of Feature 36, primary deposit midden.

tum exposed bedrock, and the feature fill of F33 contained what can be described as debitage and/or shatter from quarrying activities. These quarrying waste fragments were predominantly large in size, some of which were approximately a half meter in length. Most were recovered immediately overlying the exposed bedrock, as though they had been deposited into the hole just prior to being filled as the feature fill overlay the bedrock and the debitage. The stratigraphy for this unit shows that one major fill episode took place after the quarrying was completed and showed a substantial amount of mixing of both A and B horizon soils consistent with "backfilling" the quarry hole. This fill contained a few artifacts contemporaneous in date with the other material recovered on site (1780-1830), and thus may be indicative of a small scale quarrying episode meant to acquire building materials for the repair/construction of the house foundation. A large quantity of granite chipping debris was found in the rubble inside the foundation. These wedge shaped stones, called "chinking stones" or "pins," were likely used both in the initial phase of construction as the center fill or "hearting" of the walls, and later in the maintenance regime, as the foundation settled and shifted in various places over the years. Perhaps the rubble from the quarrying was used more in upkeep, or in the 1802 upgrade, than in initial construction. In either case, this feature, along with the methods of construction for the foundation itself (Feature 37), a dry well (Feature 49 see below), the stone drainage feature (Feature 41) and the outlying cobble areas in the yard all speak to a continuity of practice in using what materials were in abundance, specifically stones, in the maintenance of the farmstead structures and landscape.

Feature 36

Directly to the east of F24 the most intact primary deposit on the site was encountered within unit C14 (Figures 5-28 and 5-29). On the southern boundary of this unit a layer of cobbles that was arranged in one continuous surface over approximately a quarter of C14 was encountered. At the northern termination of this "cobbled surface" a heavy concentration of artifacts in an excellent state of preservation was unearthed that represents the only undisturbed primary deposit on the site, perhaps randomly spared the disturbance of the bulldozing episode in 1938 (Bagley 2013). The recovery of several reconstructable ceramic vessels from the feature adds weight to its being interpreted as a primary deposit. Furthermore, the spatial proximity of this deposit to the cellar hole (F37) suggests that the area encompassed by C14 represents an undisturbed sheet midden that at one time would have been adjacent to the structure.

Feature 44

Feature 44 is a 10yr4/6 dark yellowish brown and 10yr5/6 yellowish brown silty loam stain found at the A/B Interface in unit B2 in 2006 and unit C22 in 2010 (Figure 5-30). Soils appeared notably reddish and contained some pockets of malodorous soil. The feature reached a depth of 35 cm and revealed little to help us determine its cause or purpose. Its close proximity and upslope positioning from the foundation feature suggests it was not likely used for the disposal of human

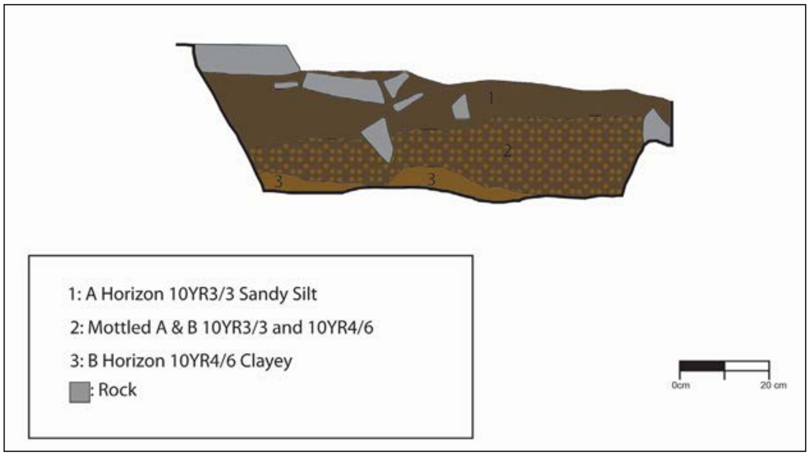


Figure 5-29. West wall profile of Feature 36.

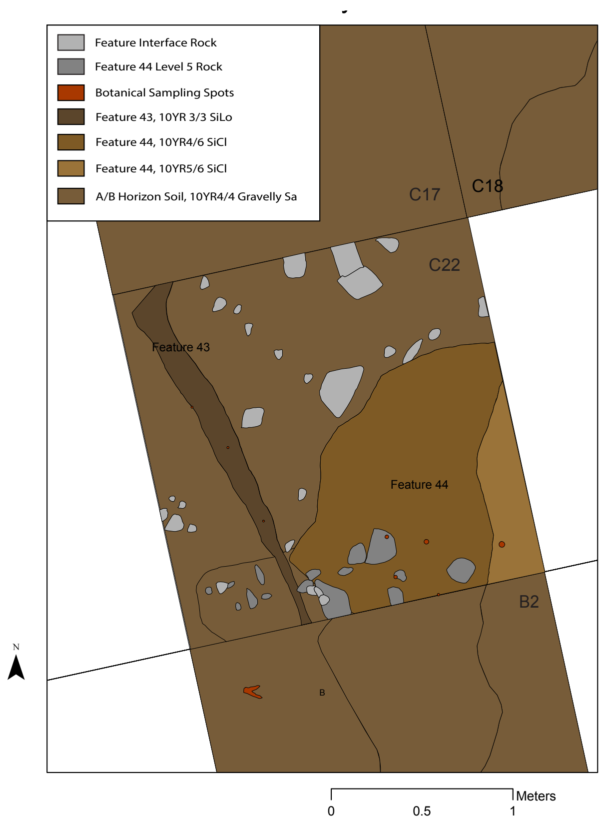


Figure 5-30. Hybrid plan of Features 43 and 44.

waste, however its position nearby the proposed garden area might suggest its use as a compost pit, though little evidence to that effect (like fish bones for example) were recovered. A small, associated feature (Feature 43, Figure 5-30) may have been linked to the reddish soils stains, but that remains unclear. Although samples were collected from the feature, subsequent floatation did not recovered any botanical materials that might help in the interpretation of the feature.

Feature 49

Feature 49 presented as a large 2 x 2m 10YR 3/3 dark brown soil stain encountered at the A/B interface in units C2 and C3 in 2012 (Figure 5-31). The feature was bisected on the north/south axis and initial excavations suggest it is filled with cobble sized stones. Excavations of this feature continued in 2013, during which time the feature was excavated to sterile soil in both the east and west bisects. After weeks of carefully mapping and removing layers of haphazardly placed cobbles and removing little to no material culture of any kind, the team concluded that the feature was most likely a dry well, or a hole filled with loosely packed rocks, meant to collect and disperse water draining down from the upslope of Keith Hill. We have little evidence to tie this feature to the same time period as the Sarah Burnee/Boston house, or any time period for that matter; however, if the dry well was contemporaneous, its placement in the middle of the North Yard suggests that it was meant to manage the water that flowed near the house structure and the established activity areas in that vicinity. The general technology of the dry well echoes that of the house construction itself, as well as the french drain and the outlying cobble areas. The dry well would have allowed water to

Figure 5-31. Photograph of Feature 49, possible dry well.

spill between the cracks in the rock and collect there, before it flowed out from the feature in a more controlled way. We uncovered no terrestrial evidence for the control of the outflow, such as a ditch or a gravel channel, but something like that would have demanded regular upkeep and may have proven too ephemeral to have lasted like the dry well itself. The technique and principles of the dry well speak to a general use of the resources present on the landscape, mainly stones, to control and otherwise engineer the flow of water and other materials either around or through the foundation in a predictable manner.

Spatial Analysis

The excavations around the foundation, yard areas, and the home lot as a whole, have revealed a fairly straight forward picture of the landscape, the main structure, and some of the locations where activities took place. It is not a complicated picture in the sense of extensive archaeological deposits, but certainly enough to reveal the overall character of the home site. Through the examination of artifact distributions across the site it is possible to gain further insights into the spatial dimensions of the various activities that occupied the residents of the home lot. Although initial testing revealed that material culture was found over much of the home lot (see Gary 2005) as well as in the pasture areas to its north and south, the most pronounced concentration was recovered from in and around the foundation. Within the area surrounding the foundation there are notable concentrations both to the north of the foundation in what appears to be a yard used for food preparation and consumption as well as a general site midden to the northeast and east of the foundation. The latter appears to have been purposely located downslope of the terrace that contains the foundation and surrounding yard.

The analysis of the distribution of artifacts across the site employed a combination of geostatistical tools provided by ArchGIS. Both involve measures of the density of artifacts recovered from individual 2x2 meter excavation units. Given the density of material culture often common on archaeological sites of the last 300 years, we did not piece plot individual artifacts. Instead a spherical display model was employed using the southwest corner of each unit as the display coordinate. These maps were used to illustrate the overall concentration of different classes of material culture across the site. The totals generated for each class of material statistically divided the data into uniform spherical displays that were compared across the site. In this manner the density of refined earthenwares could be compared with stonewares for example. The ArcGIS statistics package uses the total number of data – in this instance artifact counts – within each class of variable to calculate the values for each category of spherical representation. Again this allows for comparisons of multiple classes of data across space.

In addition to density display maps used in the analysis, predictive displays were generated using the Kriging method of geostatistical analysis in ArcGIS 10.0's Geostatistical Analyst Wizard tool. Kriging is a method that relies on a semivariogram - a function that describes the variation in different samples over different distances - to generate predicted values for untested areas and describe the possible error in these predictions. It assumes that the distance and direction between sample points (in this case, artifact densities at the northing and easting of units excavated onsite) correlates to explain surface variation. Again using a spherical display model, maps were produced that illustrate surface rasters that highlight concentrations of different artifact classes in areas that have already been excavated and predicts surface trends into unexcavated portions of the site. Normally

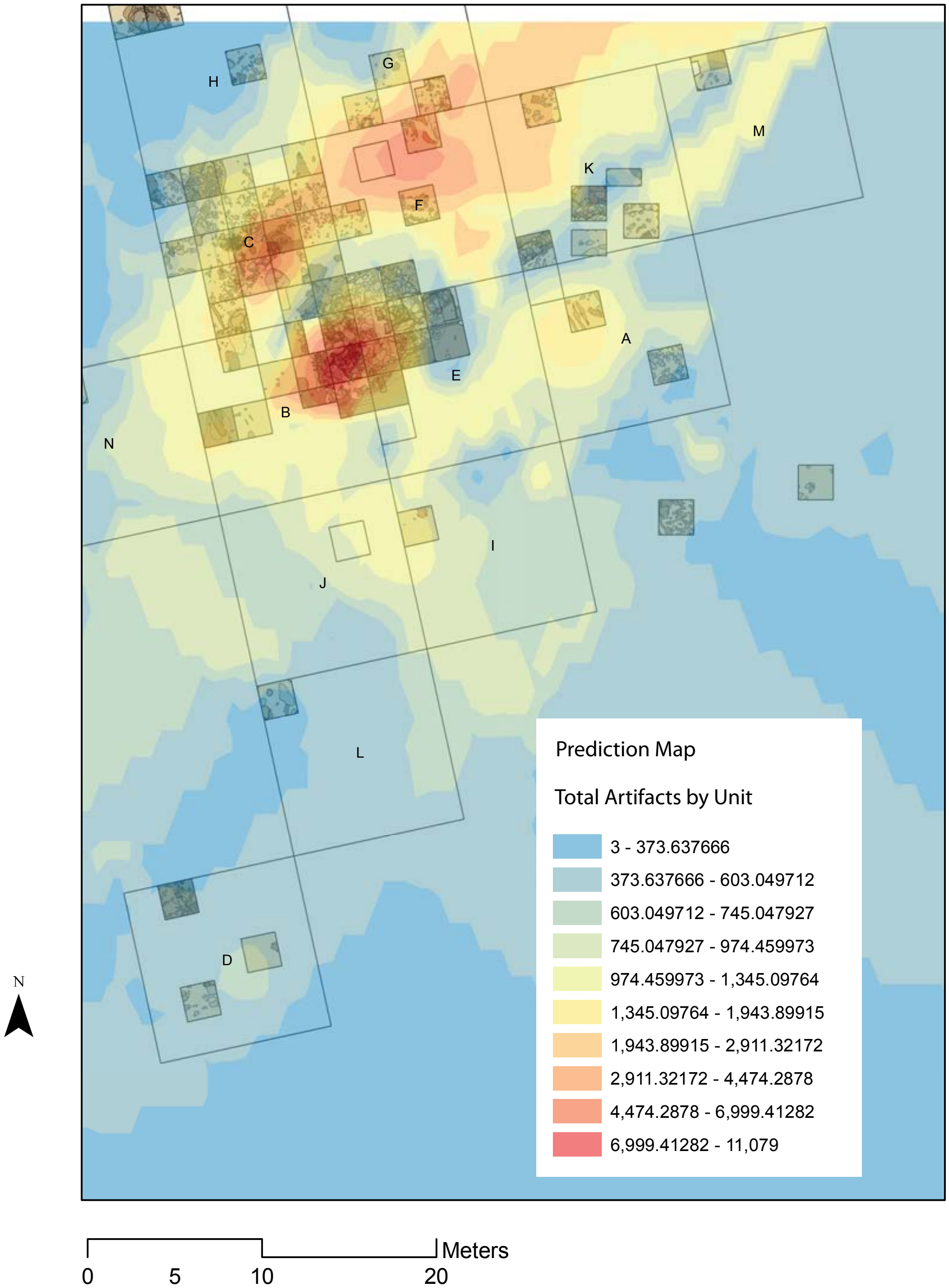


Figure 5-32. Density of total artifacts by Krig.

these predictive tools are used to identify areas for further excavation, however in this instance they have been employed primarily as a descriptive tool to identify surface trends across the site that can be used to suggest whether specific activities were being conducted in particular areas of the yard. The same tool can help in suggesting post-depositional trends across the site as well.

There are several noteworthy patterns that are illustrated by the distribution of material culture across the site area. The first is that the heaviest artifacts concentrations are associated with the

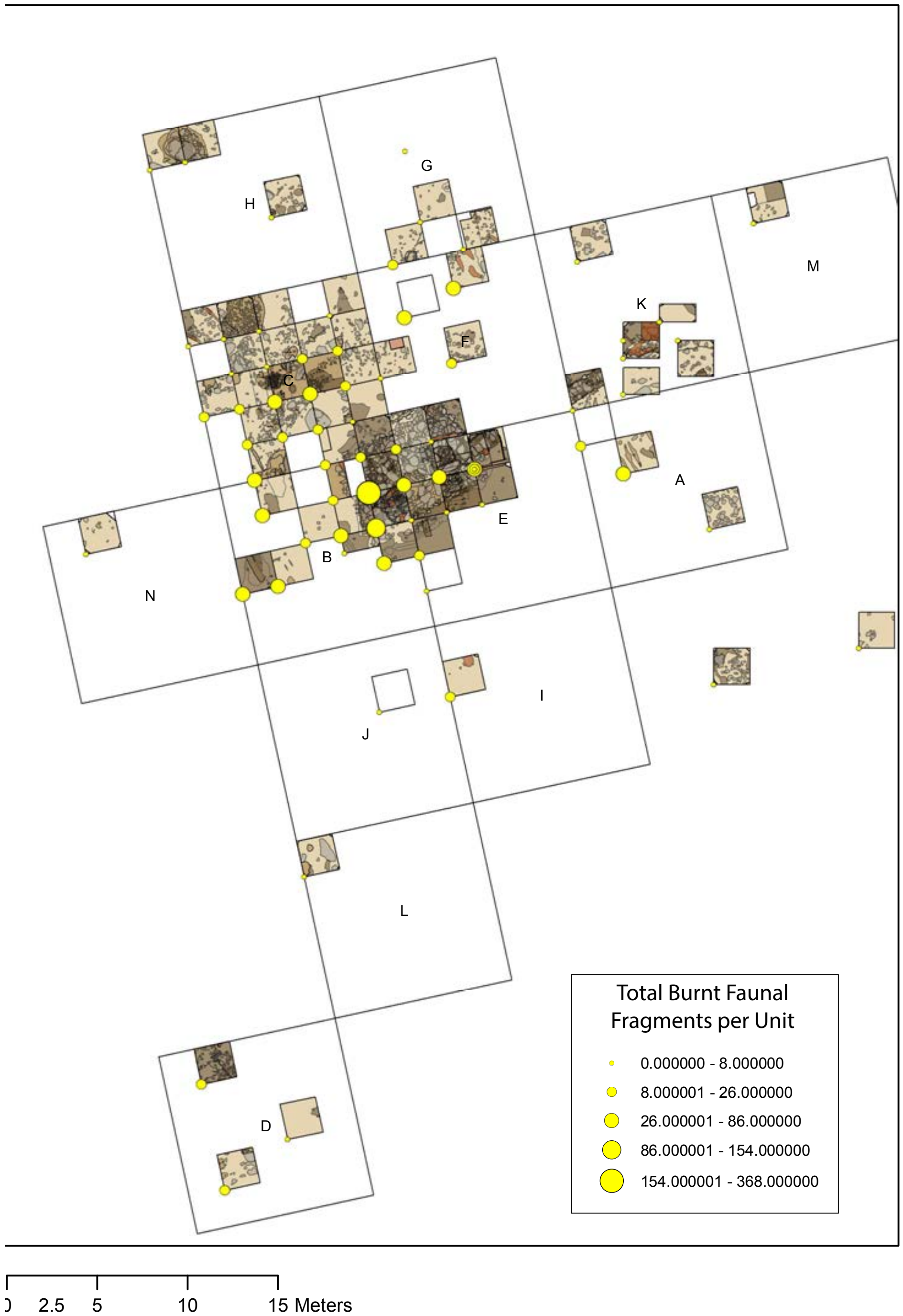


Figure 5-33. Density of burned bone per unit.

foundation, the north yard area, and the midden (Figure 5-32). Using Kriging to predict the overall surface trends outside the areas of greatest excavation suggests that within both the foundation and the north yard there are distinctive concentrations that may be linked to specific activities such as food preparation and consumption. It also seems evident that the midden area – which was not subject to the same level of excavation cover as either the foundation or north yard – is a dense concentration that more than likely extends downslope to the northeast. These same statistics suggest there

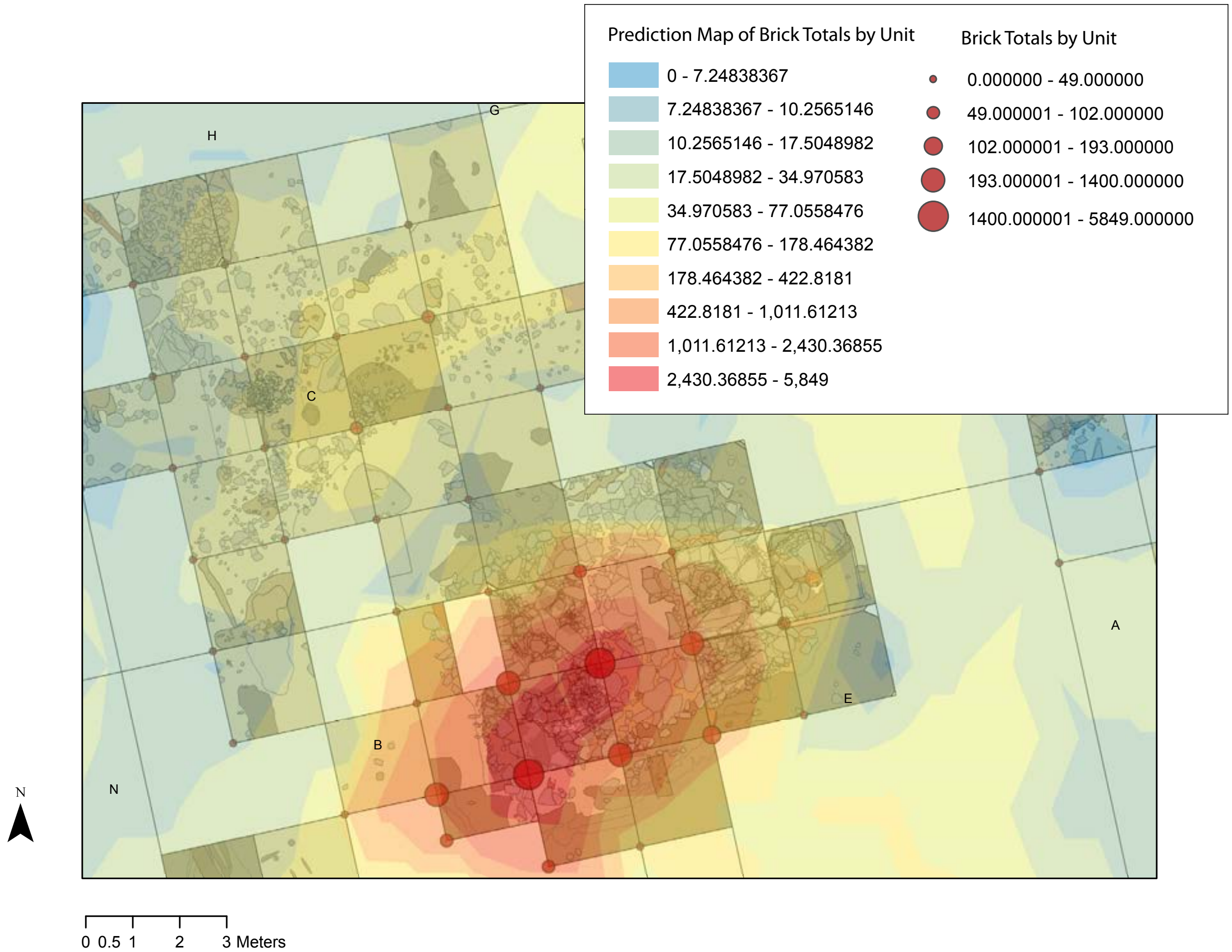


Figure 5-34. Brick totals by unit, Krig and graduated symbols.

are other areas where artifact concentrations likely extend, but interestingly enough, D-Block does not appear to be one of those. This is in some respects an artifact of the analysis, but it nevertheless suggests that D-Block is unlikely to represent an early occupation that would have produced the same levels of artifact concentration unearthed in the foundation, north yard, and midden area.

The concentrations within the foundation and in the north yard area illustrated in Figure 5-32 may be linked to specific functional or depositional activities. There is, for example, a higher concentration of burned bone in the units associated with Feature 24 that suggests it served as an outside cooking hearth (Figure 5-33). A similar concentration inside the foundation, in particular units B-5 and B-10, combined with the presence of several iron kettles and a skillet does suggest that food preparation could have been carried out in the cellar or on the floor above. No structural evidence of a chimney was uncovered during the excavation, however there is a concentration of brick associated with the foundation (see Figure 5-34) that suggests there could have been an interior hearth for cooking. If a combination of red earthenwares and burned faunal material are used a proxies for areas where cooking may have taken place, it seems that both the dwelling and yard were used for this purpose (Figure 5-35). Concentrations in the area of Feature 24 and the western portion of the foundation, in particular units B5 and B10, suggest that this is the most likely area for a hearth. The concentration in the midden is also expected as it represents the disposal of residue of these activities.

When stonewares, a ceramic that is a proxy

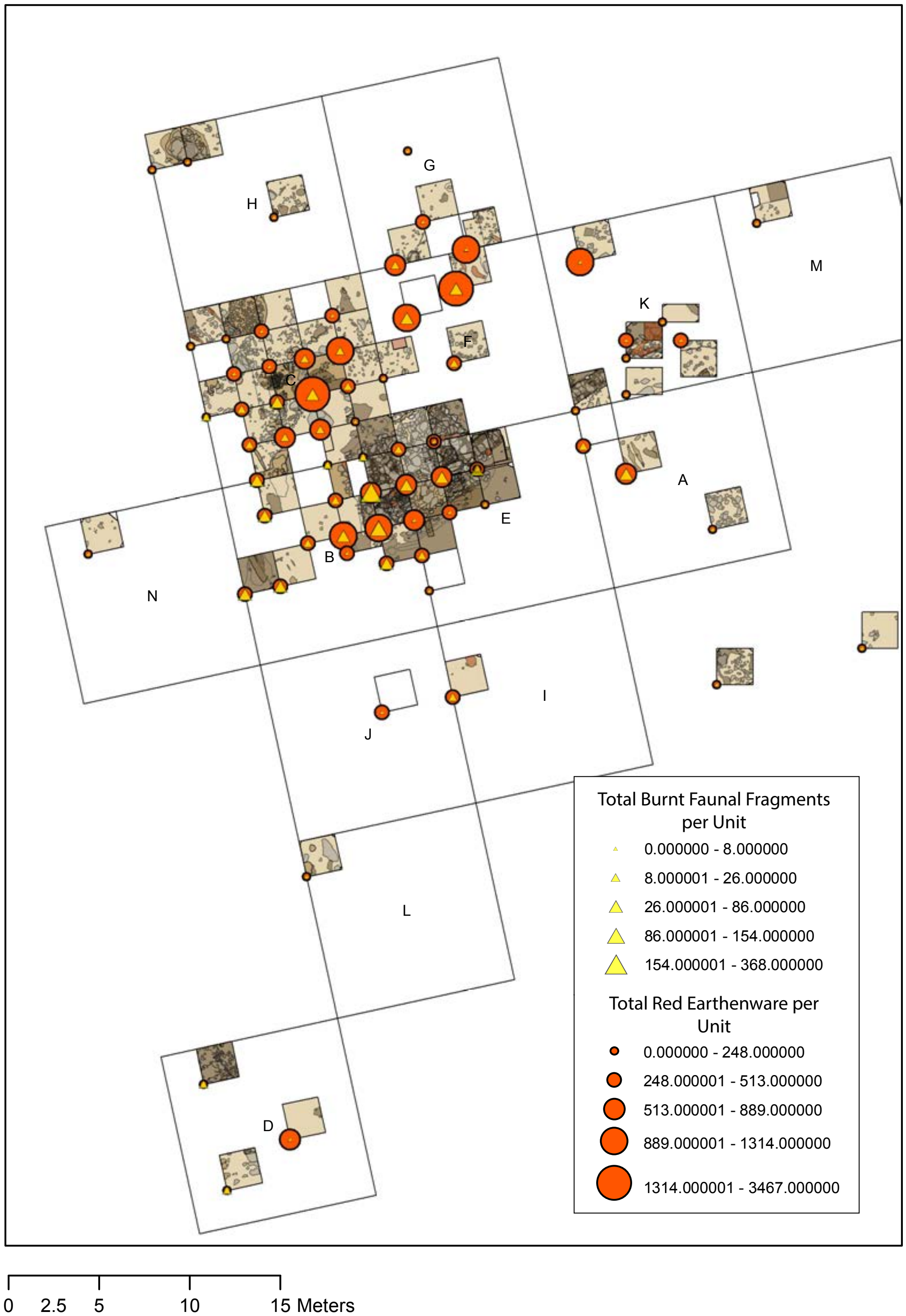


Figure 5-35. Red earthenware and burned faunal totals across the site.

for food storage and drinking related behaviors are added to the comparison with red earthenwares and burned faunal material, some variation in the pattern of material across the site is discernable (Figure 5-36). The larger concentrations of stoneware both inside the foundation and the midden area in blocks F and G would be consistent with an interpretation of stoneware being used for

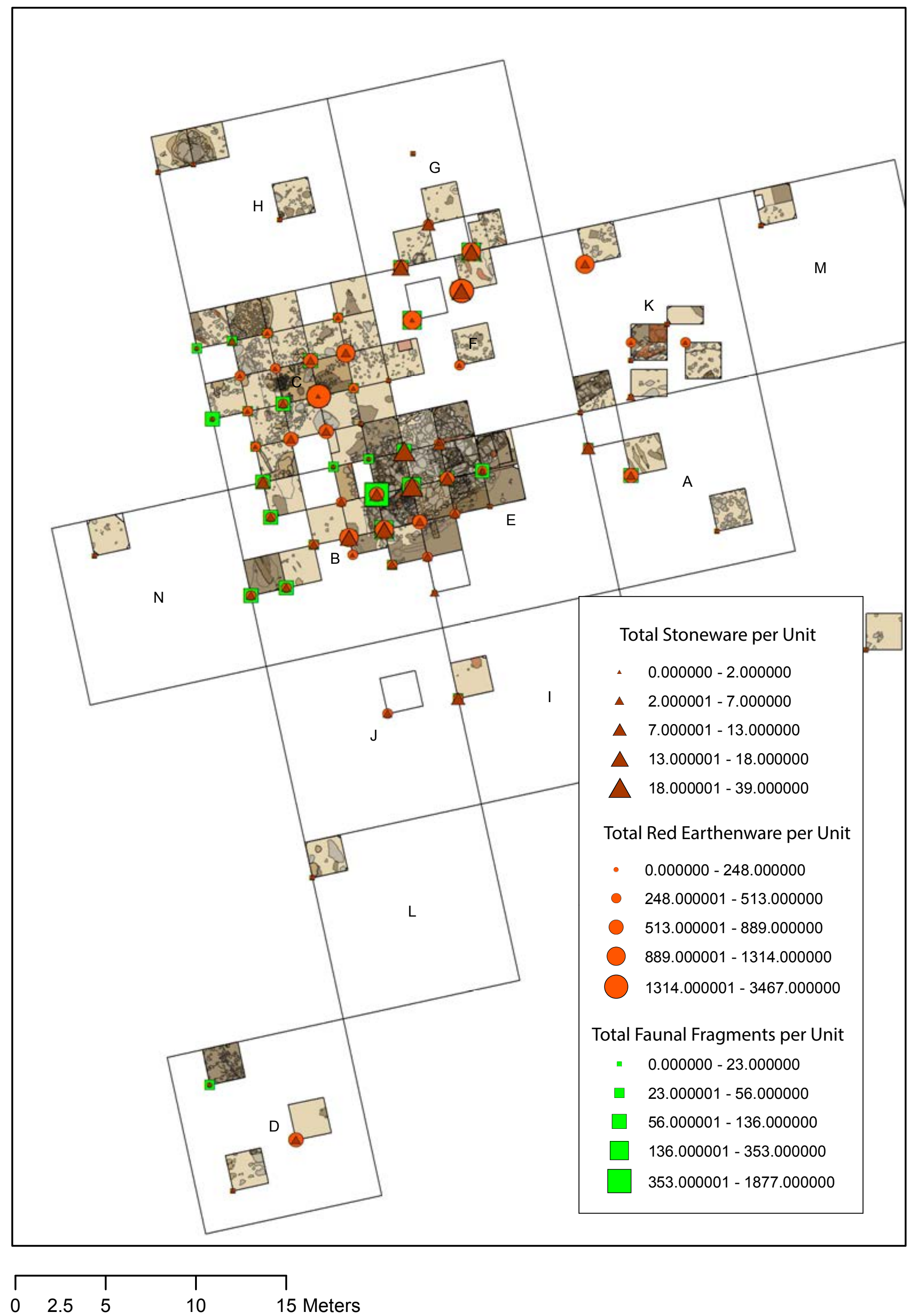


Figure 5-36. Red earthenware, stoneware and burned faunal totals across the site.

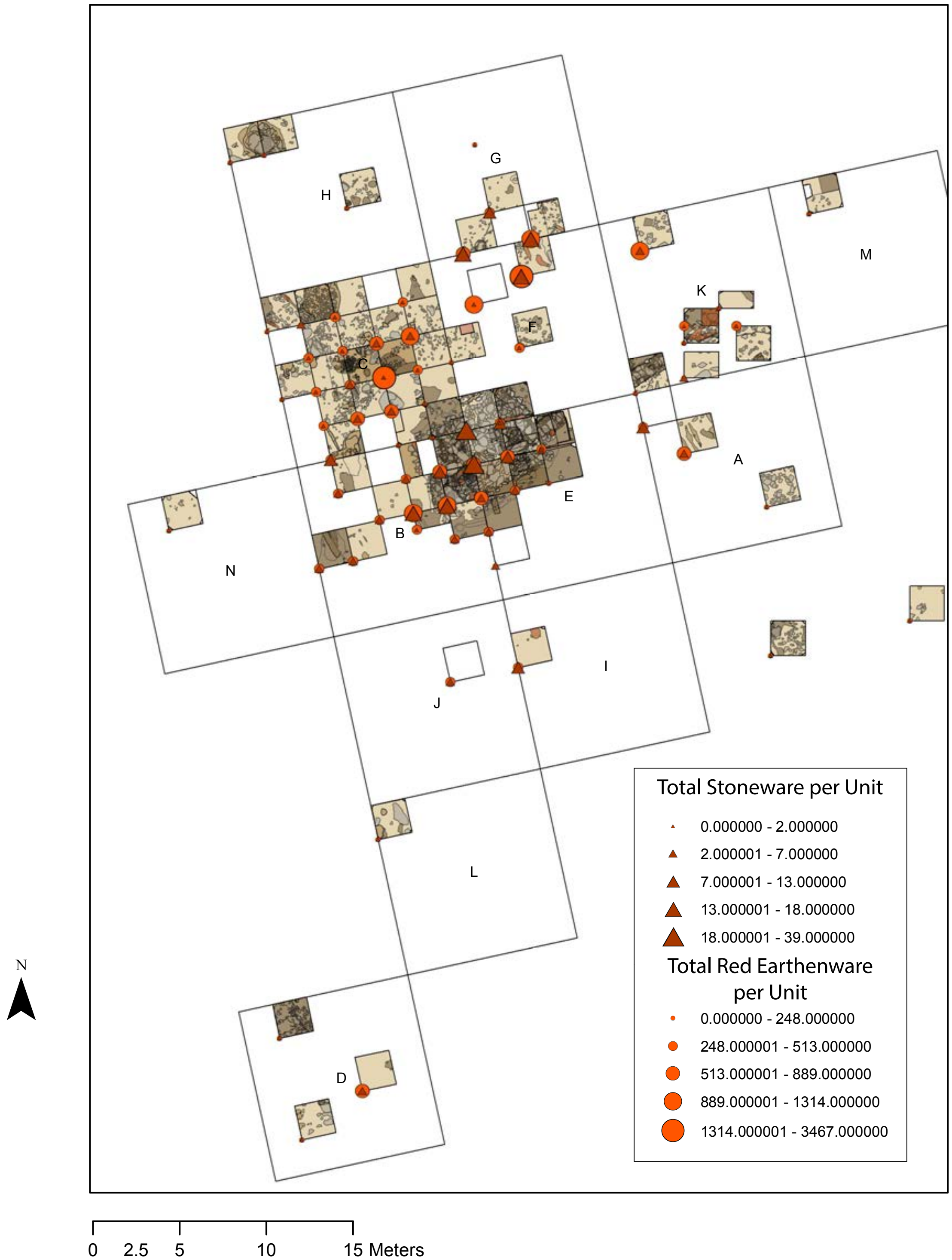


Figure 5-37. Total red earthenware and stoneware per unit.

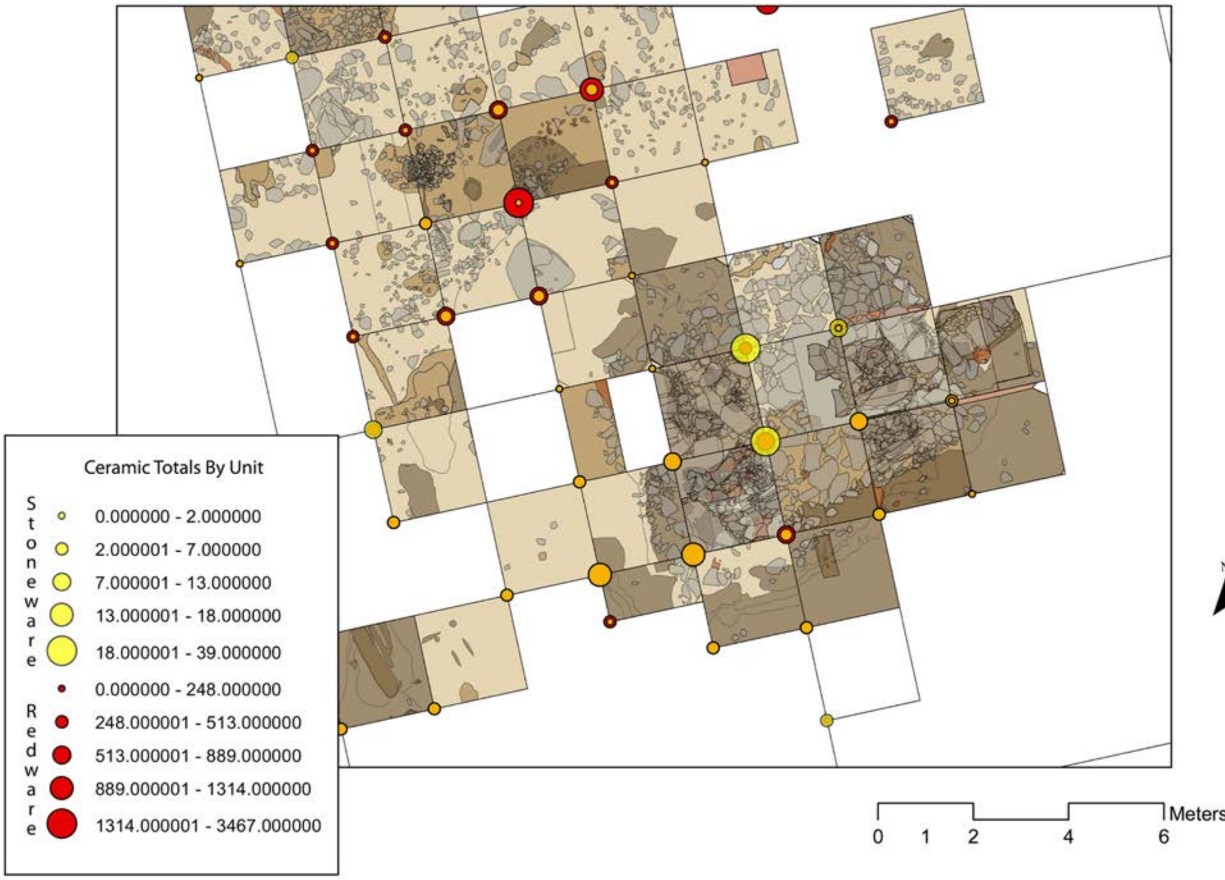


Figure 5-38. Stoneware and red earthenware totals in and around the foundation.

food storage. One would expect more food storage vessels to be found inside, especially in the cellar. Their presence in the midden would also be expected once they were being discarded. Contrast this with the larger concentration of red earthenwares (Figure 5-37) in the yard area – an area where food preparation and/or consumption might also be carried out - and this supports the idea of the difference between stoneware and red earthenware spatial distribution being linked to their use in different activities. This observation becomes clearer when the same materials are compared separately in both the foundation (Figure 5-38) and the North Yard (Figure 5-39).

Refined white earthenwares are normally associated with food consumption, especially formal or everyday meals (see Chapter 8). When the totals for refined white earthenwares are compared across the site (Figure 5-40) it seems that they are widely distributed across the foundation, yard and midden areas. The large concentration in the yard area seems to support the idea that meals were often served out of doors. Further support for this interpretation comes from two classes of information – a comparison of refined white earthenware and red earthenware (Figure 5-41) and Allard's (2010, 2015) faunal analysis that points to food preparation and consumption taking place in the yard. The idea that feasting took place in the yard is examined in more detail in Chapter 8. Here we just want to call attention to the spatial data that supports this interpretation.

Two additional classes of material culture add texture to the spatial interpretation of site materials. These are the curved class fragments associated with drinking vessels and the stems and bowls of smoking pipes. As in all forms of analysis there are basic assumptions that are brought to the examination spatial data. In this instance the assumptions surround the use of both artifacts classes in behaviors that can be casual – as is the case for smoking which can be done while work-

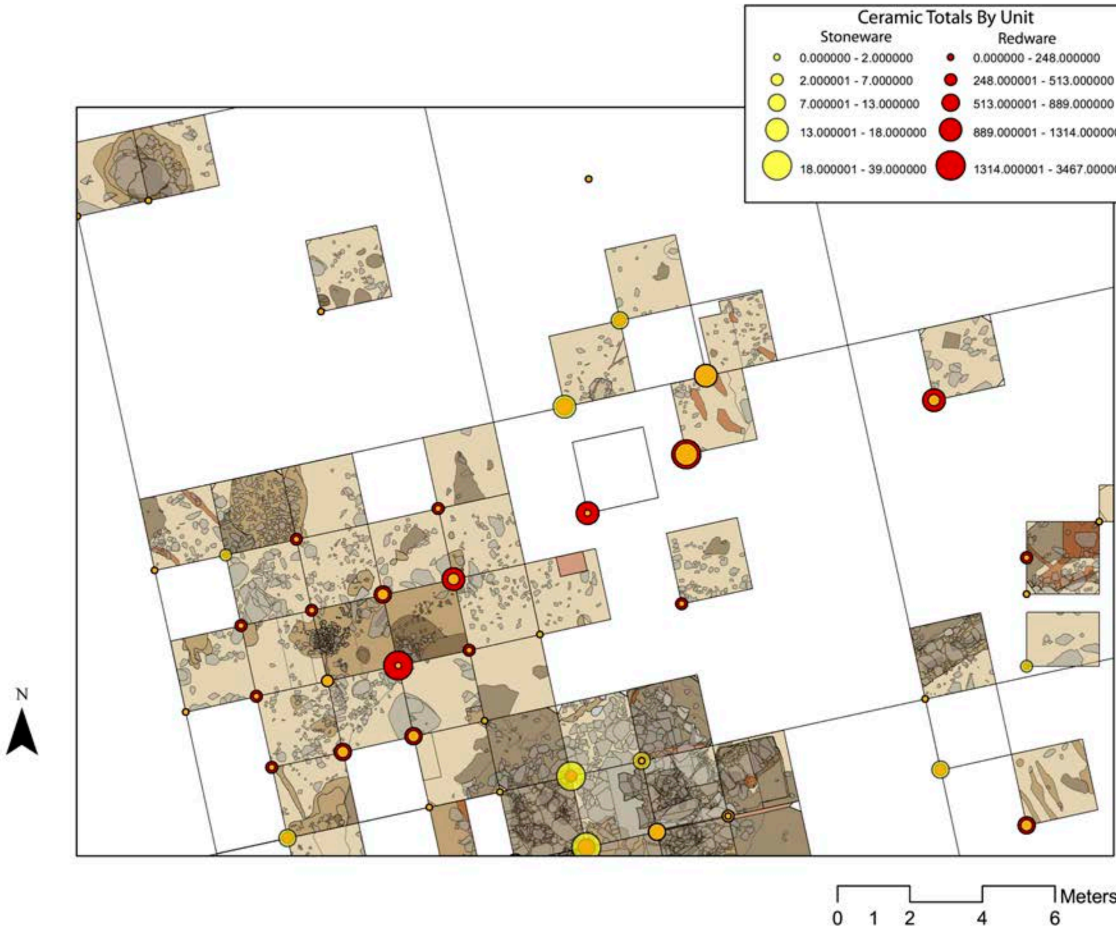


Figure 5-39. Stoneware and red earthenware totals in the north yard.

ing, while entertaining with groups, or individually. If curved glass is associated with liquids and their consumption, then again we are dealing with a class of material culture that can be used daily or on special occasions, individually or in groups. In both instances, the distribution of curved glass and pipes seems to be spread relatively evenly across the site (Figures 5-42 and 5-43). This is certainly truer for pipes than perhaps any other class of artifact. There are larger numbers of curved glass across the site and higher, but not dramatically higher concentrations in the foundation and the north yard. In general the curved glass mirrors other classes of material more so than the pipe distribution. This comparison of curved glass and pipe stems and bowls is examined again in Chapter 8 where smoking and drinking behavior are examined in some detail.

One of the more interesting classes of material culture to be recovered during our excavations is the large and interpretively rich assemblage of iron and metal tools, eating utensils, and architectural hardware (see Chapter 8). While these various categories of artifacts provide a wealth of information concerning foodways practices, architectural details and other activities carried out on the site, their spatial concentrations are primarily restricted to two areas, the main building foundation and the midden area. The only deviation from this pattern is a lone chair maker's bit that was recovered from Unit K2 that is east and downslope from the midden and foundation. The fact that virtually all of the tools and eating utensils were recovered from either the foundation or midden suggests that food preparation and consumption appears to have been carried out inside or immediately outside the dwelling. The same seems to be true for activities such as wood working, furniture repair and

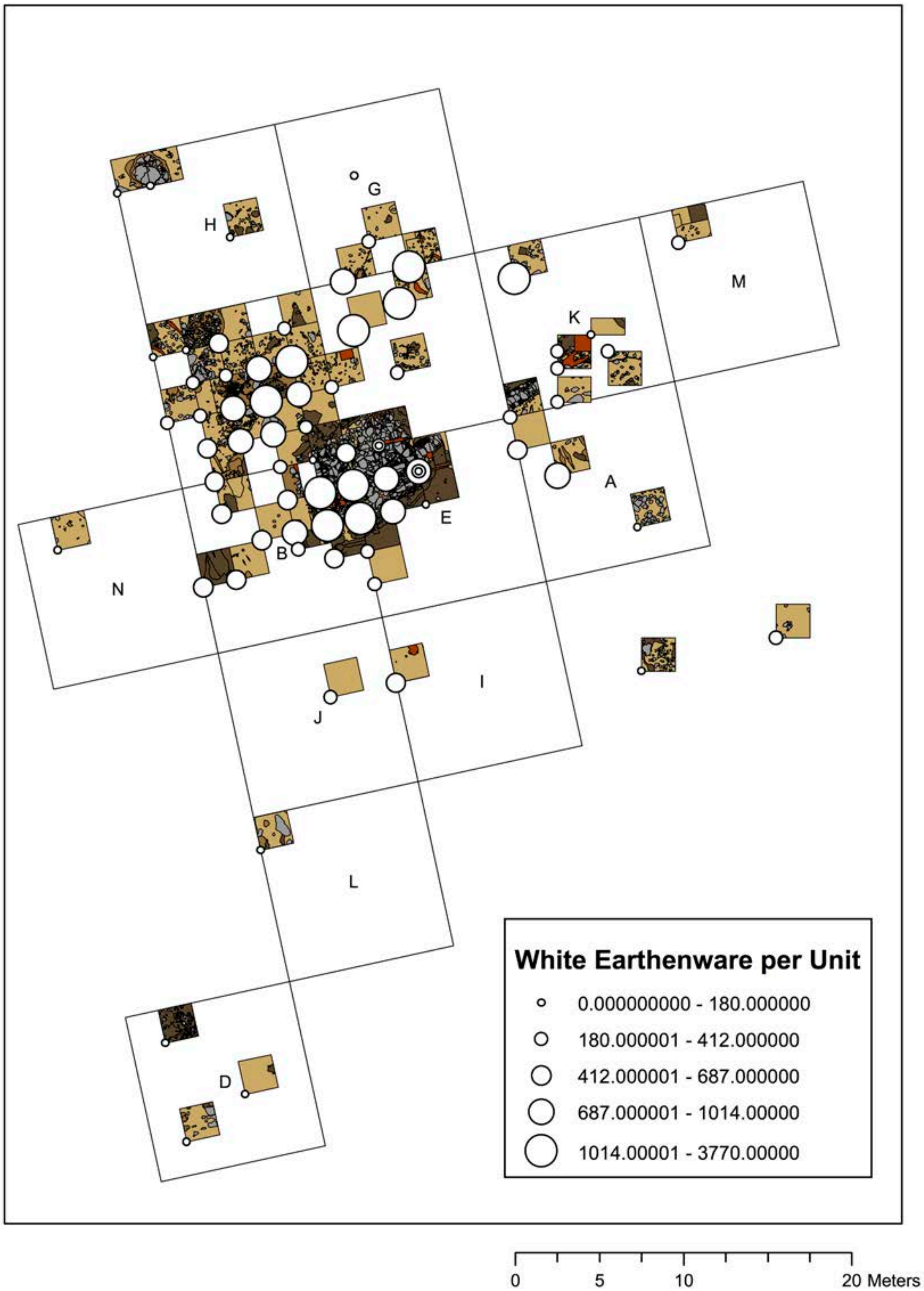


Figure 5-40. Refined white earthenware totals per unit.

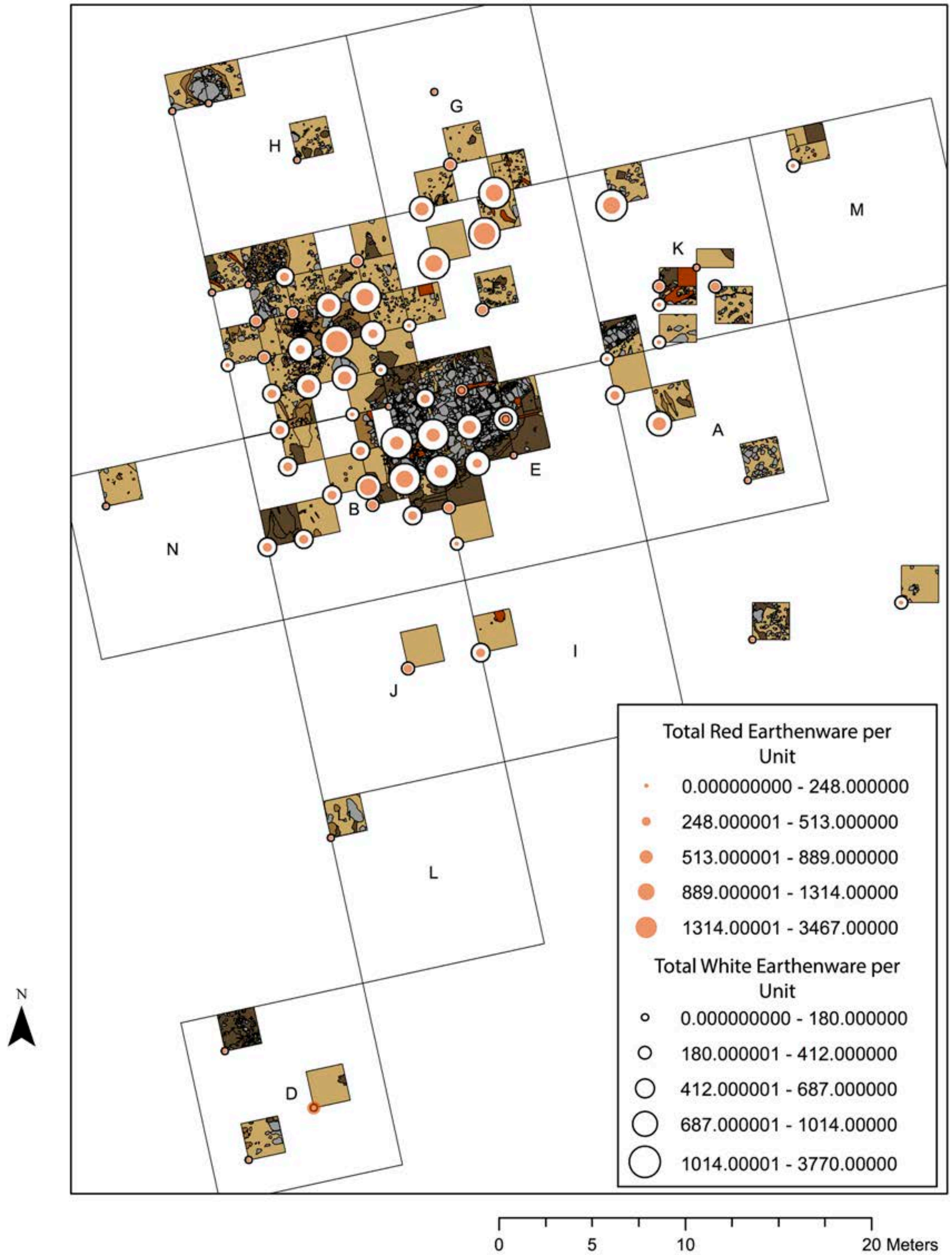


Figure 5-41. Refined white earthenware and red earthenware totals.

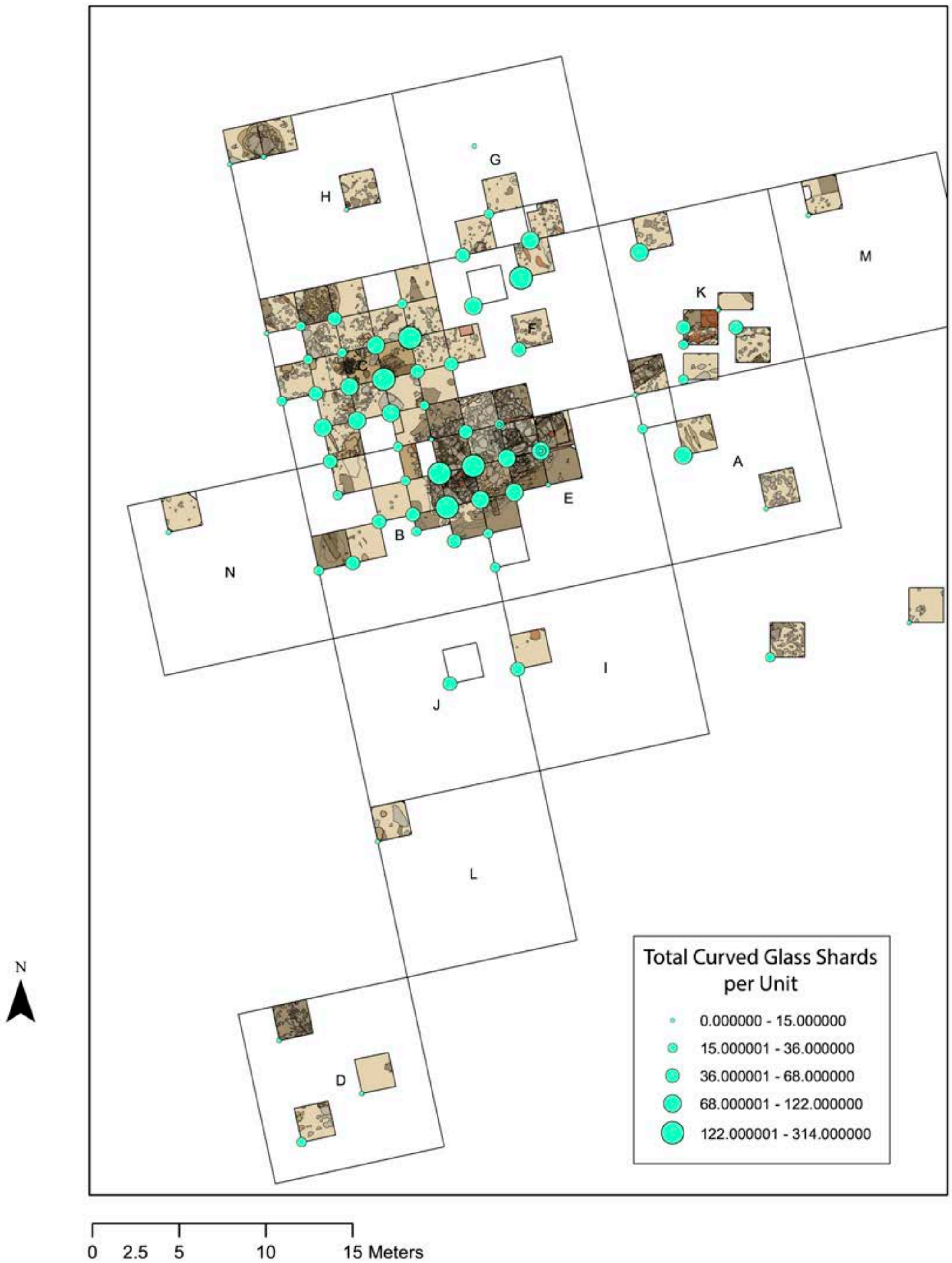


Figure 5-42. Curved glass totals per unit.

possibly basket making which appear to have been carried out either inside or immediately outside the house.

The one other category of iron artifact that showed a deviation from this pattern were the collection of 13 horse and ox shoes that were recovered from the site. Five of the ox shoes were recovered from the area of the foundation while an additional 3 ox shoes were found in the midden. There were, however, 2 horse shoes recovered from unit H1 and a single ox shoe recovered from Unit C18. Both of these units are north of the

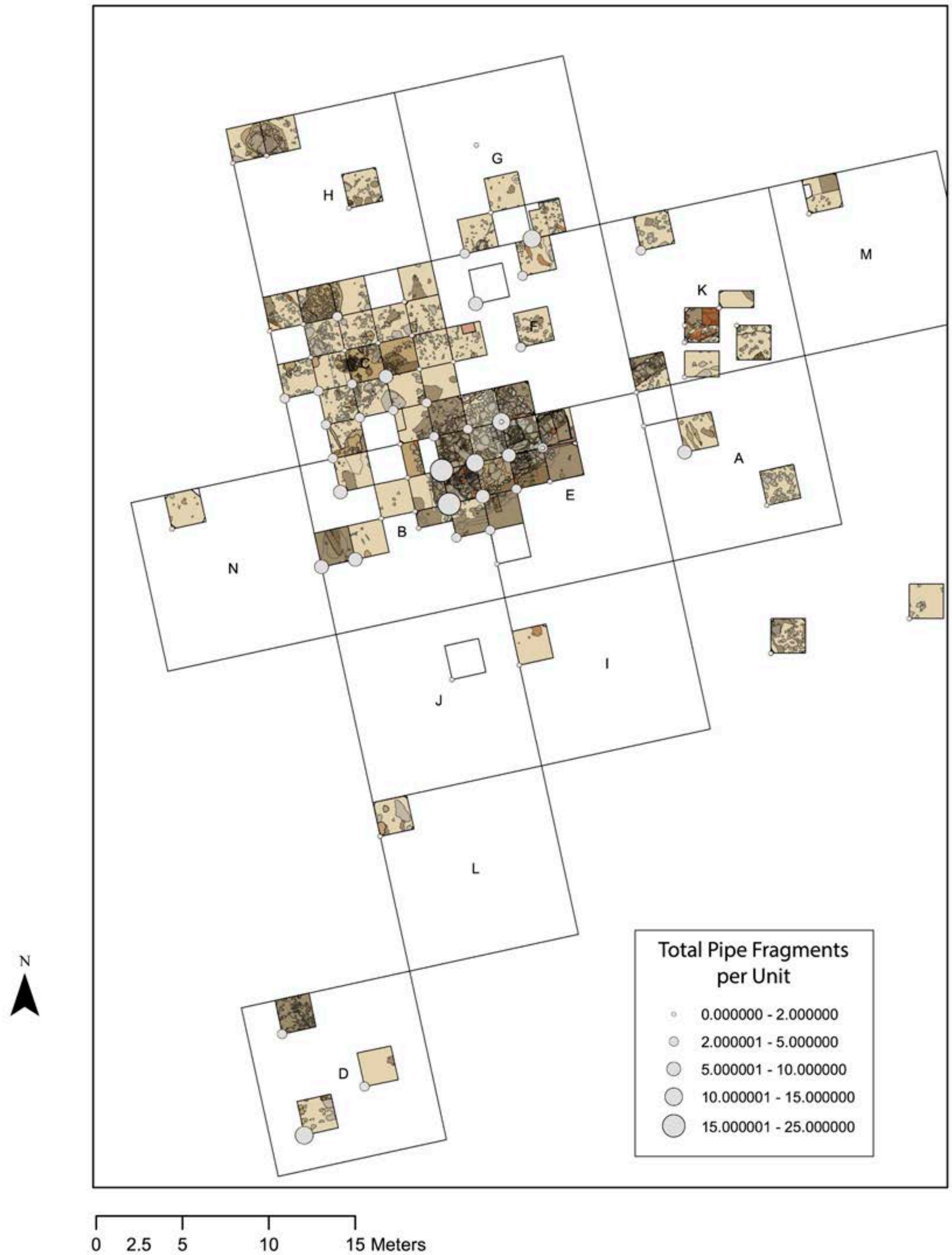


Figure 5-43. Pipe stem and bowl totals per unit.

foundation and may suggest that the location of the barn noted in several documents could be in this general area. Additional testing in this area did not, however, unearth any structural evidence that might be interpreted as a potential barn, assuming that it was supported with a stone foundation.

The final class of material culture to be examined spatially are the buttons found across the site. These will be dealt with in greater detail in Chapter 8. Here we want to discuss only their distribution across the site. Buttons are distributed across the site in a seemingly random fashion with

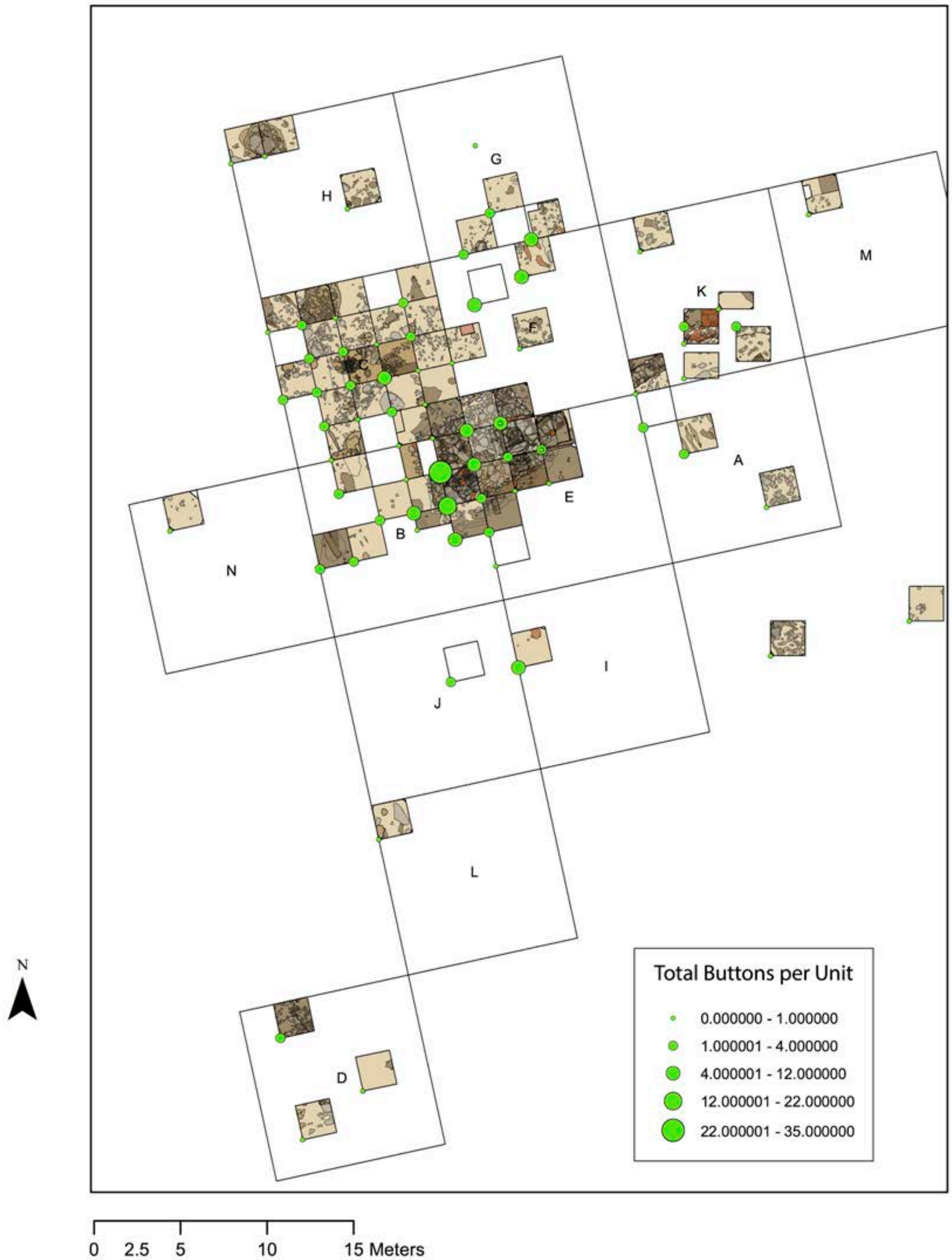


Figure 5-44. Button totals per unit.

the exception of the foundation and north yard areas (Figure 5-44). They were also recovered from the midden. In the foundation they are more concentrated in the western portion of the feature. In many respects their distribution, which does not suggest any strong spatially circumscribed activities, nevertheless point to the strong correlation between where high concentrations were first encountered and where their presence required additional excavation. Once the midden to the northeast and downslope of the foundation was identified, decisions were made to limit our excavations in the area rather than merely to seek more artifacts. As a protected site, additional excavations were deemed unnecessary.

Chapter 6: Micromorphology at the Sarah Burnee/Sarah Boston Home Site

Dennis Piechota

Introduction

This chapter describes the use of soil micromorphology to answer particular questions using the micro-analysis of the archaeological matrix at the Sarah Burnee/Sarah Boston (SB/SB) Site in Grafton, Massachusetts. At that site the Fiske Center for Archaeological Research at the University of Massachusetts Boston, has, between 2006 and 2013, investigated a late Hassanamesit Nipmuc homestead constructed and occupied from the mid-18th through the early 19th centuries. The complete deeded property, as opposed to the Home Site under excavation, is referred to as the Muckamaug Allotment after its original late 17th-century owners Sarah Robbins and Peter Muckamaug. It then passed matrilineally through five generations of descendants within the Nipmuc tribe. Beginning with Sarah Robbins, it passed to her daughter Sarah Muckamaug, then to Sarah Burnee Philips, and finally to Sarah Boston (see Figure 2-3). The period of interest includes the time when the land was owned and occupied by Sarah Burnee Philips and her daughter, Sarah Boston (Figure 6-1).

At any scale of view an archaeological site such as the SB/SB Home Site is a palimpsest where soil and sediment strata become the pages of manuscripts on which past events have been written and over-written. As these layers are removed their puzzles are slowly deciphered by multiple researchers studying the site and its finds from different points of view. The soil matrix of a site is commonly viewed at multiple scales from landscape mapping, soil and sediment profile analysis, down to microscopic particle identification. Archaeological micromorphology is a part of geoarchaeology that studies the microstructure of soils and sediments at fine macroscopic and optical microscopic levels. The purpose is to identify the residues of past events, actions that may have occurred during the original occupation of a site, as well as the natural and historic forces that acted upon a site after its occupation. Special attention is paid to identifying possible anthropogenic deposits in the context of the naturally occurring biogenic and geogenic strata (Courty 2001; Karkanis and Goldberg 2007).

Fine-scaled analyses cannot be conducted in isolation. In fact, the archaeological micromorphologist must begin with a clear understanding of large-scale physico-temporal processes in order to supply fine-grained interpretations through thin section microscopy. This analytical approach is similar to opening a set of Matrushkas, or nested Russian wooden dolls. One starts with a general understanding of how the bedrock geology of the region evolved from ancient times; one moves to the landforms and historical geology of that region; and then studies the soils, land-use and hydrology of the local area around the site. While it may at first seem unlikely, bedrock formed hundreds of millions of years ago and the glaciations of the past millenia can inform our understanding of the human lifeways of the last three hundred years (Stone and Stone 2006; Walsh 2011). These processes, by giving rise to our modern and historic landforms, set the stage for parsing the anthropogenic deposits of an archaeological site (Stein 2001). For a discussion of the wider geological setting see the first chapter in this report.

Micromorphological Methods

The field of archaeological micromorphology studies soil and sediment micro-stratigraphy by preparing polished hand samples and thin sections and then using high resolution optical scanning and petrographic microscopy to visualize and record their structure and content in fine detail (Bullock et. al. 1985). Small fragile blocks of soil, called hand samples, are removed from a site, usually from the sidewall of an excavation in an area that promises diagnostic soil or sediment layers (Figure 6-2). The faces of each block are marked for original position in the wall, sample sequence and cardinal direction, and carefully wrapped for transport to the processing laboratory. There they are dried and impregnated with a plastic resin to produce permanent rock-like composites. The hardened blocks of resin and soil are then sawn

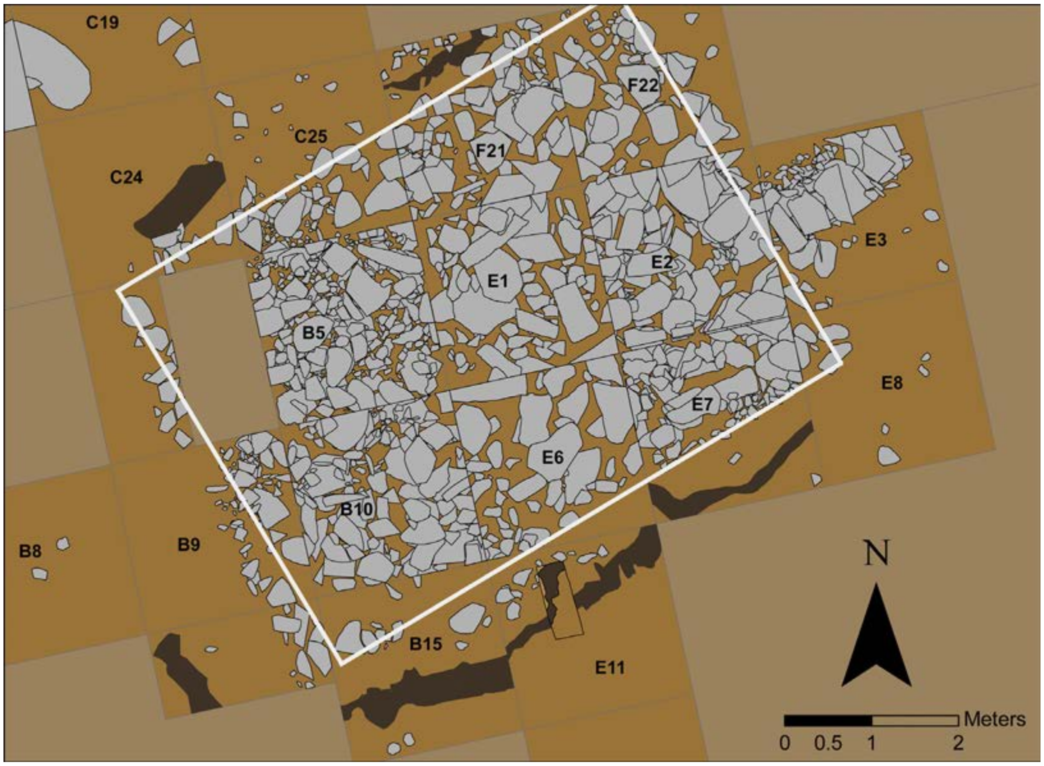


Figure 6-1. A schematic of the central portion of the SB/SB Home Site excavation showing the proposed 5 x 7 meter house in white. The rubble fill and original foundation are shown as grey stone. A subterranean drain feature extends from the house down slope to the ENE. Also shown is a dark brown stain of soil with high organic content surrounding much of the house. This may have been caused by run off from a pitched roof which caused lines of local erosion that was infilled with forest litter. It suggests a gabled roof with a ridge pole running ENE to WSW. The 2 x 2 meter excavation units E2 and E3 are the focus of this chapter and can be seen at the East end of the house.

and sliced vertically to reveal microscopic strata showing layers of rock, silt, sand and clay as well as micro-artifacts of past behavior (Figure 6-3). To facilitate this type of microscopic analysis a standardized preparation method has been borrowed from the field of geological rock analysis. A thin slice is cut from the impregnated soil sample, mounted on a glass slide and then further ground down to a uniform thickness of thirty microns, equivalent to one-third the thickness of a sheet of paper. This 'thin section' as it is called becomes the unit of microscopic study with its soil particles ground thin enough for light to pass through them. A polarizing microscope is then used at a magnification of up to 400x to describe and analyze the overall soil and sediment micro-structure, texture and content. Finer analyses are done as needed down to the limits of optical microscopy including the characterization of the surfaces of individual grains within the sample. Soil micromorphology has been successfully used in archaeology for over fifty years (Goldberg 1983) with a demonstrated ability to isolate or confirm strata associated with the construction, occupation and abandonment of a site (Huisman 2014).

Sampling at SB/SBS

During four of the eight excavation seasons at the SB/SB homelot micromorphological soil and sediment samples were removed from the site to answer questions posed by particular features at the site (Table 6-1). On June 24, 2008 two hand samples were removed from excavation unit E11, just outside the southwest corner of the original foundation wall to investigate the origin of a dark organic stain in the soil surrounding the house foundation. Both hand samples were impregnated with polyester resin and cut with a rock saw and

Figure 6-2. Field image of HS2010-5. This image shows the profile of the hand sample still in place after excavating the soil around it and just prior to removing it from under a large boulder. In the bottom 2/3rds of the profile the lighter sediment/soil layers of Feature 47 can be seen. At the very bottom of the sample the darker sediment is a glacially-derived sandy silt. The dark layer at the top of the sample includes charred wood that may derive to the burning of the abandoned house. When removed the sample is 12 cm L x 12 cm W x 16 cm H and its base was 163 cm below duff.

Figure 6-3. Impregnated hand sample HS2010-5 showing the north and west profiles. The sediment layers show deposition from water-born sedimentation flowing first in a westerly direction and then gradually turning northwesterly. Sample dimensions were 12 cm L x 12 cm W x 16 cm H.

polished to reveal the soil profile of the sample. From this sample one thin section was prepared to examine the microscopic changes in the soil composition at the boundary of the dark stain. On July 7, 2010 three hand samples were taken from within excavation unit E2 from what is believed to be the original cellar floor composed of compacted earth. All hand samples were cut to reveal their soil profiles and eight thin sections were made of these profiles to look closely at differences in the micro-strata in the sediment. On June 29, 2012 two bulk (loose soil) samples across the foundation wall at excavation units B4 and B5 were collected to investigate whether this area was the site of a chimney base and to confirm the original western limit of the cellar. To date no analysis has been done on these samples. On June 26, 2013 two large hand samples were removed from within the southwest corner of the foundation wall in excavation unit B10. The hand samples were impregnated, cut and polished to reveal their soil profiles and nine thin sections were prepared. On the same date ten bulk soil samples were also collected from specific levels to allow for a closer examination of coarse and fine fractions mounted as microscopic grain mounts separated from the microstructure of their sources within the hand sample. On June 27, 2013 at excavation unit K21 three cores were taken to examine the sediments in what appears to be a drain outflow area downslope from the house. These were impregnated, cut and made into eight thin sections to examine the sediment micro-

Table 6-1. Hand samples and thin sections from the SB/SB Home Site.

Unit	Hand Samples Taken	Thin Sections Made	Bulk Soil Samples Taken	Sample Date	Purpose
B5	-	-	2	6/29/12	Examine particle types and size range to help discriminate glacial sediment from cultural deposits
B10	2	9	10	6/26/13	Help to understand the post-occupation site formation processes
E2	3	8	-	7/7/10	Confirm the presence of cellar floor and drain features
E11	2	1	8	6/24/08	Characterize the dark stain in the soil around the perimeter of the foundation
K21	3	8	3	6/27/13	Examine the sediments and fabric of outflow feature

structure, particle size and content and how they changed through time.

To date the three hand samples collected on July 7, 2010 from excavation unit E6 dealing with the cellar floor and drain have been studied most intensively.

Sample Processing

All hand samples were carefully excavated and removed intact from their surrounding matrix. They were immediately either wrapped tightly in tissue and packaging tape or encased in plaster bandaging to maintain the sample's internal microstructure during transport and processing in the lab. Small holes were cut in the wrappings to allow moisture to vent without loss of sediment. All samples were placed in a 60ºC oven to promote thorough drying and once dried they were impregnated with polyester resin hardened with MEK hydrogen peroxide catalyst. After the resin had completely hardened, usually one week, a 2 cm vertical slice was removed from the hand sample using a rock saw. The slice was further divided into 5 cm (W) by 7.5 cm (L) x 2 cm (Th) sections. Enough of these thin section blanks, as they are called, were prepared to represent the profile of the hand sample. A professional petrographic services laboratory, Applied Petrographic Service in Greensburg, PA, was contracted to cut the 2 cm thick blanks down to 30 microns (0.030 cm) thick thin sections and mount them on 50 x 75 mm glass slides. In order to retain the potential for micro-chemical surface analysis no cover slip was applied to the thin sections. Instead of a cover slip the surface of the slide was coated with a thin layer of mineral oil to improve the visibility of the sample during high-powered transmitted light microscopy.

For macroscopic inspection, optical scans were made of both the thin sections and the hand samples. Selected faces of the hand samples, those that corresponded to the thin sections, were hand ground and polished using 150 to 1500 grit wet/dry silicon carbide sandpaper. The digital scans were made using an Epson GT-15000 at 1200 dpi resolution and saved as TIFF images.

All samples were recorded by type, date collected, number and subsample number. For instance the second hand sample collected in 2013 is designated HS2013-2. Thin sections were documented similarly. The first thin section made from the above hand sample is recorded as TS2013-2.1 etc. Bulk samples, i.e., small bags of unconsolidated sediment, were similarly recorded as BS2013-1 etc.

Description and Discussion

Hand Samples 2010-4 though 2010-6 documenting a possible catchment and drain feature

Hand Sample 2010-5 was removed from excavation unit E2 near the south east corner of the cellar at a depth of 163 cm below duff. It measured

Figure 6-4. Excavation units E2 and E3 showing the cellar and eastern foundation wall of the SBP/SB Home Site. Under the North/scale marker the foundation wall runs NNW/SSE down the right of the image. Feature 47 is identified as a light-colored beaten floor layer of the cellar. Also shown is the subterranean drain leading eastward from the cellar. The locations of three micromorphology hand samples are shown in red. The solid red lines indicate the faces of the samples from which thin sections were made. The dotted red lines indicates faces that were optically scanned but not thin sectioned. The three samples were taken to understand the composition of the thin floor-like layer visible as the lighter soil in the bottom of the excavation.

approximately 12L x 12W x 16H cm. This and the two other hand samples (HS2010-4 and HS2010-6) removed from excavation unit E2 confirm the discovery of a beaten cellar floor, a layer of sediment compacted by being repeatedly walked upon (Figure 6-4). Closer examination of a thin section made from the hand sample TS2010-5.2 shows finely laminated sediments sloping slightly downward in a westerly direction in its lower half and in southwesterly direction in its upper half. Such fine micro-laminations suggest that while the surface served as a floor it was not deliberately laid down as such. Instead the analysis suggests that it was the by-product of sediment-bearing water that was flowing inward toward the center of the cellar and just to the south of the main cellar drain that takes water out of the cellar in the opposite direction downslope and away from the house foundation.

Using thin section TS2010-5.2, one sees that this sediment structure is banded with simple packing voids meaning that the particles appear to have been packed in place with little post-depositional alteration (Figure 6-5). The rhythmic bedding of the laminations suggests that there were many separate flow events building up the sediment profile. One sees coarse particles of sand alternating with fine sand and silt within each lamination suggesting faster flow deposited the coarse grains and then tapered off allowing the finer sands and silt to deposit. So while the layer was walked upon and served as a floor it does not appear that it could have been deliberately laid down for that purpose. The dominant mineral is quartz and quartzite-bearing sand and silt with large minor fractions of charcoal, feldspar, hornblende and biotite, all commonly found in the surrounding glacial soils and sediments.

In any sediment stream that is depositing par-

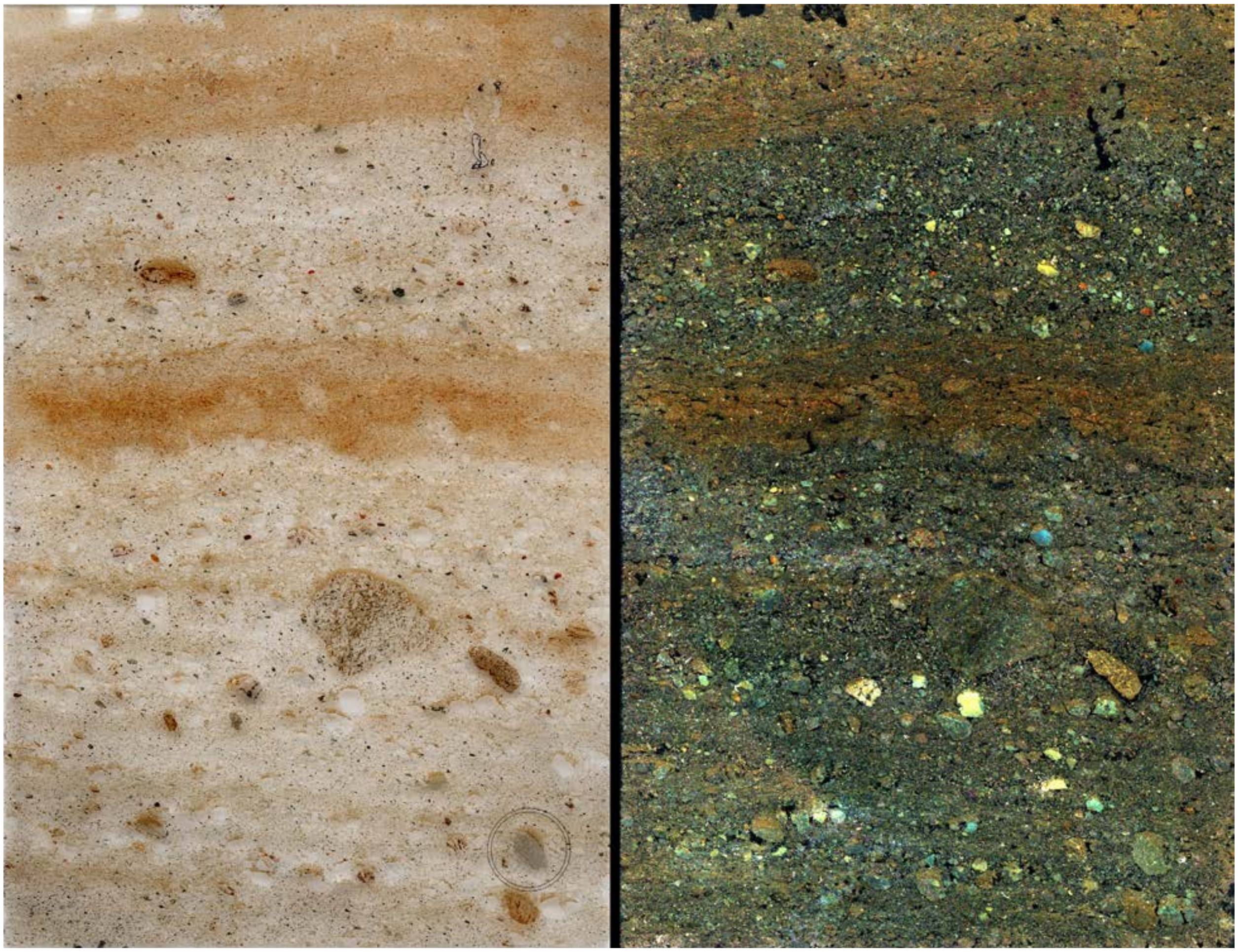


Figure 6-5. Two views of the 50 mm x 75 mm thin section, TS2010-5.2, taken from the middle of the north face of the hand sample HS2010-5 shown in previous figures. A conventional optical scan of the thin section is shown to the left with a scan of the same thin section through crossed layers of polarizing film is on the right. The lower half of the section shows fine laminations of coarse to fine sand grains composed of quartz, hornblende, feldspar and biotite as well as multi-mineral rock fragments of schist. Silt and clay in the lower half are limited to very thin micro-layers between the sand lenses of sand and as silt-capping visible on the coarse grains. The fine pebble circled in the lower right corner of the conventional scan is discussed in more detail as a representative of this form of silt-capping (Figure 6-8).
In the middle of the thin section a period of silt and clay sedimentation occurs and is repeated at the top edge of the section. These two sediment bands suggest the free flow of water was temporarily stopped leading to puddling. In the scan using polarized film these bands can be seen to be made up of ovoid flocculation which typically occurs when clays that were forced into aqueous suspension by mechanical action gradually fall out of suspension due to the alignment of surface charges on the faces of particles (see also Figure 6-10).

ticles of variable size one expects the longer and flatter sides of the particles to orient themselves along their most stable surface, that is, parallel with the bedding of the stream. This offers the least resistance to flow and allows the particle to come to rest during the flow. This orientation can be altered as the result of obstacle scouring during subsequent flow events. If during a succeeding flow, the particles already deposited on the bedding surface are large enough to resist removal they may nonetheless be affected by the removal of smaller particles around them. When water encounters an obstruction to its flow the area around the obstruction experiences a form of turbulence

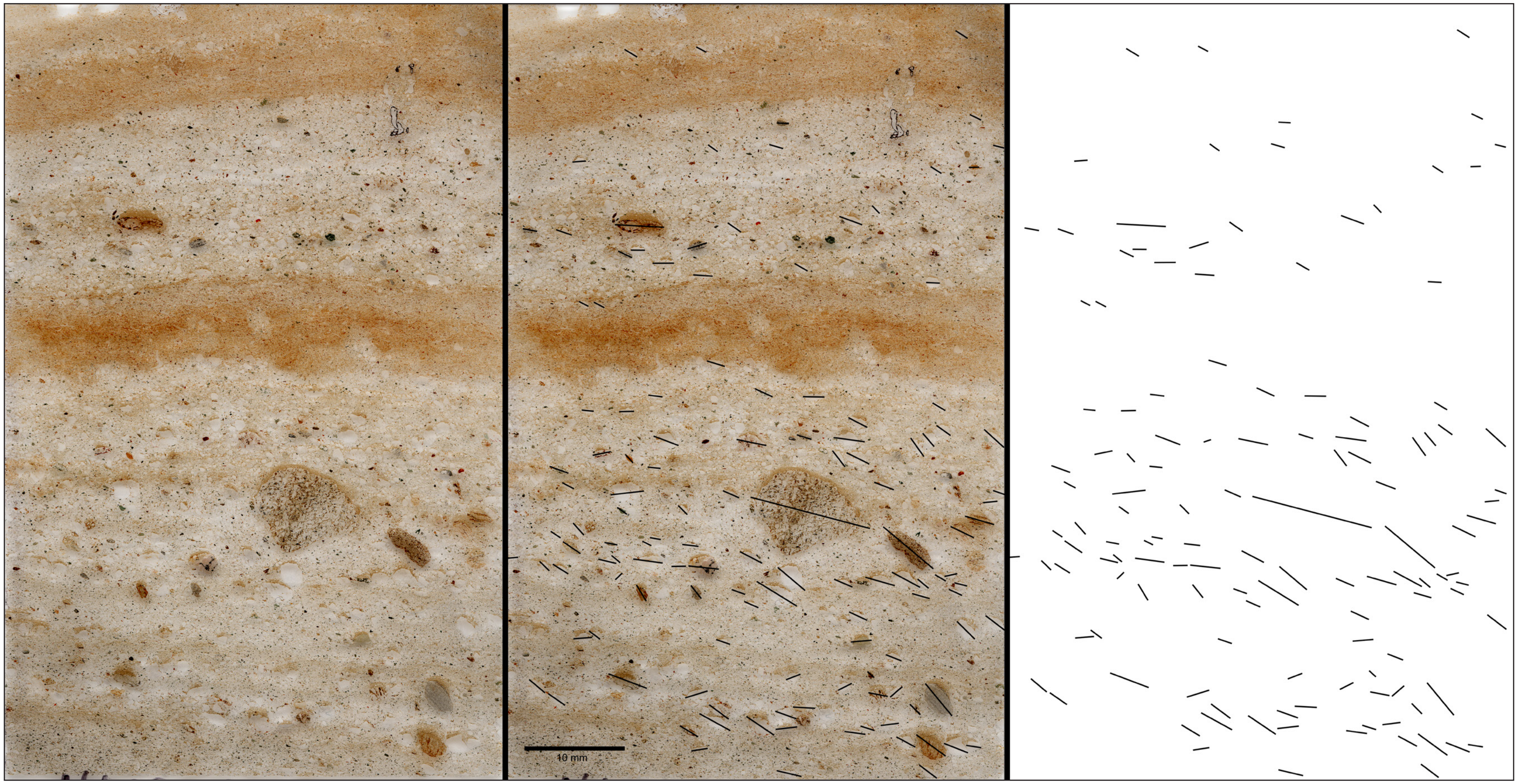


Figure 6-6. The optical scan of thin section TS2010.5-2 with strikelines added to the views in Figure 6-5 to show how approximately ¾ of all medium to coarse sand grains show a tilt downward into the direction of flow. This is interpreted to show that a repeated sedimentation occurred such that it created a very limited form of horseshoe scour around the coarse grains strong enough to erode their positioning but not so strong that they were removed from the layer. These larger grains gradually became dug into the surrounding layer and rotated from a presumed initial position parallel with that layer as fresh small particles were jammed in front of the coarse grains. This suggests that repeated and controlled fast/slow flow events occurred with a very limited maximum flow energy followed by a trailing slow flow that deposited fine particles in the voids created during fast flow. Each field of view is 50 mm (W) x 75 mm (H).

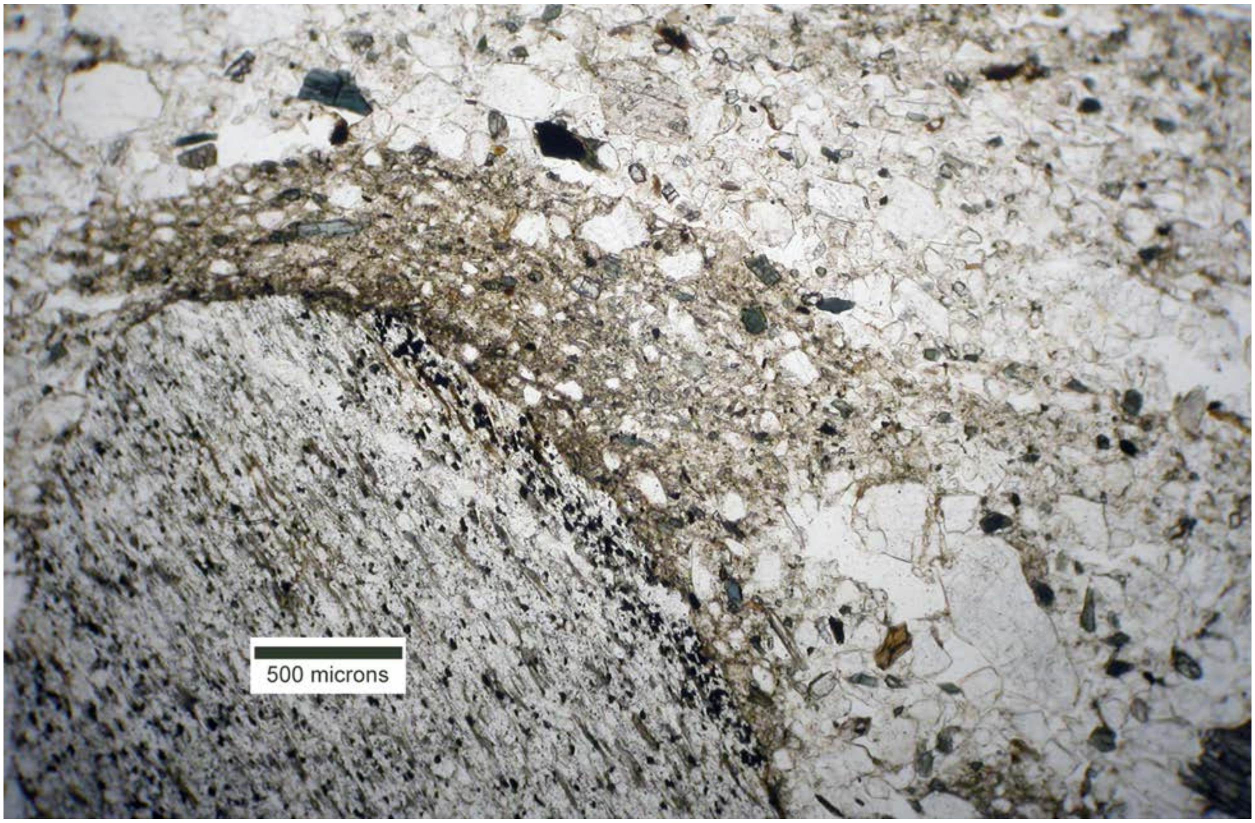


Figure 6-7. Silt-capping due to repeated fine particle deposition during the slow period of the fast/slow flow events, here called 'flow-capping'. This is shown on the fine pebble of schist from thin section TS2010-5.2 circled in Figure 6-5.

called horseshoe scour (Nichols 2009:66)) which causes removal of the matrix particles surrounding the obstruction on all sides especially on the downstream side. When one stands on an ocean beach in shallow surf one can see this process at work when the water from a wave that has crashed and run up the beach recedes back to the sea. The sand around one's feet will be removed (scoured) by the rushing water tipping one forward toward the sea. Similarly in the thin section the larger obstructing particles are seen to tip downward in the direction of flow. When the direction and velocity of succeeding water flow events are controlled, the obstructing particles, like one's feet on the beach, will remain in place and may show a slow rotation due to scouring. The downstream edge of the particle will tilt downward as turbulence at that end removes finer sediments and carries them further downstream. This leaves a void that the obstructing grain settles into. Within the cellar of the SB/SB homesite this effect can be seen in thin sections such as TS2010-5.2 giving a tilted orientation of most coarse sand to fine pebbles particles (Figure 6-6). In the image solid lines have been drawn over oblong particles following the longest dimension of each particle to highlight this effect. In the thin section about four out of five particles in the size range of 1 to 5 millimeters in their longest visible dimension show this scour effect.

Looking even more closely one sees a process, called silt capping, that documents how the particles have gradually rotated. Silt capping is usually considered a soil formation process where silt and clay particles being translocated during the downward flow of ground water attach themselves to the tops of the stationary sand grains in the soil matrix (Stoops 2003:109). In thin section TS2010-5.2 one sees a different process at work. The radial layering of the capping suggests that the sediment was carried laterally in the separate flow events mentioned above attaching itself to the tops of the obstructing particles during the slow

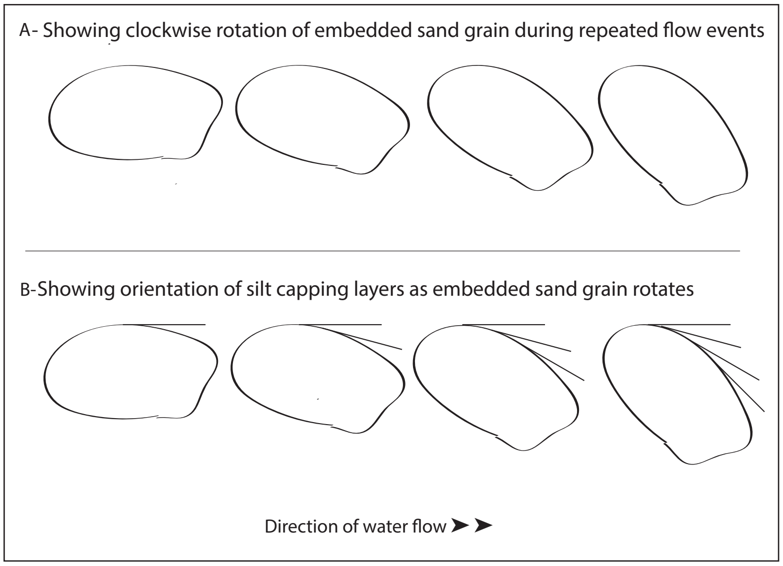


Figure 6-8 A and B. Schematic of how the flow-capped layers on the coarse pebble in Figure 7 built up as the particle rotated due to erosion:
A- Schematic of obstacle scouring where a sand grain gradually rotates due to repeated controlled flow events that are strong enough to undermine and remove small particles of fine sand and silt that form its bedding but not sufficiently strong to dislodge the larger sand grain itself.
B- Schematic of silt capping that occurs during the slow tail-end flow of each flow event where small particles settle onto the bed surface forming a coherent micro-layer and record the rotational position of the larger sand grains.

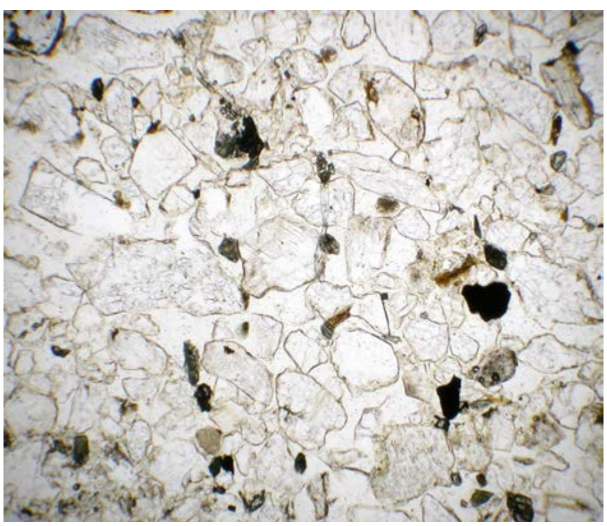


Figure 6-9. View of the 'cleaned' looking sub-rounded and sub-angular sand grains from TS2010-5.2 to be contrasted with the typical colluvial soil shown in the thin section TS2013-2.3 in Figure 6-11. The field of view is 2.5 mm (W) x 2.1 mm (H).

period of each flow event. As the obstructing sand grains rotate in place due to obstacle scouring, the attachment point of each succeeding capping layer gradually moves with the obstructing grain in the upstream direction (Figures 6-7 and 6-8).

Unusually 'clean' quartz sand of limited size range shows both sub-rounded and sub-angular forms (Figure 6-9). In glacial soils angular and sub-angular quartz grains are the mark of glacial tills, sediment particles that have been ground and moved by glacial action with relatively little water-borne movement. Rounded and sub-rounded quartz sands are the mark of fluvial and glacio-fluvial sediments, which are commonly derived from glacially-generated sediment that was subsequently worn down or rounded by aqueous tumbling in rivers and streams. Drumlin soils being glacial till deposits commonly contain angular to sub-rounded grains in their coarse fraction, predominantly the quartz sand grains in this case, while glacio-fluvial and riverine deposits contain rounded and sub-rounded grains in their coarse fraction. Because of their different origins the two types of deposits are not usually found intimately mixed in the way they are in this sample. The SB/SB site on

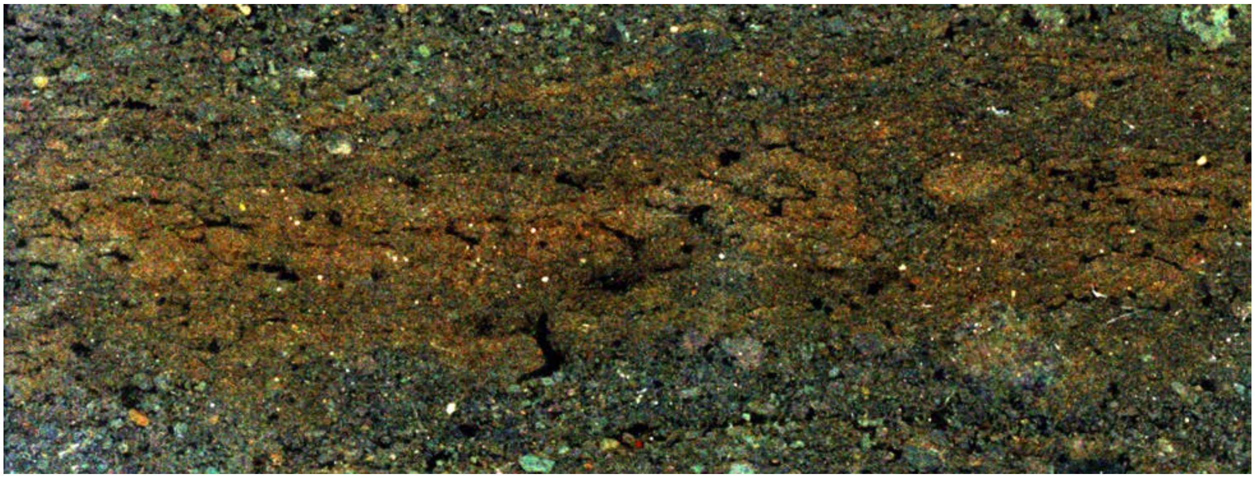


Figure 6-10. Ovoid flocculation. This is a detail of thin section TS2010-5.2 showing the ovoid flocculation characteristic of clays that fall out of a mechanically created aqueous suspension. Mechanically created suspensions are characteristic of wash water rinses as well as other sources. The field of view is 35 mm (W) x 16.7 mm (H).

the lower slope of Keiths Hill is near the boundary of the glacial fluvial and till soils. One explanation of this mixing may be that they resulted from the laundering of clothes that accumulated soils from multiple locations.

In two areas of the thin section a break is seen in the pattern of repeated micro-lamination. Two bands of silty-clay, devoid of larger sand grains, can be seen in the upper half of the thin section. This shows there were periods of reduced flow rate during which the water deposited fine sediments only. Looking at how the layers are formed one sees that there is a pattern of ovoid clotting called flocculation. One can see this best in the polarized image of the thin section (Figure 6-10). Flocculation occurs when the electro-static charge on the surface of suspended silt and clay particles dissipates upon standing. The particles, which in solution were separated by this charge, then cohere to one another and fall out of solution forming these oblong 'clots.' This typically occurs to fine particles that have been mechanically dispersed into water. When the water surrounding those particles becomes still and cools, its particles clot and fall from solution.

Taken together these observations of TS2010-5.2, the micro-lamination of sediments, the controlled range of water flow velocity, evidence of repeated fast flow followed by slow flow, the unusually 'clean' sand grains, the rotational silt capping and flocculation suggest a form of human-induced sedimentation, the residue of a washing, perhaps laundering, operation at this location, the southeast corner of the home site. There may have been a barrel or tub placed just outside the house where wash water would be drained into the east end of the cellar. This would explain the direction of the slope of the laminations (away from the wall towards the center of the cellar), the apparent unnatural limit to the range of flow rate variation, the consistent sediment load and similar quality, consistently short flow durations and many repetitions. The cellar may have served as a catchment basin where small items such as buttons and coins could be retrieved from each wash before they became inaccessible in the subterranean drain (Figure 6-2).

Two Hand Samples, HS2013-1 and HS2013-2, were taken from excavation unit B10 from the southwestern corner of the cellar just inside of the foundation wall to characterize the sediment entering the cellar from the surrounding area. The interest was to see if there were changes in the profile of that sedimentation that would suggest, when compared with other sedimentation samples that an addition to the house was placed on that side. The samples show typical surface runoff sediments from the hillside. They built up over time as slope wash entered the cellar area carrying layers

Figure 6-11. Example of run off from the west side of the cellar showing how different the sedimentation is compared to that of TS2010-5.2 with a wide range of translocated soil particles. The field of view is 50 mm (W) x 75 mm (H).

of organics, silt with some clay and pebbles. This upslope exposed soil was heavily bioturbated by worms and insects prior to being washed into the foundation. This includes small rounded granules of silt and fine sand that were translocated intact from the surrounding hillside to the cellar deposit. The water flow appears to have been heavily laden with sediment that preserved the granular fabric of the soil (Figure 6-11).

There is no change in the character of this sediment that would suggest an addition being built in this location. However that may not mean that no addition was built. Organisms such as worms mine the nitrogen nodules of plant roots and while an addition covering the soil would discourage the growth of smaller plants there would still be many roots from trees and bushes capable of reaching under an addition yielding a bioturbated soil from under an addition that did not look different from the surrounding exposed soil.

While the micromorphological samples could not confirm that an addition was built at the western end of the house, sample TS2013-1.4 shows how the strata of translocated soils was mined by various living organisms suggesting, along with the presence of charred wood, that this marks the period when the house structure collapsed allowing light, plant growth and worm bioturbation. When compared with the human-induced sedimentation of thin section TS2010-5.2, one sees a stark contrast between this colluvial soil and washed sediment.

Analysis of a black soil lens at the perimeter of the foundation

In 2008, Feature 28, a lens of black soil surrounding the house foundation was sampled in an effort to understand its significance to the house construction, its occupation as well as post-occupation site development (Figure 6-1). The deposit appears to have formed within a linear depression in the soil. Above the black lens is a blond sandy soil quite unlike the surrounding soils that may have been imported as erosion fill from a nearby sandy beach. Several bulk samples were taken as well as one hand sample, HS2008-1, from which one thin section, designated TS2008-1.1, was made using the method described above. The deposit under microscopy is observed to be composed of a coarse mineral fraction similar to that of the surrounding hillside soils containing quartz, feldspar, hornblende and biotite in a similar size range and particle morphology. The quartz grains are predominantly angular to subangular suggesting that they are derived from glacial till as opposed to a fluvial or glacio-fluvial source which would tend to deliver sand grains with rounded edges. This suggests that the non-organic component of the black stained area is the result of local colluvial flow or slope wash. The black organic component of this feature is composed of both charred woody matter as well as humic residues from plant decay processes. Charred particles show the micro-structure of the original woody matter very clearly with well-defined cell

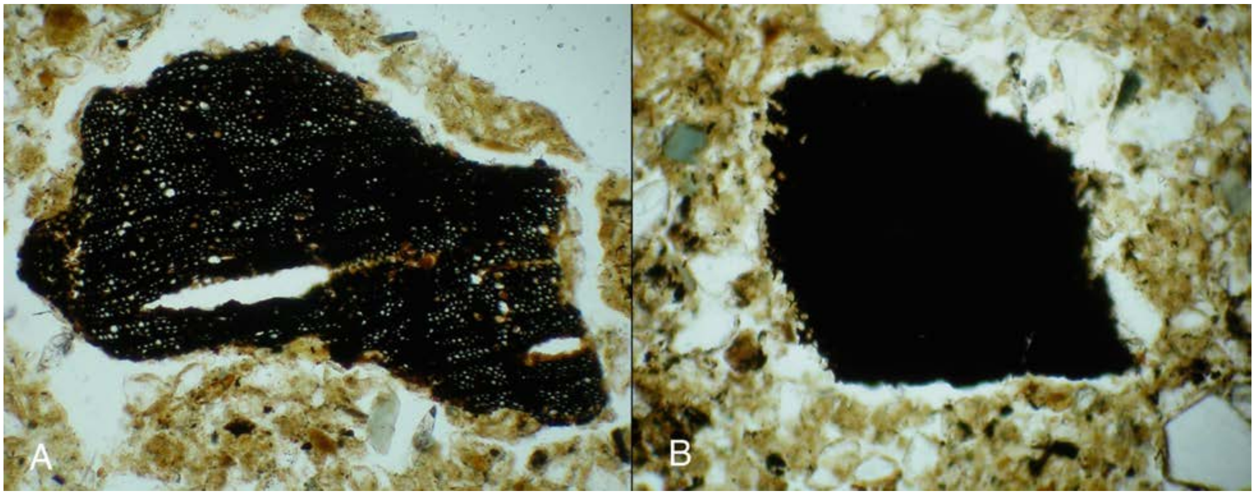


Figure 6-12. Charred versus humic matter in black stain surrounding house foundation. When viewed in thin section the pores of charred woody matter (A) are clear and show the cell structure of the wood. The pores of humically decomposed woody matter (B) are clogged with decay products obscuring the cell structure and indicating that the material decayed in place. The fields of view are (A) 875 microns (W) x 680 microns (H) and (B) 865 microns (W) x 680 microns (H).

structure. Decaying plant matter is in the process of transforming into undifferentiated humic matter with many small nodular amorphous decay products surrounding and filling the voids of the original plant material (Figure 6-12). This suggests that some of the black color of the lens is due to bacterial and fungal decay products of plant matter that may have been washed down with the mineral fraction and/or blown into the depression. Qualitative field XRF readings taken on June 24, 2010 by Dr. Bruce Kaiser using a Bruker Tracer III SD Portable XRF Analyzer noted a higher level of manganese in the black soil lens compared with the surrounding soil. This suggests that the color may also be due to in situ deterioration of organics. Insoluble soil manganese like this is often left behind by bacteria and fungi which use the variable oxidation states of manganese ions found commonly in soils to facilitate electron transfer during the breakdown of the plant remains. It builds up over time and cannot be washed out by normal soil water even after the bacteria and fungi have consumed all organics and died off themselves.

These findings suggest that the black soil staining that forms a linear pattern just outside the north and south walls of the foundation was formed due to infilling of a line of concentrated erosion that occurred during occupation of the house (Figure 6-13). It also suggests the position of the roof drip edge which suggests that the ridgeline of the house ran east-west with gables at the east and west end. Extending this analysis further, the partial soil stain outside the west end of the foundation (Figure 6-1) may suggest that a shed roofed add-on without a dug foundation was built sometime after the initial house construction (Figure 6-14).

Summary

The samples from excavation unit E2, from the southeast corner of the house foundation, suggest that a repeated washing activity area occurred just east of the foundation. The water carried a low proportion of entrained sediment and left behind a sediment that looked in the field like a floor and, from the compaction of that layer, was probably walked upon. However closer inspection of thin section TS2010-5.2 showed that the layer is composed of a series of micro-laminations containing similarly sized sand grains tilted downward in the direction of flow by obstacle scour. This was confirmed by examination of the silt capping on selected sand grains which showed that as they gradually rotated the capping occurred at a progressively upstream edge of the grain. Examina-

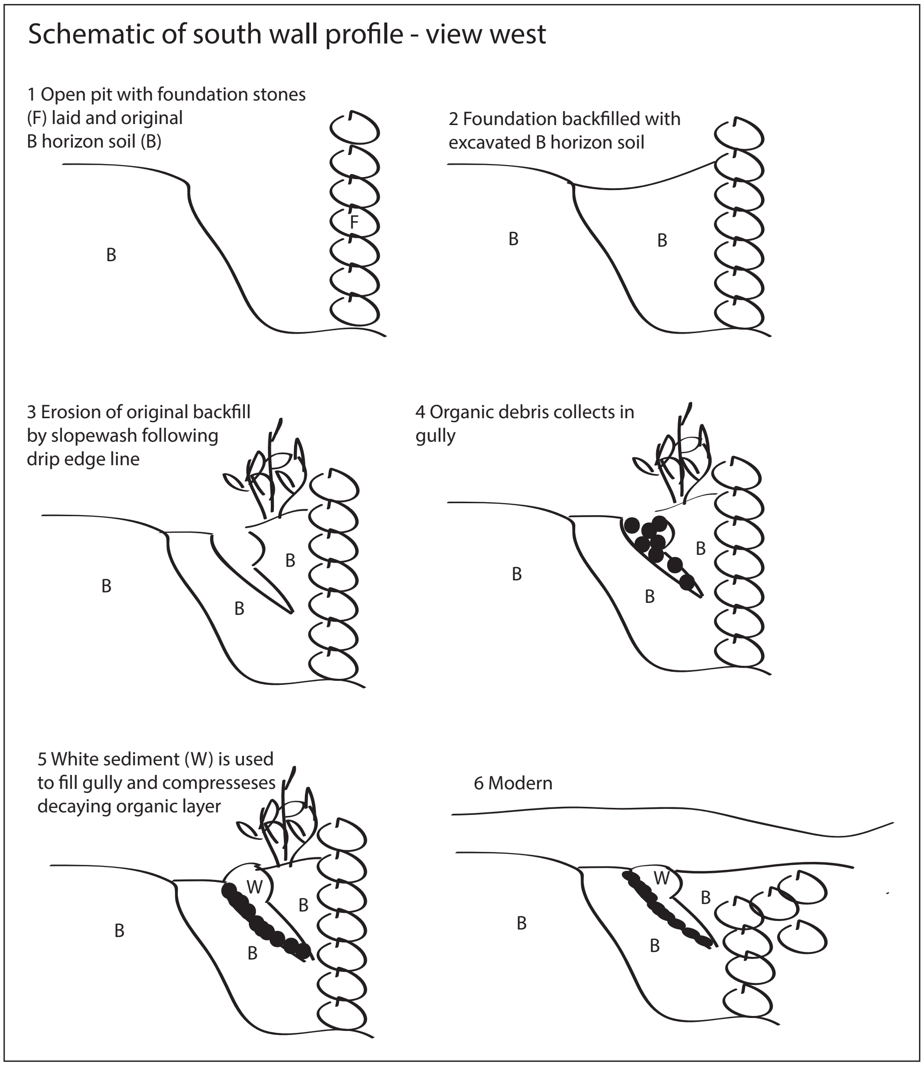


Figure 6-13. Schematic view showing a possible sequence explaining the development of a black soil lens under an imported blond soil.

tion of the two bands of finer sediments in that thin section showed flocculation in the silt and clay suggesting that the particles were either suspended by nearby mechanical or chemical action both of which support the interpretation of washing as a source for the deposit. It is suggested that a tub or barrel was used for some routine washing, such as laundry work, just outside the house. The rinse water was then dumped into the cellar the east end of which may have been used as a catchment to recover items before the water entered the underground drain/culvert. Samples taken from excavation unit B10 at the west end of the foundation were used to highlight the differences between the E2 washing residues and slopewash with its high proportion of entrained soil granules.

Sampling of the E11 excavation unit was used to examine a black lens of soil running just outside of the north and south edges of the foundation and partially on its west end. The mix of charred wood with bio-deteriorated organics suggests that soil had been eroded and that organics accumulated for a period of time in the resulting linear pit. It is likely that the erosion feature developed during the occupation of the house. It was filled with blonde non-local sediment. The mixed origin of the organics and the location around the foundation walls suggests that runoff and a drip edge caused the

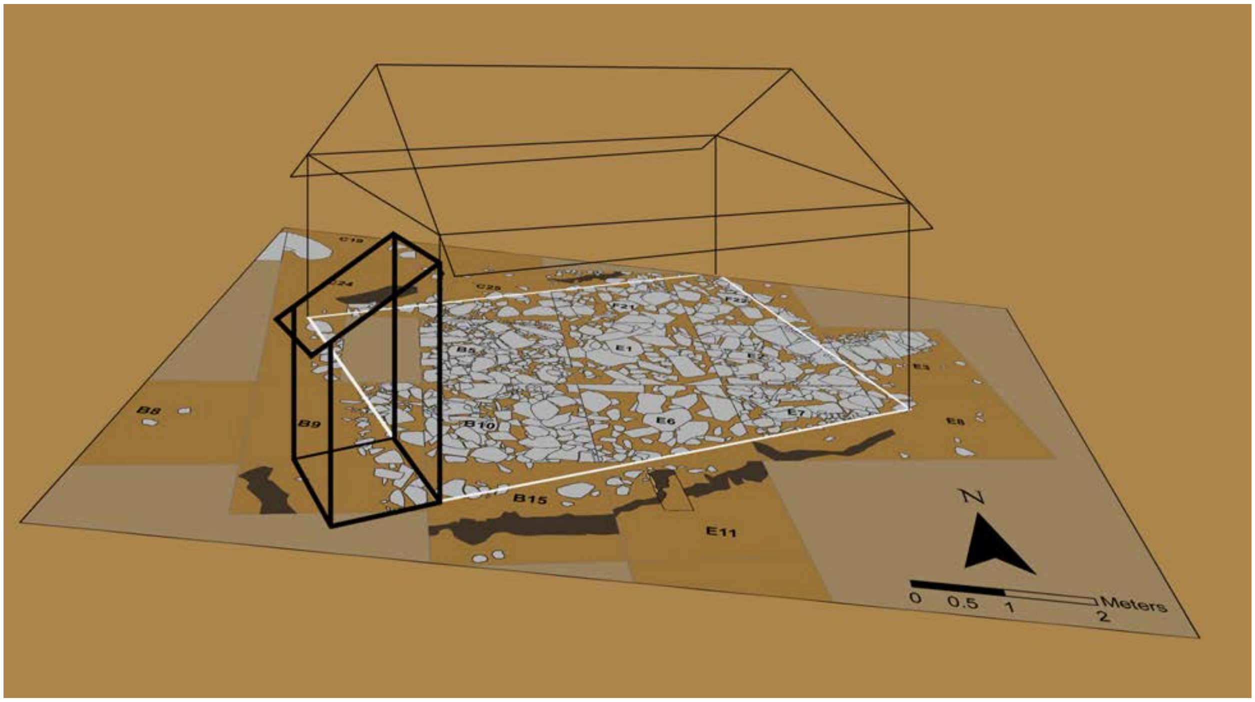


Figure 6-14. 3D schematic showing a possible orientation of the house with a shed (bold) attached at the southwest corner.

erosion and implies some form of gabled house with a ridgeline running east to west.

Conclusion

At the Sarah Burnee/Sarah Boston site the use of soil and sediment micromorphology creates an added opportunity for archaeologists to reconstruct past activities. The method depends greatly upon the visual analysis of microscopic soil and sediment residues that often contain traces of past activities that may be no longer be visible in the larger archaeological record. It is part of a collaborative approach where the application of micromorphology can confirm and expand on interpretations made by the team of archaeologists at the site and lead to a more nuanced and complete understanding of its heritage.

Chapter 7: Analysis of the Botanical Materials from the Sarah Burnee/ Sarah Boston Farmstead

Heather B. Trigg

Introduction

The purpose of the macrobotanical analysis conducted at the Sarah Burnee Phillips/Sarah Boston farmstead was to understand the relationship between these households and the botanical environment. Plants play a profound role in many societies as the source of raw materials for many aspects of peoples' daily lives: for construction materials, tools, medicines, dyes, fuelwood, household goods such as basketry, floor coverings, and clothing, as well as providing, in most societies the majority of calories. Likewise, peoples' activities transform environments, producing microenvironments around their homes as they go about their daily lives. On a larger scale, activities such as producing food, managing woodland resources through fire, or selectively encouraging or culling plants alter and re-structure plant communities. Because of this, plants recovered from archaeological contexts have the potential to provide a powerful window into the relationship between people and their environments as well as society more generally. In this analysis we sought to recover evidence of the plants used by these households for food, firewood, and perhaps medicines as well as the longer term impacts of activities on the land.

The challenge, especially in exposed, temperate environments such as the location of the Sarah Burnee Phillips/Sarah Boston homestead, is the recovery of plant materials that speak to these interactions. We undertook several analyses for obtaining and interpreting the remains. There was an intensive program of sediment sampling for macrobotanical materials on the SB/SB homelot. We conducted a modern vegetation survey of the homelot because historic landuse has been shown to structure contemporary vegetation (Foster 1992; Foster et al. 1997; Hall et al. 2002). These data may allow us to reconstruct some aspects of past use and provide modern context for the palynological analysis. Finally, we examined a pollen core taken from wetlands near the Deb Newman site to develop of picture of the regional vegetation history from deep time to the present. The integration of these data sources provides some indication of Nipmuc interactions with the botanical world in the past.

Historical Vegetation Context

Historic accounts of the vegetation provide a nearly 250-year record of the types of trees and land use practices around Grafton. One of the earliest written accounts comes from Peter Whitney, a minister who visited all of Worcester County's communities in 1793, describing the ways land was used along with the types of trees he encountered. About Grafton, Whitney (1793:168) wrote the land was "good for Indian corn, wheat, rye, oats, barley and flax … well adapted to orcharding and all kinds of fruit trees." The hills surrounding the town center were covered with "walnut, oak of all kinds, chesnut (sic), some pitch pine, butternut, button wood (*Platanus* sp.), black and white ash, and birch" (Whitney 1793:169). Based on Whitney's 1793 data, Grafton lies in "transitional hardwood with plains vegetation" type (Foster 1992). The extant vegetation on the homestead bears some resemblance to the 18th-century data, although it is recent.

Land use history is important for understanding forest composition because vegetation trends depend not only on successional processes and pre-existing vegetation, but the ways in which land was used and abandoned (Foster 1992). Research by Foster (1992) on the Harvard Forest lands, located in northwestern Worcester County, has divided the post-Anglo arrival history into five periods based on landuse: speculation (1730-1750), low-intensity agriculture (1750-1790), commercial agriculture and small industry (1790-1850), farm abandonment and industrialization (1850-1920), and residential period (post 1920). During the speculation period, Anglo-American farmers began moving into the area and establishing farms; small scattered farms were the norm during the 18th-century, and Foster estimates that 50% of the land was cleared by 1800 and 85% by 1850. The land was cleared for cattle and sheep, although areas unsuitable for agriculture, such as rocky slopes and gullies, and wetlands provided trees for timber, firewood, and other forest products and land for grazing. During the residential period, reforestation has taken place and in northwestern Worcester County; 90% of the land has been reforested. Foster's analysis of historic records and recent vegetation surveys showed that the timing and nature of land use (pasturage, tillage, forestry), abandonment and reforestation has an impact on current vegetation. Despite the extent of the reforestation, it was recent and forests are young. Given the proximity of the Harvard Forest, this landuse history was probably similar to the activities around Grafton and the SB/SB farmstead.

Looking at the landscape even deeper in time, there is substantial data indicating Native American landuse, especially forest management had an impact on the vegetation even prior to European arrival. Most evidence suggests that maize agriculture in New England was concentrated in the large river valleys and along the coast (Chilton 2002). Thus agriculture in the Grafton area, if it existed was probably limited. Yet, the extensive nut-trees, walnuts, hickory nuts, acorns, and chestnuts were an important subsistence resource and would have been a draw for collecting in the area. And secondary successional areas, like the area around the Deb Newman site, offered dense stands of highly productive fruit and nuts.

Macrobotanical Analysis

In general, plant materials in open, temperate contexts are exposed to decay. Different plant parts, leaves, seeds, and wood, may differentially persist, with the more delicate parts decomposing more quickly (Miller 1989). Charring renders plant parts chemically inert and prevents decomposers from breaking down organic materials, although charred materials are vulnerable to mechanical breakage. It is typical that for open archaeological sites of the deep past, uncharred materials are not considered archaeological, but rather more recent intrusions. Because of the recent nature of deposits at the SB/SB farmstead, we carefully considered whether uncharred plant materials might be archaeological. We looked for the preservation of delicate plant parts, uncharred but clearly archaeological wood, the condition of any uncharred seeds (whether they looked recent and fresh with little decay or aged with some evidence of decomposition), and finally we considered the nature of the uncharred seeds (whether delicate or woody). Some charred plant materials were recovered in the screens, but we relied on a strategy of intensive collection of sediment samples for flotation and macrobotanical recovery.

Sampling

Over 240 flotation samples were taken from the SB/SB site (Appendix A, Table A-3). The sampling strategy tended to target discrete features. After the first half of the feature was removed and the profile map drawn, a 2-3 liter flotation sample (or as much possible) was taken from the second half. If the feature was stratified, separate samples were taken from each stratum. In the house foundation, which was deep and the strata thick, the samples were collected from every 5 cm level. We avoided taking samples from obviously disturbed contexts. Samples were placed in plastic bags labeled with the sample type and usual provenience data. Additional samples, up to 4 liters, were taken from other contexts that appeared promising. Of these 240+ flotation samples, 135 have been floated, and 58 analyzed as of March 2014 (Table 7-1). We chose samples that provided two columns through the house foundation in units B5 and B10, other contexts within the foundation, and those associated with features.

Flotation Sample Laboratory Methods

Each flotation soil sample was processed with the Fiske Center's Dausman Flote Tech A1. Following Toll's (1989) methodology, we quickly scanned some samples to assess their potential. For most analyzed samples, we scanned the light fractions for charred seeds, related plant parts and wood. The samples were scanned under 10 to 40x magnification using a binocular dissecting microscope. All charred seeds, related plant parts, and botanical tissues (excluding wood) greater than 2 mm in size were removed and identifications were attempted. A grab sample of 20 to 25 pieces of charred wood greater in size than 2 mm was collected from each scanned light fraction, and identifications were attempted with the low power dissecting scope. Some samples did not contain enough wood for the standard sample; in these cases, we examined as many pieces as were available. When necessary, the charred wood was viewed under a compound microscope at 200 to 600x for more thorough identification. Wood and seeds were both identified as specifically as possible. Botanical materials were identified using published references (Cappers et al. 2006; Hoadley 1990; Martin and Barkley 1973), the United States Department of Agriculture plant database (http://plants.usda.gov), and the University of Massachusetts Boston's comparative collection.

Both uncharred and charred seeds were noted, but because the seeds did not come from a protective preservation environment, such as a waterlogged deposit, inside a closed structure, or a privy, we were skeptical that the uncharred seeds were associated with the archaeological deposits, and considered them more recent contaminants.

Macrobotanical Results

From the flotation samples, we recovered a small number of seeds and nutshells, as well as numerous small pieces of charcoal. Many samples, especially those from the house foundation contained uncharred seeds. Uncharred seeds include Caryophyllaceae, *Phytolacca,* numerous *Chenopodium* and *Rubus,* Solanaceae, and Polygonaceae. Below we discuss the charred seeds and wood discussing their uses and the environmental zones from which they come.

Seeds

The samples did not yield many charred seeds: only a few taxa of seeds that could be related to foods, two types of domesticates, a few locally available, non-cultivated economically important plants, and a few that were probably incidental seeds were identified (Table 7-2). These included small quantities of maize and a single bean, but most of the charred assemblage consisted of the woody seeds of fruits that are generally resistant to decomposition. We also recovered a large number of uncharred raspberry seeds, typically the most numerous taxon in many samples. Rather than relating to the archaeological context, it is most likely that these are an indication of the disturbance caused by rodents burrowing and nesting in the foundation in the recent past. It is notable that we did not find any uncharred apple seeds in the samples despite the present of a tree directly above the house foundation.

Domesticates

Maize *(Zea mays)*—While no whole kernels or cupule fragments were found, we recovered 3 fragments of maize kernels. Two fragments were recovered from Excavation Unit B10, from the house foundation, and one fragment from Unit C13 (Table 7-3). Domesticated in the New World and grown in gardens or small fields, maize was one of the three sisters along with the common bean and pumpkins/squash. In New England, prior to the arrival of Europeans, it was most commonly grown along the coast in the fertile valleys of large rivers in ridged field systems such as the one discovered on Cape Cod (Mrozowski 1994).

Bean *(Phaseolus vulgaris)*—One fragment of a possible common bean was recovered (Table 7-3). This was recovered from Level 1 of B5, the house foundation. Domesticated in the New World, beans were one of the three sisters and were grown among maize plants. The recovery of the bean in the upper layer of the house foundation may speak to some churning of the deposits, or the bean may merely be a very recent (although charred) contaminant.

Fruits

Huckleberry *(Gaylussacia* sp.)—We found three huckleberry seeds. All were recovered from the fill layers of the house foundation B10 (Table 7-4). Huckleberry is a shrub low growing up to 1 m tall. In Massachusetts it is common in heathlands and oak forests, oak-pine, especially bear oaks *(Q. ilicifolia)*. It grows well in dry woods and dry acidic soils. While it does not tolerate burning, it sprouts easily from rhizomes. The fruits were consumed like other berries: dried, made into jams, and eaten raw. A tea made of leaves was commonly used as a cold remedy, to treat arthritis and other ailments.

Table 7-1. SB/SB site analyzed flotation samples.

Sample #	Context #	Block	Unit/Grid	Quad	Level	Strat
25	272	C	13	West 1/2	A	A
29	280	C	13	West 1/2	C	C
31	281	C	13		B	B
32	281	C	13	West 1/2	B	B
33	281	C	13	West 1/2	B	B
35	281	C	13	West 1/2	B	B
53	265	H	2		1	
54	265	H	2		1	
55	312	F	11	SE Quad		
56	313	E	1		B	B
59	322	C	14	East 1/2	3	A
61	325	C	14		5	
64	356	B	5		6	
65	359	C	25		4	
67	337	B	5		1	A
400	416	B	5	East	3	A
417	565	B	5		8	A
423	575	B	5		10	A
424	577	B	5		11	A
426	582	B	5		12	A
430	594	B	5		14	A
445	603	B	5		16	A
452	613	B	5		17	A
455	613	B	5			
458	619	B	5		18	A
459	622	B	5		19	A
460	626	B	5		20	A
462	627	B	5		21	A
473		B	5		24	B
477	647	B	22	F44	5	
480	654	B	5		27	B
482		B	5		28	AB
495	676	B	10		8	A
500	685	E	1		9	AB
502	689	B	10		11	A
503	690	B	10		12	A
506	696	B	10		13	A
521	711	B	10		17	AB
523	716	B	10		18	AB
527	716	B	10		18	AB
528	726	B	10		19	AB
529	728	B	5		Cleanup	
532	739	B	10		20	AB
537	753	B	10		21	AB
539	753	B	10		21	AB
540	766	B	10		23	AB
543	759	B	10		22	AB
545	762	E	1		17	AB
548	766	B	10		23	AB
552	772	E	1		20	AB
556	676	B	10		8	A
557	683	B	10		9	A

Table 7-1. SB/SB site analyzed flotation samples, cont.

Sample #	Context #	Block	Unit/Grid	Quad	Level	Strat
558	686	B	10	F37	10	AB
559	689	B	10		11	AB
560	690	B	10		12	AB
561	696	B	10	F37	13	AB
563	706	B	10	South	16	AB
565	716	B	10		18	AB
567	739	E	10		20	AB

Table 7-2. Seed taxa recovered from SB/SB flotation samples.

Common Name	Scientific Name
Maize	*Zea mays*
Bean	*Phaseolus vulgaris*
Huckleberry	*Gaylussacia* sp.
Raspberry	*Rubus* sp.
Sumac	*Rhus* sp.
Hazelnuts	*Corylus* sp.
Grass	Poaceae
Knotweed	*Polygonum* sp.
Knotweed family	Polygonaceae
Nutshells	
Starchy fragments	

Raspberry (*Rubus* sp.)—While uncharred raspberry seeds were numerous in the samples, only a few charred ones were recovered. Raspberries were eaten raw, and cooked into pies and jams. Raspberry bark was steeped as remedy for colds. Raspberry canes grow well in early successional areas, along forest margins, and in opening within forests. Their presence among the modern vegetation in the open areas in the SBP/SB homelot and disturbed area and forest margin near the Deb Newman site illustrates clearly their affinity for the local environment and the possibility of providing an important food in historic times. No doubt raspberries were an important resource for SB/SB households. However their dominance in the archaeobotanical record is probably due to the seeds' woody and durable seed coat and resistance to decay rather than a reflection of their importance to the diet. We recovered four charred specimens in the lower levels of B10 (Table 7-4).

Sumac (*Rhus* sp.)—Sumac is a large shrub or small tree that can form dense stands. It colonizes agricultural fields and cannot tolerate shade. It produces a fruit that has been made into a lemonade that is high in vitamin C. We recovered only one specimen in Level 18 of B10 (Table 7-4).

Nutshells and Starchy Fragments

Hazelnut (*Corylus* sp.)—Like many nuts, hazelnuts are high in calories and provide other nutrients. Hazelnuts, like shrubs such as blueberries, raspberries, and huckleberries, spread both by seeds and rhizomes and forms dense stands. Hazel grows in the same environmental zones and is associated with similar shrubs such as sumac and viburnum. It tolerates shade better than sumac, but also colonizes old fields. We recovered only one specimen, in B10 (Table 7-5).

Nutshell—We recovered a number of very small fragments of nutshell, none of which were large enough to identify taxonomically (Table 7-5). Possible nut taxa in the area include oaks, chestnut, walnut, butternut, and hazelnut. Given the large number of nut-bearing trees and shrubs currently living in the area and identified in historic documents, combined with their highly desirable food source, it is not surprising that they are present. It is perhaps more surprising that they are not more numerous in the macrobotanical assemblage.

Starchy fragment—We recovered plant parts that were amorphous, starchy fragments. These are probably related to ground grains, such as maize, wheat or some other grain, and probably represent

Table 7-3. Domesticates.

Sample #	Context #	Block	Unit/Grid	Level	Maize kernel	Grain	Bean
31	281	C	13	B	1		
67	337	B	5	1			1
527	716	B	10	18	1		
539	753	B	10	21		1	
558	686	B	10	10	1		
Total					**3**	**1**	**1**

Table 7-4. Fruits.

Sample #	Context #	Block	Unit/Grid	Level	Sumac	Huckleberry	Raspberry
532	739	B	10	20		2	1
543	759	B	10	22			3
560	690	B	10	12		1	
565	716	B	10	18	1		
Total					**1**	**3**	**4**

flour. Many of the starchy fragments come from E1 level 17; most were found in the lower and mid levels of B10 (Table 7-5).

Other Plants

Poaceae (Grass family)—Wild grasses grow in almost every type of environment, from swamps to fields and waste places. The incorporation of the single grass seed in the SB/SB deposits is probably an accidental inclusion rather than deliberate use (Table 7-6), although grasses are used for basketry, brooms, and for other domestic purposes.

Knotweed and knotweed family (*Polygonum*/ Polygonaceae)—Knotweed and the knotweed family are a large genus and family, respectively. This genus includes several hundred species, many of which are edible as greens. They grow in wet soils and waste places and several species that grow naturally in Virginia (Britton and Brown 1896(1):555-567). In addition to their use as an edible green, some species, including *Polygonum sagittatum* are used as a medicine (Leighton 1986:468). We recovered one charred specimen each of knotweed and knotweed family (Table 7-6).

Wood

We recovered 12 genera and 2 larger taxonomic groups of charred wood (Table 7-7, Appendix A, Table A-4). Below we discuss each taxon providing information about possible species, environmental tolerances, and uses. Information about the ecological zones these trees inhabit and their ability to tolerate shade, fire, and other disturbances can be useful in reconstructing the landscape surrounding the SB/SB farm while the possible uses can help identify the ways in which these plants may have been used.

Chestnut *(Castanea dentata)*—Chestnuts grow quickly and sprout easily, and as a consequence, when forests are cleared for settlement, agriculture or pasture, they out compete other trees and expand their numbers. However, a blight introduced early in the 20th century decimated chestnut stands. Its wood is very durable and is, therefore, valued for construction, but it generates little heat when burned and is not a good fuelwood. There is some evidence that chestnut stands were managed prior to the arrival of Europeans.

Oak (*Quercus* sp.)—Oak is valued as a hardwood in building construction (USDA 1948:297) and provides good heat value when burned as fuel. There are about 300 species of oak trees (Bailey 1949: 329), which are deciduous and grow in the well-drained soils of mature forests (Medve and

Table 7-5. Nutshells and starchy fragments.

Sample #	Context #	Block	Unit/Grid	Level	Nutshell	Hazelnut	Starch ct/wt
55	312	F	11				2
59	322	C	14	3			1
67	337	B	5	1			.59g
423	575	B	5	10	5		1.31g
423	575	B	5	10	2		
426	582	B	5	12	2		
500	685	E	1	9	1		1
502	689	B	10	11			.02g
506	696	B	10	13			0.3g
521	711	B	10	17	1		0.19g
523	716	B	10	18			12
527	716	B	10	18			5
528	726	B	10	19			54
532	739	B	10	20			10
545	762	E	1	17			20
556	676	B	10	8	2		0.01g
557	683	B	10	9	1		0.01g
559	689	B	10	11			0.01g
565	716	B	10	18		1	
Total					**14**	**1**	

Table 7-6. Non-economic plants.

Sample #	Context #	Block	Unit/Grid	Level	Poaceae	Polygonaceae	Knotweed
423	575	B	5	10	1		1
539	753	B	10	21		1	
Total					**1**	**1**	**1**

Table 7-7. Wood taxa recovered from SB/SB farmstead flotation samples.

Common Name	Scientific Name
Oak	*Quercus* sp.
Chestnut	*Castanea dentata*
Hickory	*Carya* sp.
Ash	*Fraxinus* sp.
Elm	*Ulmus* sp.
Walnut	*Juglans* sp.
Beech	*Fagus* sp.
Maple	*Acer* sp.
Cherry	*Prunus* sp.
Apple	*Malus* sp.
Cherry	*Prunus* sp.
Birch	*Betula* sp.
Grape	*Vitis* sp.
Pine	*Pinus* sp.
Hardwood	
Softwood	

Medve 1990:204-205). They are most valued for the hardwood timber, especially in white oak, which is a more durable (USDA 1948:297). Some species were also used in basketry.

Oak/chestnut—The wood of oak and chestnut is morphologically similar especially in small pieces. Specimens that we could not distinguish were placed in the oak/chestnut category.

Hickory (*Carya* sp.)—Hickory is a strong heavy wood (Petrides 1988:98) useful for tools and construction. When burned, the wood provides a great deal of heat (Medve and Medve 1990:210-211). Hickories are medium to large trees that prefer upland slopes and may be a dominant tree along with oaks (fs.fed.us/database/feis/plants/tree).

Ash (*Fraxinus* sp.)—The wood is strong and durable and used for basketry, and other household and utilitarian items such as snowshoes, paddles, and tool handles. Several species are found in the region including *F. americana, F. pennsylvanica,* and *F. nigra*. Most are found in moist areas and along streams and rivers (Samuelson and Hogan 2006: 394, 400). Ash seedlings are shade tolerant, and they are early to intermediate to near climax depending on the species (http://www.fs.fed.us/database/feis/plants/tree).

Elm (*Ulmus* sp.)—We tentatively identified one piece of elm wood. Elm is a good fuel wood. While the wood is strong, it is not durable, but it is used for basketry, furniture, and other household items (http://www.fs.fed.us/database/feis/plants/tree). Elm grows quickly and prefers moist bottomlands. It is considered a medium seral (mid-successional) taxon, one that tolerates some shade, but is usually replaced in later successional conditions.

Walnut (*Juglans* sp.)—Black walnut wood is valuable and easy to work, but it is among the most durable woods. Large specimens of this species are hard to come by today due to their harvesting for wood (Petrides 1988: 94-95). It does not tolerate shade and needs an open canopy. Casual surveys of the SB/SB farmstead did not locate many walnut trees.

Beech (*Fagus* sp.)—We tentatively identified one piece of beech wood. Beech is considered a late successional (or dominant species) in hardwood forests of the region (http://www.fs.fed.us/database/feis/plants/tree). Beech is good for construction and a very good fuel wood.

Birch (*Betula* sp.)—Birch wood is used for furniture and boxes. The tree is present in all stages of succession, and it grows well in poorly drained soils only because competition is less. Some species such as yellow birch are slow growing and long lived. Yellow birch is good for lumber. Paper birch is short lived, fast growing and early successional, shade intolerant, but has a high fuel value. Yellow birch bark is good for tinder to start fires (Medve and Medve 1990: 200-201) and all *Betula* are important pioneer species to establish cover in burned lands (USDA 1948:99).

Maple (*Acer* sp.)—This genera contains a large number of species, which grow under different environmental conditions. Different maples provide different heat values from fair to excellent. The wood is useful for furniture, household items, construction, and railroad ties; sap of various species can be made into maple syrup and sugar.

Cherry (*Prunus* sp.)—We identified one piece of cherry. Several species of wild cherries are local to the region: pin cherry, black cherry, and chokecherry. The wild cherries are small to medium trees; the bark has been used as medicines and the fruits for food. It tolerates many environmental conditions but is most common along forest margins (http://www.fs.fed.us/database/feis/plants/tree).

Apple (*Malus* sp.)—The recovery of apple wood in an archaeological context is unusual; however, we had identified several pieces of diffuse porous wood that we believe may be apple. Our tentatively identified apple wood is diffuse porous, has 1-3 seriate rays, simple perforation plates, very small and scattered intervessel pitting, and in this respect it is consistent with most published references. However published references also indicate that the vessels have helical thickenings. Our specimens do not, but examination of our modern reference sample of apple also lacks helical thickenings. We are tentatively identifying these specimens as apple. Apple wood provides very good heat value and would be a good fuel wood (forestry.usu.edu).

Grape (*Vitis* sp.)—Wild grapes inhabit open forests, woodlands, forest margins, thickets; it climbs most hardwoods and is shade intolerant. They produce an edible fruit that has been made into juice, jams and jellies. The leaves have medicinal uses (http://herb.umd.umich.edu).

Pine (*Pinus* sp.)—A small number of pine species are local to the region and are evident on the site today. These include *Pinus strobus, P. rigida,* and *P. resinosa,* of which *P. strobus* (eastern white pine) is the most common. Eastern white pine is characteristic of old agricultural fields (http://www.fs.fed.us/database/feis/plants). White pine does not provide much heat value when burned.

Hardwood and Softwood—There were instances where the charred wood could not be identified to a specific family or genus but had enough characteristics to be distinguished as either a type of hardwood (angiosperm) or softwood (gymnosperm). Hardwoods include taxa such as oak, maple, birch, and hickory. Softwoods possible in central Massachusetts include red cedar (*Juniperus* sp.), Atlantic white cedar *(Chamaecyparis thyoides)*, hemlock (*Tsuga* sp.), as well as a variety of pines.

Ring Porous, Diffuse Porous, Semi-Diffuse Porous—For hardwoods that could not be identified to a taxonomic category, we attempted to assign a morphological category – ring porous, diffuse porous, or semi-diffuse (also semi-ring) porous – based on the arrangement of pores within an annual ring (see Hoadley 1990). While such categories may not tell us what a piece of wood is, it can help us identify possible taxa and more importantly what the wood is not. Ring porous woods include oaks, hickory, and ash among others. Diffuse porous woods include maple, cherry, dogwood, tulip poplar, willow, and birch. In central Massachusetts the only common semi-diffuse porous wood is *Juglans* sp. (walnut or butternut).

Unidentifiable—When we could not provide any identification – perhaps because the specimen was too small, the tissue represented under-developed (juvenile) wood, or the wood was degraded when it was burned – we considered it unidentifiable.

Discussion

Because plants play a role in so many aspects of peoples' lives, they provide the potential for understanding a variety of social and cultural phenomena. Among the most basic are the uses of plants for subsistence needs: food, fuels, medicines, and utilitarian objects. In addition, the plants used represent the intersection between peoples' choices and the vegetation available, which is, in turn, dependent on prior land use as well as contemporaneous land management strategies. Thus, the recovery of wood and other plant parts from the SB/SB site can tell us about the environment around the homestead. Because only the charred materials have preserved and the quantity of charred material is small, the plant remains from the farmstead provide only a partial picture of the use of plants there. Understanding plant use in light of these skewed data depends on the nature of the deposits and the potential for plant preservation, in addition to their cultural uses.

Formation Processes and the Archaeobotanical Record

First, we explore the distribution of plant remains and their relationship to the stratigraphy in the house foundation, the cultural context that we analyzed most thoroughly. We begin by comparing the botanical assemblage in B5 and B10. From both units, we have a column of samples that largely spans the deposits including not only the living surfaces (cellar floor), but strata that relate to the collapse of the building, the activity of the bulldozer, and later filling of the house foundation. What is notable from the B5 contexts is the number of wood species recovered throughout the deposits. Table 7-8 provides the taxonomic richness, the number of different taxa, recovered from each layer. It should be noted that the levels in B5 do not correspond directly to the levels in B10. We have shown them this way to simplify the data presentation. From several layers in B10, we analyzed multiple samples. In this case, we averaged the taxonomic richness. The richness in B5 is generally high throughout the column, whereas the richness in B10 is highest in the lowest and middle levels (12-20 and 23), and there is a distinct peak at level 16. Similarly the food remains from the house foundation are dispersed among the middle levels of B10 (see Tables 7-3 to 7-5), and only one food remain was recovered from B5. Presenting the wood data in a different way, we plotted the average weight of wood pieces in each level (Figure 7-1 and Figure 7-2) to see if there were particular strata that seemed to have the largest, most intact pieces of wood. In B5 we see a noticeable increase in wood size in the upper layers of the column, which generally correspond to the bulldozer fill. This difference is much smaller than the one in B10 where the size of charred wood is generally small except for levels 19-22 (Figure 7-2).

The consistency in size and nature of materials in B5 suggests a good deal of homogenization, probably by the combined action of the bulldozer and mixing by rodents, tree roots, and 20th-century landscaping. The presence of typically rare

Table 7-8. Taxonomic richness of charred wood for units B5 and B10.

Level	B5	B10
1	10	
2		
3	6	
4		
5		
6	2	
7		
8	8	4
9		4
10	7	3
11	6	3.5
12	8	7
13		7
14	6	
15		
16	6	11
17	8	5
18	10	5.5
19	6	6
20	7	5
21	5	2
22		2
23		5
24	9	
25		
26		
27	7	
28	8	

types of wood such as birch, the possible apple, and softwoods throughout the column (Figure 7-3) also lends credence to this notion. Distinguishing the source of these charred materials and when they were deposited is difficult but the presence of charred wood and the charred bean in the topmost level of B5 as well as other contexts suggests that there is recent charred wood that is ambient in the environment – perhaps from recent land management, such as burning off debris from the hurricanes that struck the area, from campfires from later activities such as the use of the house as a hunting blind in the late 19th and early 20th centuries, or from the fireplaces of nearby homes. In B5, these more recent inputs are likely mixed with the cultural remains from the SB/SB households.

The botanical assemblages in B10 and B5 show some distinct differences despite the proximity of these units within the house foundation. Compared to B5, the charred wood assemblage in B10 demonstrates greater differentiation among the layers in the size of charred wood (Figure 7-2), the numbers of species represented (Table 7-8), and the presence of food remains (Tables 7-3, 7-4, and 7-5). These remains appear to be less disturbed and therefore offer more interpretative potential. If the largest charred wood is concentrated in the layers representing the most intensive use of the house, that period and the associated deposits are represented by levels 19-22, which are just above the cellar floor. These charred materials may have filtered down through the floorboards as the house was occupied or, perhaps more likely, the collapse of charred material in the kitchen area into the cellar as the floorboards deteriorated when the house was not occupied. The wood from the cellar floor, level 23, is smaller (Figure 7-2) and more diverse (Table 7-8, Figure 7-4), which is consistent with frequent trampling of materials into the floor over time (also see Piechota, Chapter 6, this volume). The lowest levels of other units within the house foundation E1 and E10 (Figure 7-5) are similar in the types of taxa recovered: oak, chestnut, and maple.

In the most intact house foundation deposits, B10, both the pieces themselves and the levels in which they were found suggests that the charred wood represents fuelwood rather than construction debris or other primary use such as basketry or tools. The small size of the fragments, typically less than .02g, and the diverse taxa represented (Figure 7-4), many of which are good fuelwoods, also argue for these being the remnants of cooking or heating fires. The charred seeds identified in the middle layers of B10 are economically important and probably represent food remains.

The majority of food remains on the SP/SB site come from the middle layers of the house foundation (B10 levels 10-20), and in Feature 24 (unit C13, see Table 7-3). While the charred fruit seeds and wild grass and knotweed seeds may be accidental inclusions into the archaeobotanical record, the charred maize is more indicative of food preparation. In Feature 24, the presence of one maize kernel fragment, the only plant food

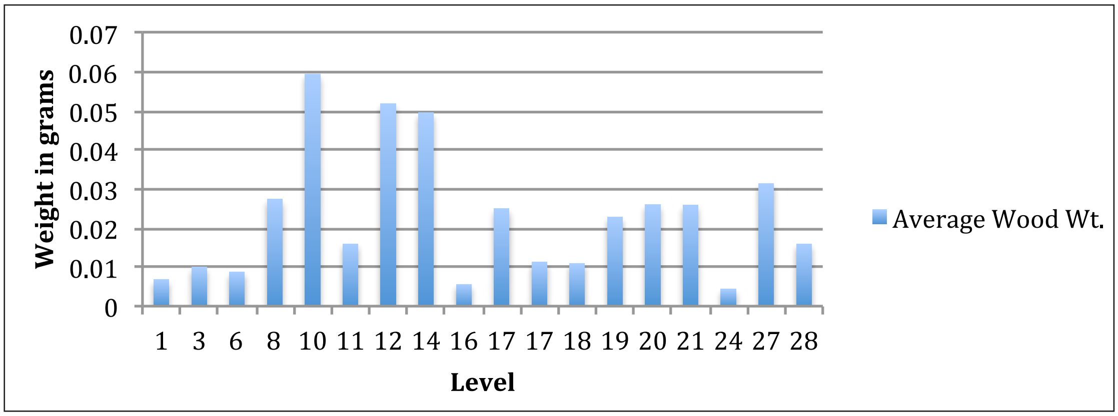


Figure 7-1. Unit B5, average specimen weight per sample.

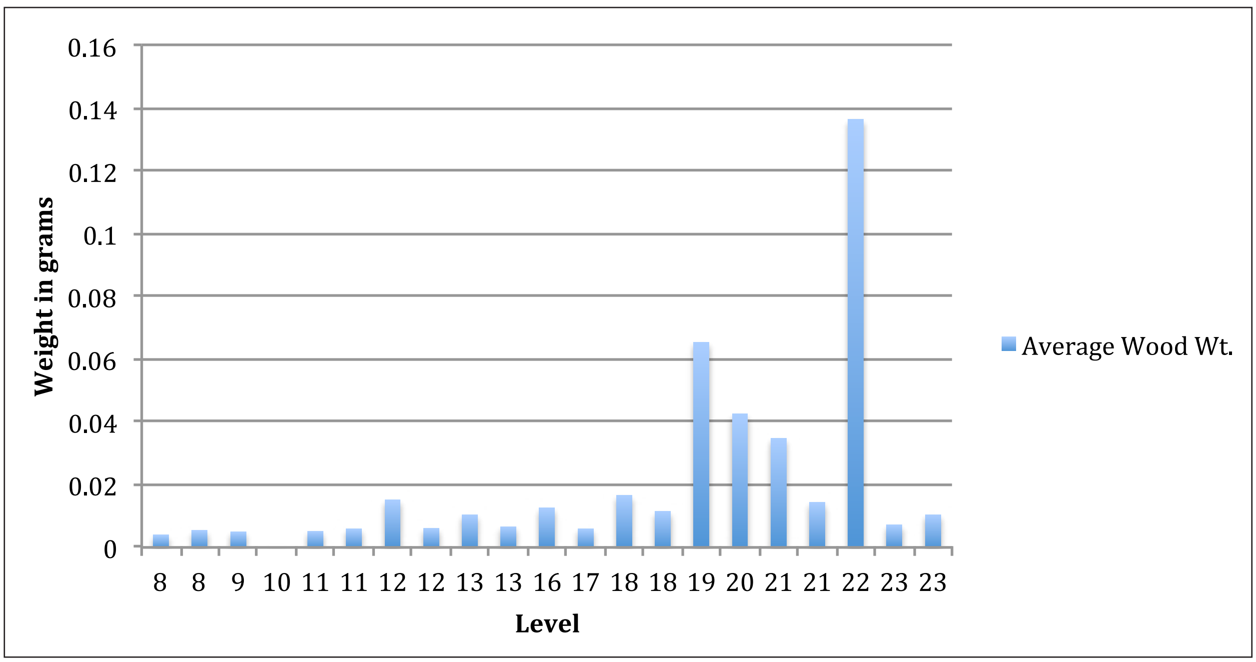


Figure 7-2. Unit B10, average specimen weight per sample.

remain recovered from this feature, suggests that maize was being cooked, perhaps roasted, here. Although much of the wood from Feature 24 cannot be identified to a specific taxon (Figure 7-5), the charred wood assemblage provides indications of the fuel used for this cooking. These include several taxa, oak, chestnut, hickory, and some type of diffuse porous wood (maple, apple, cherry, or birch). These taxa are generally good fuel woods. While the quantity of plant food remains are small, the maize found in this context represents 1/3 of the maize recovered from the entire site, so its recovery is significant, and the fuels suggest that the SB/SB households were able to acquire good fuel wood for cooking and heating. The charred wood assemblage includes mature forest hardwoods (oak, some hickory, possibly chestnut) and some seral taxa (birch, cherry, and perhaps maple).

The charred wood assemblage from other contexts (Figure 7-5) is similar with its emphasis on mature forest taxa: oak, chestnut, hickory and maple. The most unusual wood recovered in this

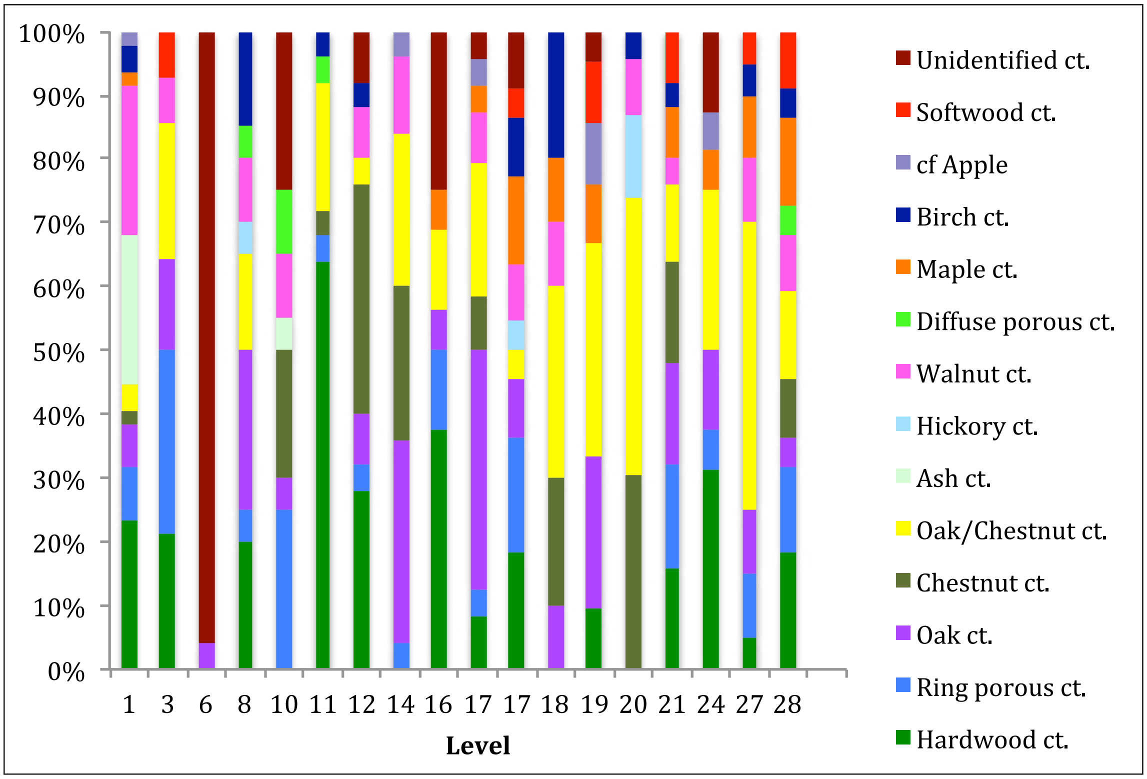


Figure 7-3. Unit B5, charred wood assemblage.

analysis was the identification of charred grape vine in excavation unit H2. This distinctive wood is not typically recovered in archaeobotanical assemblages in New England. However, the sample comes from Level 1 of H2 and given that grape vines are common in the woods today, this charred wood probably represents a fairly recent burning episode. The presence of chestnut, which was largely destroyed by a blight, in the same sample suggests that the charring episode was no later than the first quarter of the 20th century.

The possible apple wood in B5 may be merely contamination from the recent orchard, but it is charred and occurs throughout the column. The apple co-occurs in some contexts with chestnut so it is likely deposited prior to the chestnut blight, which began early in the early 20th century. While the apple wood may be recent contaminants, Whitney talks about the Grafton area being good for orcharding in the mid-18th century. Historically apple trees were used by indigenous people to demonstrate ownership and control over their lands, and texts indicate that in the late 19th century, Sarah Boston's daughter returned to the homestead to pick apples. We cannot discount the idea that some of the possible apple wood in the deposits relate to the 18th- and 19th-century use of the area.

Food/Environment

The importance of plant remains for reconstructing diets is paramount because until recently the majority of diets worldwide were composed of plant foods. The search for the plant component of diets is critical for understanding foodways. It is unfortunate that the flotation samples recovered very few charred seeds, nutshells, and related plant parts. The majority of the seeds recovered are economically important and likely represent food remains, although evidence for food is sparse, to say the least, and provides a limited picture of the diet. The plant foods indicated include domesticates (maize and perhaps beans), as well as gathered resources (berries and nuts). The charred pieces of maize are fairly large, which suggest that the SB/SB families obtained their maize as whole kernels, likely growing their own. The starchy fragments likely represent a later step in processing maize

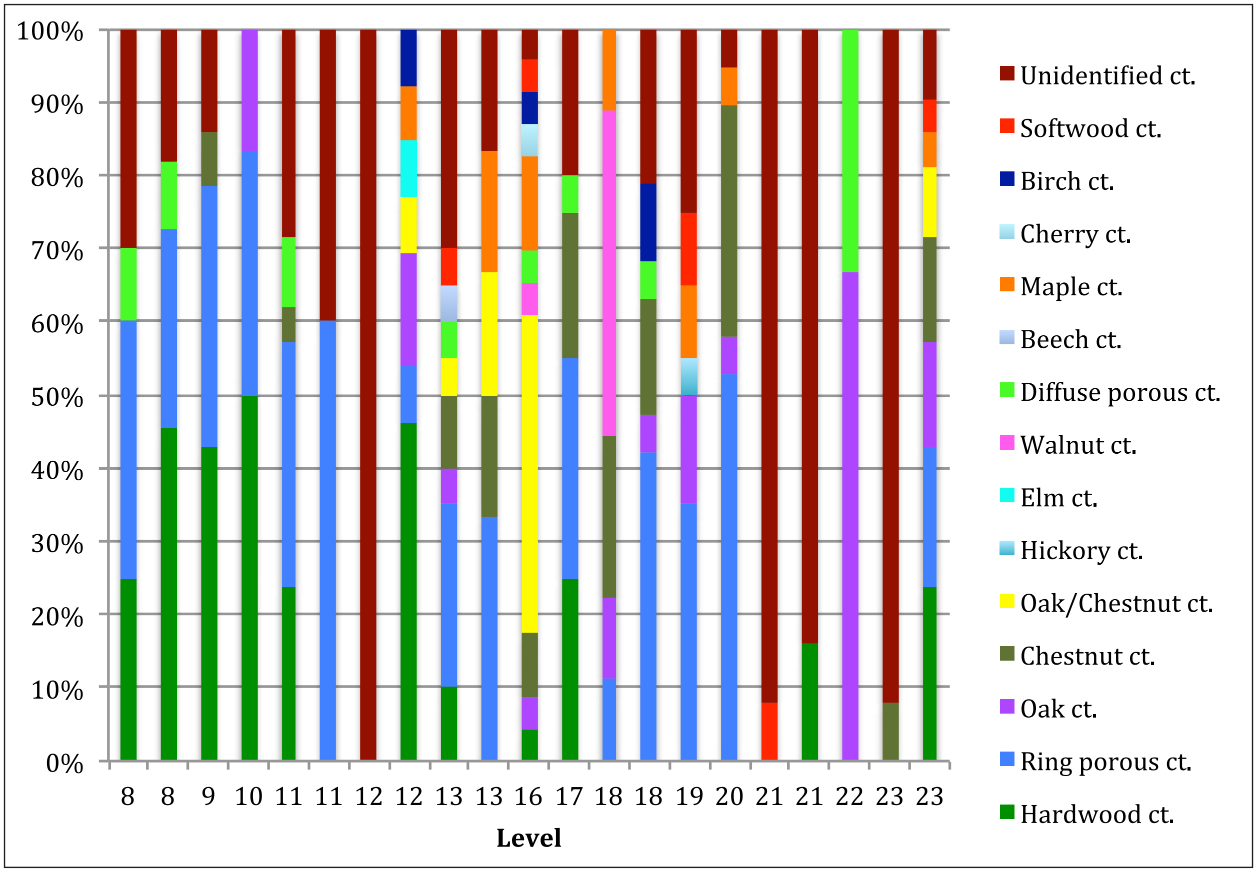


Figure 7-4. Unit B10, charred wood assemblage.

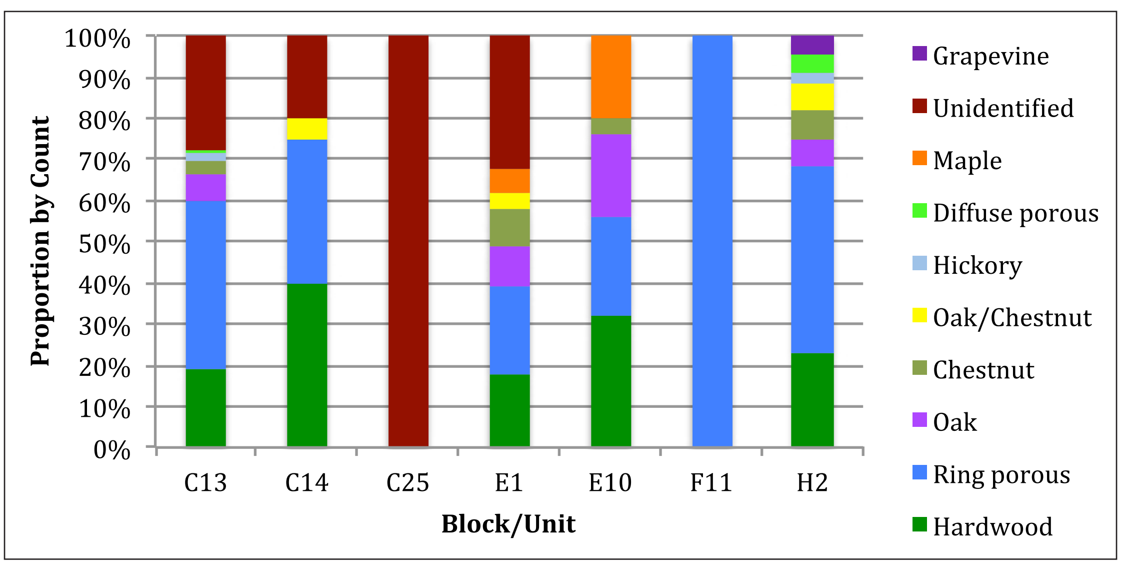


Figure 7-5. Charred wood from various contexts.

or other cereals when the grains were ground into flour. From the current data, we cannot determine how the SB/SB households obtained their flour – whether they ground their own or took their maize to a mill. The production of maize has been associated with many plants for which there is no archaeobotanical evidence at the site, but could logically have been used. In addition to the three sisters, maize, beans, and squash, garden plants that might have been cultivated include sunflowers and Jerusalem artichokes. Wild plants that may have been tolerated in the gardens include weeds such as goosefoot, purslane, mint, knotweed, and a variety of other plants that were useful for food or medicines. Many of these plant foods would have provided important vitamins and other nutrients or seasoning to a starchy diet which can be bland.

In addition to the use of garden or field crops, the archaeobotanical remains also indicate the consumption of gathered fruits (huckleberries, raspberries, and sumac) and nuts (hazelnuts and some unidentifiable nutshells). Fruits such as raspberries and the others found at the site were easily stored dried or cooked into preserves. They provide needed vitamins and the nuts would have been a good source of calories, making gathered resources critical to a balanced diet. Although the wood assemblage from the site indicates a large proportion of common nut bearing trees – walnut, chestnut, oak, and hickory – we did not definitively identify the nutshells of any of these trees. Chestnuts are generally rare in archaeobotanical assemblages but walnuts and hickory nuts are common in pre-European collections and their absence here is curious and may reflect either their lack of availability or differences in processing strategy.

People may select different types of wood for fuel so the archaeological assemblage may not reflect forest composition. Nonetheless, Peter Whitney's description (1793:169) of Grafton identified "walnut, oak of all kinds, chesnut [sic], some pitch pine, butternut, button wood [sycamore or plane tree], black and white ash, and birch." All taxa except sycamore, which may be included in the diffuse porous group, have been identified in the archaeological assemblage. Hickory, despite being a common forest hardwood, was not a common component of the assemblage. The specifics of the environment surrounding the site are difficult to tease apart with the level of taxonomic specificity that we are able to provide with the archaeological wood. For example, different species of birch have different environmental tolerances. Yellow birch is slow growing, tolerates shade, and provides bark with high heat value. Paper birch grows quickly especially in early successional environments, but is shade intolerant and does not provide much heat. Both species grow in the area. The various local species of maple, likewise, inhabit a variety of environments.

The environmental zones that the recovered plants come from can help describe the areas the Burnee-Phillips/Boston families accessed for food and the nature of the landscape that surrounded them. The plant remains suggest the families produced some of their own food in agricultural fields. The fruits and the only taxonomically identifiable nut, hazelnut – a mid-seral shrub, comes from lands that had been cleared of forest, perhaps for agriculture, but then allowed to regrow. The charred wood assemblage, especially the presence of oak and hickory indicates access to stands of mature forests. The charred wood also reflects the presence of pines and wetland species such as birch and perhaps aspen or cottonwood. Given the springs near the site, wetland species, even though they are generally poor fuelwoods, might have been a convenient source of fuel. Thus the plant remains suggest a patchwood of old growth fields, early successional forests, mixed hardwood and softwood mature forests, and lands cleared for agricultural production.

SB/SB Homestead and Other New England Sites

Archaeobotanical materials in New England are robust only in a few open sites such as Bernham-Shepard (Bendremer 1999) and under certain preservation conditions such as privies or waterlogged environments (Meyers and Trigg 2011; Patalano 2009; Reinhardt et al. 1986). We would not expect open sites like the SB/SB farmstead to have the preservation of plant remains evidenced from contemporaneous privy sites. However there are notable differences between the SB/SB site and earlier indigenous sites in New England. Nutshells are a common component of earlier sites and these were absent from the SB/SB samples. Charred seeds are generally not numerous but include raspberry, sumac, huckleberry (Trigg 2007; Trigg et al. 2007; Ferguson 2010). In comparison to many sites in the American Southeast, Midwest, and Southwest, there is typically a broad spectrum of plant foods recovered, but relatively low densities and few specimens. In open sites from the 17th century and later, botanical indications of foodways are particularly slim (see Trigg 2007; Trigg and Leasure 2007). While the "acidic soils" of New England have been often cited as the primary reason for the lack of remains, the paucity of seeds probably relates to the combination of the intensity of use of the site, the way plant foods are produced, prepared, consumed, and the remains discarded. Thus the lack of food remains at the SB/SB site is due to behavioral and preservation factors rather than any indication of dietary importance, and changes from pre-European foodways may illustrate preparation methods rather than changes in diet or cultural importance of traditional foods.

One example provides an illustration of changes in recovery without a change in use. Prior to European arrival, nuts were an important food source, and their remains (nutshells) were fairly common in archaeological context perhaps because nuts were often parched or made into walnut or hickory nut milk. Nuts, with the nutmeat still in the shell, are coarsely pounded, and then boiled (Fritz et al. 2001). The nutrient and calorie rich oil rises to the top and is skimmed off and preserved, the nutmeats and shells were formed into balls for later use, and the nutshells were burned as fuel (Fritz et al. 2001). It is this charring that allows the nutshells to be preserved.

Based on Whitney's 18th-century description of the Grafton area, it is likely that walnut and hickory nut trees were available to the SB/SB households. The charred wood remains also suggest that walnut was common and accessible, and it is difficult to envision that the Nipmuc women did not utilize such an important and available food resource. The lack of plant remains may reflect the contexts analyzed which primarily include the house and especially the kitchen area, but only a small portion of the midden (Units C13, C14, F11) where we might expect the final disposal of debris of cooking fires and food preparation. However, the lack of plant remains may also signal a shift in food production and disposal patterns with the adoption of metal cooking vessels and formal indoor kitchens.

Conclusions

The macrobotanical assemblage provides little direct information about food production or consumption at the SB/SB homestead. Maize, raspberries, huckleberries, sumac, and hazelnuts are all represented in the archaeobotanical record. It is likely that the SB/SB families relied on small-scale agriculture, which incorporated uncultivated but tolerated weedy plants that were useful. These subsistence items were augmented with gathered resources such as berries and nuts. The quantity of charred plant materials is small and contrasts with the highly productive contexts of privies and waterlogged sites. While pre-European, open sites in the region are not as productive as such sites elsewhere in North America, the post-European sites tend to have even fewer plant remains. It is likely that this represents a change in food preparation technology and disposal practices rather than dramatic changes in the foodways.

The picture of the landscape and the SB/SB households' use of it offered by the plant remains suggest a patchwork of agricultural fields, access to fields allowed to go fallow, and mature stands of hardwoods and softwoods. It is likely that the SB/SB families had gardens or agricultural fields in which they grew maize. And if so, it is likely that they had access to a wide variety of garden produce that is not evident in the archaeobotanical record. The paucity of plant remains makes these indications tentative, and additional data may change our understanding. The lack of food remains is consistent with other similar, contemporaneous sites in the region, both indigenous and European-American, but is notable for its slight decrease from earlier Native American sites. This decrease may signal a change in a variety of cultural practices of food preparation, cooking, and storage.

Chapter 8: Material Culture

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Introduction

Over the course of 8 years of field excavation at the SB/SB site we have unearthed a bounty of material culture that closely dates to a period roughly spanning the years 1750 to 1840. The overwhelming majority of the material culture recovered from the site is of English, European or Anglo-American manufacture. There is, however, a small but very significant collection of Native American manufactured items. Despite the origin of manufacture all of the material culture is Nipmuc and as such was part of a rich materiality that served a variety of functional, social, and symbolic purposes. The long-standing biases that accompanied the acculturation model in archaeology confused the link between material culture and identity. The incorporation of European material culture into Native American cultural practice did not result in a loss of Native identity. Much to the contrary, evidence points to a hybrid cultural reality that was dynamic and pervasive for everyone involved in the cultural encounters resulting from colonialism (see Lightfoot et al 2013; Mrozowski 2013; Mrozowski et al 2009; Panich 2013; Pezzarossi 2014; Pezzarossi, Kennedy and Law 2012; Silliman 2009). Combined with the overall richness of the assemblage there is enough evidence of cultural continuity to complete a picture of a society that both maintained some practices while changing others.

Taken as a whole the assemblage can be divided into four large functional groups, architectural material associated with the former building/s on the site, foodways related items that were linked to the production, processing, consumption and discard of food, a large collection of tools that were used in a variety of activities from gardening and food processing to basket making, and finally a substantial collection of items of personal adornment mainly related to clothing. The majority of the tools recovered from the site are made of metal, however Bagley's analysis (2013) clearly indicates that the use of stone, in particular quartz, in the production and use of what might be best conceived of as instant tools, continued to be practiced into the nineteenth century by the site's residents. The architectural materials comprised mainly of iron nails, window glass, and hardware have aided us in our attempts to reconstruct the building style and technology that was employed in constructing and maintaining the dwelling on the property. The foodways related artifacts include large collections of ceramics, glassware and metal eating utensils – knives, forks and spoons - that were the mainstay of food storage, processing and consumption items used by the residents of the farmstead. A large collection of faunal material has proven particularly informative concerning the animal husbandry practices of the farmstead as well as the strong evidence of feasting (see Allard 2010; Pezzarossi, Kennedy and Law 2012). The evidence for feasting from the faunal material is reinforced by the material culture from the site that suggests that large meals were a common feature during its history. Discussed in more detail below, this interpretation is one of the central pieces of evidence for the SB/SB farmstead serving as a community-gathering place for the local Nipmuc during much of the late eighteenth and early nineteenth centuries.

Providing a detailed description of an assemblage that numbers more than 120,000 artifacts is a daunting task that will be aided by a series of more intensive examinations of a select number of artifact types including ceramics, metal cutlery and tools, items of personal adornment and smoking pipes. These have been chosen because of their direct links to interpretive questions that have been particularly important to our overall understanding of the cultural dynamics that shaped the daily lives of the farmstead's residents. Other categories have been chosen because of their links to particular forms of behavior, such as smoking or basket making. As a backdrop to these more detailed discussions, a general discussion that summarizes

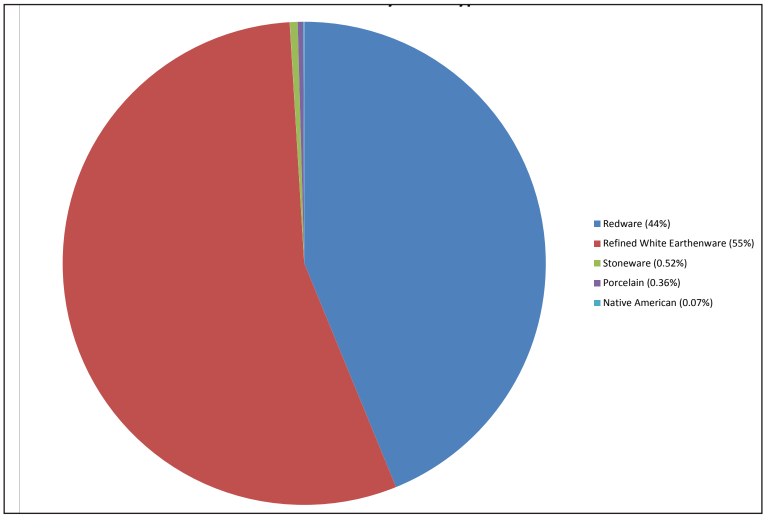


Figure 8-1. Ceramic totals by ware type.

the various categories of material culture and some basic metrics concerning their numbers and spatial distribution across the site is provided. In presenting these discussions the focus will be on the larger categories of material culture including ceramics and glassware, some of which draws on previous analysis (Law 2008; Pezzarossi 2008, 2014), architectural materials including nails, window glass, brick, stone, and hardware, items of personal adornment, in particular buttons and fasteners, iron artifacts including tools and cooking utensils – kettles, skillets, knives, forks and spoons, and lithic artifacts. These form the bulk of the material recovered. Faunal remains will be discussed, but their analysis has been the focus of previous research carried out by Allard (2010) and Kennedy (Pezzarossi, Kennedy and Law 2012). Lithics from the site have been analyzed by Bagley (2013) and his results will be summarized here. Macrobotanical analysis is covered in Chapter 7 of this report and pollen analysis will be covered separately in a later report.

Site Assemblage

As noted above a total of more than 120,000 artifacts were recovered during the excavations of the SB/SB farmstead. Although much of the collection, close to 64%, was comprised of ceramic sherds, a wide array of other materials was also recovered from the site. Table 8-1 and Figure 8-1 provide a breakdown of the various categories of material culture by count. As these figures illustrate, more than half of the collection was comprised of either coarse, red-paste earthenwares (28%) or refined white earthenwares (35.5%). The remaining ceramics, stonewares, porcelains and Native American ceramics comprise a little more than one percent of the assemblage. The large number of ceramic sherds is common for sites of this period and when combined with curved glassware, an impressive collection of iron cooking vessels, and eating utensils that were recovered from the site, as well as the faunal and plant remains it provides more than ample data for reconstructing the foodways practices of the farmstead's residents over several generations. The site assemblage also includes a rich assemblage of items of personal adornment including buttons that provide insights into the clothes the site's inhabitants were wearing and what these items may suggest about the construction of individual identities. There is a small collection of pipe bowls and pipe stems, but these offer interpretive value both spatially and in terms of the assemblage's unexpectedly small size (see below).

Along with the categories noted above the site assemblage also contains a wide array of building related materials that we assume are linked to the dwelling that stood atop the dry-laid foundation that was unearthed. Much of the flat glass, brick and nails were recovered from the area inside and immediately around the foundation area, and so it seems safe to assume that they represent the remains of the dwelling that once stood on the site. The nail collection is both large and varied. Although its analysis is not yet complete, it has been possible to compare it with some of the documentary evidence in piecing together an empirically based picture of the house itself. The interpretive potential of the nails was enhanced by the conservation protocol that was employed during the project. The vast majority of the collection has been conserved, and this has resulted in a collection that offers a much richer picture of the different types of nails used – roofing nails versus lathe nails for example – that has helped in suggesting the different kinds of structural elements that were part of the building.

The same conservation protocol that helped in enhancing the interpretive quality of the nail collection also helped in conserving an unusually rich collection of iron cooking vessels, eating utensils, and tools. As noted earlier, the cooking vessels and eating utensils – close to 70 knives, spoons and forks – have aided us in developing a detailed picture of the foodways practices that were employed by the site's inhabitants. By far the most important facet of the foodways related items is the evidence of feasting they provide. This interpretation, which will be discussed in greater detail below, is particularly important in arguing that the site served as a political gathering place for the Hassanamesit families in the nearby area. When the Nipmuc petition for Federal Recognition was overturned, after having been approved initially (see Adams 2004), one of the chief complaints was that the Hassanamesit had not provided written evidence of political continuity after King Philips War (1675-1676). We believe the evidence of feasting provides such evidence (see below) and when compared with research carried out by Rae Gould (2010) at the current Nipmuc Reservation – part of the what was another of the 1727 lots that was owned by the Printer family – an empirical argument can be made in support of political continuity for close to 300 years if not longer.

In addition to the cooking vessels and eating utensils, an interpretively rich assemblage of iron tools was also recovered during the excavations. Like the nails discussed earlier, this collection required conservation and stabilization. Once this work was completed, however, it provided an assemblage that can be linked to a variety of activities including possible evidence of basket making and repair. Obviously other activities can be inferred from the analysis of this collection, but several of the tools appear to be similar to those discussed in both historical and ethnographic sources that document this important part of indigenous economies between the 18th and 19th centuries. Given the deep history of basket making among indigenous groups throughout North America, it comes as little surprise that Native basket makers would have continued a tradition that provided a much sought after commodity for exchange. Bolstered by documentary evidence and oral histories, the role of baskets in New England society between the 18th century and the present – especially their acquisition by museums in the area and beyond – is an important avenue for examining indigenous mobility and identity. The role of baskets as a form of cultural capital for New England families seeking to burnish their places in an emerging Anglo-American history (see Law-Pezzarossi 2014) is another story that helps in revitalizing a Native American history that has been forcefully denied.

The size of the site assemblage has required a continuing process of cleaning, cataloguing and analysis. Some of this research has provided the corpus of several master's thesis (Allard 2010; Bagley 2013; Law 2008; Pezzarossi 2008) and subsequent scholarly publications (Allard 2015; Bagley et al in press; Law-Pezzarossi 2014a, in press; Pezzarossi, Kennedy and Law 2012; Mrozowski 2012, 2013, 2014; Mrozowski, Gould and Law-Pezzarossi 2015; Pezzarossi 2014). There are currently two master's theses that are in process that are drawing on information from the site. Despite what is already a highly visible scholarly record, there remains analysis to be completed. Therefore the discussion of the material culture from the site that follows is drawn from a variety of sources and analysis that remains incomplete. As a result there is a certain unevenness to the discussion that follows with some classes of material culture completely analyzed, such as the pipes and stoneware vessels, while others are only partially

Figure 8-2. Silver plated seal top spoon.

Figure 8-3. Reconstructed creamware tankard.

completed. Given the nature of archaeological research this is not an unusual situation, and we expect that the site and our investigations will continue to provide a rich corpus of data for years to come.

Silver Plated Spoon

On rare occasions there is a single artifact that stands out from a larger assemblage that warrants special attention. Such is the case of the lone artifact that might represent the strongest possible link between the members of the SB/SB household and their ancestors who were important members of the 17th-century Hassanimisco community. The silver plated, seal topped spoon (Figure 8-2) is the sole artifact that may well have been the property of someone such as Sarah Robins' grandfather, who was Sachem of the Hassanimisco Nipmuc at the time when John Eliot sought to Christianize some of the local indigenous groups. Based on its attributes the spoon seems to date to the second half of the 17th century so it may well have represented an "heirloom" that could have served as mnemonic devise in maintaining the memory of the earlier community. One possible way of determining the status of an item such as the spoon is to examine it for wear. In this instance the relatively good condition of the item argues in favor of its interpretation as having been intentionally curated.

Ceramics

Easily the most numerous category of artifact that we recovered from the SB/SB farmstead are ceramics. By number, ceramics comprise close to 65% of all of the artifacts recovered from the site. Virtually all of the close to 80,000 ceramic sherds were from vessels manufactured either in Britain, Europe or locally, by Anglo-American potters. Four different material types were recovered: soft, low fired earthenwares that were of Native manufacture and high fired earthenwares, stonewares and porcelains of European, Anglo-American, or Chinese manufacture. Within these large material groupings there are a variety of ceramic types that are distinguished by manufacturing technique, color, and decoration that reflect the changing character and scale of the ceramic industry, especially the British ceramic industry, that unfolded between 1750 and 1850 (Barker 1999, 2001; Barker and Majewski 2006; Majewski and O'Brien 1987; Miller 1988, 1991). These changes are particularly visible in the refined white earthewares recovered from the site. This large ceramic category that consisted of creamwares, pearlwares and whitewares represented approximately 55% of all ceramics, by sherd count, unearthed from the site (Figure 8-1). Within these individual types there was a wide variety of decorative types including creamware, undecorated pearlwares, blue and green edged pearlwares, blue and polychrome hand painted pearlwares, as well as a host of transfer-printed pearlwares of various colors (see Barker and Majewski 2006). Although a complete minimum vessel count has not yet been calculated, there is ample evidence of a range of vessel forms including bowls, plates, soup plates, serving platters, cups, saucers, teapots, mugs, tankards (including a rather large creamware tankard (Figure 8-3), and a blue, transfer print butter dish cover. All of these vessel forms are consistent with those used in the serving and consumption of food and drink.

Refined earthenwares played a major role in revolutionizing ceramic consumption, represented first by the appearance of what was first called "Queensware" and later Creamware, introduced by Josiah Wedgewood in the 1770s, followed by the whiter pearlware in the 1780s (Barker 1999, 2001; Barker and Majewski 2006). Over a relatively short period the quality and uniformity of British refined earthenwares improved to the point where they became the dominant ceramic manufacturered in Europe. One of the great appeals of these ceramics was the availability of entire sets characterized by a wide variety of forms. From a foodways perspective they represent an important step in the availability of ceramics that could serve both for daily use and for entertaining. Certain decorative types were associated with specialized functional groupings such as the use of blue and polychrome hand painted pearlwares primarily for tea and coffee wares. Also known as "Chinawares" these vessels were particularly popular during the period 1775-1812 (see Miller and Hunter 2010; www.chipstone.org). One of the reasons for that popularity was that unlike creamware – the ceramic type that experienced a meteoric spread in popularity just before the appearance of pearlwares – "china glaze" wares were so named because of the varied forms of decoration that were employed in their manufacture. Creamware had been almost exclusively undecorated. In arguing for the use of the term "china glaze" over that of pearlware Miller and Hunter (2010:154) note that the former term – which was widely used by ceramic dealers during the period 1775-1812 – captures two of the most important dimensions of pearlware's rise in popularity, the multiple forms of decoration used in the production and the strong influence of Chinese motifs that reflected the long standing appreciation for Chinese porcelains.

The next largest group of ceramic types recovered from the site were glazed and unglazed red paste earthenwares that were the chief utilitarian ceramics used by most households during the 18th and 19th centuries. Approximately 43% of the site assemblage was made up of these course earthenwares commonly known as redwares (Figure 8-1). These ceramics were widely produced both in Europe and North America making the precise location of manufacture difficult if not impossible in some instances. New England had hundreds of local potters, and many of the glazed redware vessels recovered from the SB/SB site are similar in form and decoration to those recovered from sites in the region that have been attributed to New England potters (see Turnbaugh 1985; Watkins 1950). The redwares from the SB/SB site are predominately glazed vessels including many examples of slip-decorated wares that were useful both in food preparation and consumption. The vessel forms that have been identified so far (Pezzaorossi 2014: 161; see below) include 13 pans/pudding pots and 3 milk pans. As a whole the redware assemblage is perhaps most notable for being not notable. Compared with Anglo-American farmsteads in the surrounding region, the SB/SB site assemblage resides squarely in the middle of the aggregate, a characteristic true of the entire assemblage (Pezzarossi 2014).

Combined the refined white earthenwares and course red earthenwares make almost 99% of the total site assemblage. This proves not to be unusual for sites of comparable age and location (Pezzarossi 2014:162-167). By vessel, however, the few coarse and refined stoneware vessels recovered from the SB/SB site do provide excellent interpretive information. In fact a total of 16 stoneware vessels were identified including 7 drinking vessels, 5 service vessels, and 4 storage vessels. The assemblage also includes a single, black basalt dry stoneware bowl/vase that is a highly specialized vessel (see below). Although the functional breakdown of the assemblage offers important insights into the use of such ceramics by the site's residents, it is their links to the Sarah Burnee occupation that are perhaps most noteworthy. The Nottingham and English white salt glazed stonewares vessels, including a scratch-blue tea cup, were commonly in use during the second half of

Table 8-1. Artifact totals for SB/SB Site by excavation unit.

Unit	Redware	Refined earthenware	Stoneware	Porcelain	Native American	Total ceramics	Glass, curved	Glass, flat	Faunal, burned
A1	387	555	12	1	0	**955**	37	30	27
A19	90	133	0	0	0	**223**	12	3	0
A7	832	1007	5	1	1	**1846**	87	64	46
B10	1502	2475	18	7	0	**4002**	166	221	167
B11	446	627	4	1	0	**1078**	26	15	34
B12	429	622	5	2	1	**1059**	42	34	51
B14	320	247	0	1	0	**568**	21	17	6
B15	406	600	4	4	0	**1014**	58	48	43
B2	494	641	5	4	0	**1144**	37	45	45
B20/25	0	0	0	0	0	**0**	1	0	0
B4	333	515	5	4	1	**858**	32	56	10
B5	829	1620	17	13	1	**2480**	161	216	398
B5/E1	6	8	0	0	0	**14**	1	2	0
B8	470	624	3	8	0	**1105**	47	44	26
B9	1081	1003	15	8	2	**2109**	73	106	37
C1	105	93	0	5	0	**203**	17	14	7
C10	1089	1555	3	5	0	**2652**	149	144	16
C11	254	280	0	0	0	**534**	23	15	22
C12	273	411	1	2	0	**687**	37	33	12
C13	513	904	3	3	2	**1425**	80	41	55
C14	2516	3771	2	29	4	**6322**	314	228	65
C14/19	4	4	0	0	0	**8**	0	0	1
C15	353	778	0	10	2	**1143**	62	131	10
C17	461	666	0	6	0	**1133**	100	47	22
C18	750	1029	7	15	1	**1802**	82	85	15
C19	672	770	3	6	0	**1451**	89	110	15
C2	223	190	3	2	0	**418**	19	22	0
C2/3	6	5	0	0	0	**11**	0	0	0
C20	190	243	2	5	0	**440**	27	51	6
C22	467	690	11	2	0	**1170**	63	54	37
C24	175	248	2	1	2	**428**	20	45	19
C25	147	274	1	4	0	**426**	24	36	22
C3	376	466	2	8	0	**852**	40	32	0
C5	434	417	2	5	2	**860**	33	28	3
C7	313	415	1	4	0	**733**	32	35	6
C8	302	305	0	4	4	**615**	35	35	3
C9	849	833	4	11	4	**1701**	98	86	12
D14	546	42	6	0	0	**594**	15	18	0
D17	239	19	1	0	0	**259**	21	30	16

Faunal, unburned	Pipes	Total metal	Buttons	Organic incl. charcoal	Lithics, worked and unworked	Brick	Other	Artifact total, EU
12	6	0	2	21	20	15	0	**1125**
7	0	13	0	0	3	3	0	**264**
56	8	0	4	38	15	44	1	**2209**
156	11	398	26	521	86	7145	35	**12934**
33	10	45	3	146	1	36	0	**1427**
14	6	30	2	31	7	26	2	**1304**
4	1	38	1	20	5	62	0	**743**
19	5	111	5	90	10	117	1	**1521**
35	7	5	2	13	2	14	0	**1349**
0	0	0	0	0	0	0	0	**1**
3	3	65	1	33	4	46	13	**1124**
1725	31	356	41	776	169	1659	138	**8152**
0	0	1	0	0	2	0	0	**20**
0	2	0	2	17	15	49	0	**1307**
60	2	259	5	12	5	1468	607	**4743**
31	0	5	1	3	0	1	0	**282**
52	1	79	3	18	81	88	6	**3289**
51	4	0	3	43	19	13	0	**727**
20	5	27	2	20	7	5	2	**857**
85	3	19	2	405	29	25	24	**2193**
288	7	133	5	22	85	85	0	**7554**
0	0	3	0	0	1	0	0	**13**
16	2	11	1	3	3	4	0	**1386**
27	3	0	2	64	15	21	0	**1434**
28	4	30	1	5	16	33	2	**2103**
33	5	93	3	23	16	23	8	**1869**
36	2	11	2	1	25	18	0	**554**
0	0	0	0	0	0	0	0	**11**
5	3	7	1	23	4	14	0	**581**
28	4	48	0	5	4	10	2	**1425**
10	1	27	1	17	5	8	0	**581**
35	4	39	1	9	3	11	1	**611**
56	4	3	0	3	90	32	4	**1116**
51	1	2	2	11	11	14	1	**1017**
11	1	3	2	43	19	14	0	**899**
8	0	16	2	43	0	9	0	**766**
78	2	38	1	26	8	43	2	**2095**
56	3	13	0	11	4	29	0	**743**
7	12	11	0	38	22	4	1	**421**

Table 8-1 cont. Artifact totals for SB/SB Site by excavation unit.

Unit	**Redware**	**Refined earthenware**	**Stoneware**	**Porcelain**	**Native American**	**Total ceramics**	**Glass, curved**	**Glass, flat**	**Faunal, burned**	
D2	201	16	1	1	0	**219**	5	13	24	
E1	858	1649	34	15	4	**2560**	195	268	64	
E1/2	1	2	0	0	0	**3**	0	0	0	
E10	1	6	0	0	0	**7**	0	0	0	
E11	267	368	5	3	2	**645**	28	26	17	
E16	113	243	3	4	0	**363**	17	12	5	
E2	661	819	17	2	0	**1499**	110	259	40	
E2/3	18	39	0	1	0	**58**	6	29	2	
E2/E6	3	2	0	0	0	**5**	0	0	0	
E3	233	291	16	4	0	**544**	22	89	15	
E5	2	4	0	0	0	**6**	0	0	0	
E6	846	1522	7	11	0	**2386**	97	283	0	
E7	360	835	5	1	0	**1201**	135	223	3	
E7/2	1	2	0	0	0	**3**	0	0	0	
E8	56	104	0	0	2	**162**	14	11	0	
F 21 and 22	2	8	0	1	0	**11**	0	3	1	
F11	246	304	1	2	0	**553**	39	57	0	
F13	363	323	1	2	0	**689**	38	19	17	
F2/7	1317	1618	2	13	1	**2951**	122	103	51	
F21	278	598	39	8	0	**923**	44	81	18	
F21/22	2	3	0	0	0	**5**	2	1	0	
F22	299	387	10	2	0	**698**	37	67	0	
F22/E2	9	1	0	0	0	**10**	0	0	0	
F3.5	3502	2436	19	8	0	**5965**	148	80	86	
G18	366	347	11	2	0	**726**	21	5	4	
G22	891	988	15	5	7	**1906**	68	12	10	
G24	1389	1713	22	3	0	**3127**	139	66	9	
G8	23	50	0	0	0	**73**	3	1	0	
H1	102	95	0	1	0	**198**	3	1	4	
H1/2	1	0	0	0	0	**1**	0	0	0	
H14	6	24	0	0	0	**30**	4	0	0	
H2	108	97	0	1	0	**206**	7	1	7	
I6	495	567	9	6	0	**1077**	55	31	17	
J9	296	385	5	1	0	**687**	53	16	7	
K2	970	1543	4	8	0	**2525**	107	23	0	
K21	109	218	1	2	0	**330**	7	15	0	
L1	90	43	0	0	0	**133**	9	0	0	
M2	225	252	1	0	2	**480**	15	8	0	
N2	16	37	0	1	9	**63**	1	1	0	
792/976	51	4	0	0	0	**55**	3	1	0	

Faunal, unburned	Pipes	Total metal	Buttons	Organic incl. charcoal	Lithics, worked and unworked	Brick	Other	Artifact total, EU
4	5	0	2	60	3	93	0	**428**
143	23	320	13	236	92	4467	40	**8421**
0	0	0	0	0	0	5	0	**8**
0	0	0	0	1	0	5	1	**14**
3	3	25	3	44	1	41	0	**836**
1	0	12	0	19	3	6	0	**438**
37	12	206	2	37	42	994	6	**3244**
0	0	6	0	8	0	79	10	**198**
0	0	2	0	1	0	91	0	**99**
6	2	20	2	15	8	17	0	**740**
1	0	0	0	0	0	0	0	**7**
6	13	58	3	107	33	994	29	**4009**
11	8	57	3	28	17	230	9	**1925**
0	0	0	0	0	0	0	5	**8**
0	0	5	0	5	0	10	0	**207**
1	0	5	0	0	0	45	1	**67**
11	1	22	1	1	7	14	0	**706**
5	3	19	1	2	14	4	1	**812**
117	7	90	5	24	27	30	4	**3531**
63	3	97	6	11	26	67	24	**1363**
0	0	1	0	3	0	7	0	**19**
0	17	6	5	32	43	34	9	**948**
0	0	0	0	7	0	35	0	**52**
176	5	17	11	193	20	184	5	**6890**
5	0	3	3	4	1	4	0	**776**
104	4	54	3	59	19	42	12	**2293**
153	13	127	7	15	110	9	1	**3776**
0	0	2	0	0	1	0	1	**81**
10	1	14	0	2	18	9	2	**262**
0	0	1	0	0	0	0	0	**2**
0	0	4	0	13	1	0	3	**55**
9	0	2	1	10	4	10	1	**258**
22	1	40	6	18	0	102	1	**1370**
13	2	33	4	6	1	21	0	**843**
0	10	2	0	28	3	32	3	**2733**
0	1	15	1	0	2	3	1	**375**
0	0	0	0	7	3	19	0	**171**
0	0	3	0	4	2	11	4	**527**
0	0	0	0	11	0	3	0	**79**
0	0	0	0	0	6	0	0	**65**

Table 8-1 cont. Artifact totals for SB/SB Site by excavation unit.

Unit	Redware	Refined earthenware	Stoneware	Porcelain	Native American	Total ceramics	Glass, curved	Glass, flat	Faunal, burned	
001/781	68	39	0	0	0	**107**	4	2	3	
118/019	39	37	0	0	0	**76**	2	2	0	
188/019	49	46	0	0	0	**95**	6	3	1	
188/038	10	12	0	0	0	**22**	2	1	1	
772/019	11	17	0	0	0	**28**	0	0	4	
772/023	16	37	0	0	0	**53**	3	1	0	
781/003	39	79	0	0	0	**118**	4	1	5	
792/976	203	20	1	1	0	**225**	8	6	0	
792/978	0	0	0	0	0	**0**	0	1	0	
792/986	16	35	0	0	0	**51**	4	2	0	
795/976	1	0	0	0	0	**1**	0	1	0	
795/978	0	2	0	0	0	**2**	0	0	0	
795/986	179	57	2	0	0	**238**	13	7	0	
799/976	33	13	27	1	0	**74**	4	0	1	
799/978	18	4	9	0	0	**31**	1	0	0	
804/023	17	47	0	0	0	**64**	2	4	21	
804/038	56	98	0	2	0	**156**	2	2	1	
804/904	1	1	0	0	0	**2**	0	0	0	
804/905	89	151	0	1	0	**241**	5	5	16	
806/021	190	215	5	0	0	**410**	17	9	0	
806/023	188	295	2	1	1	**487**	21	8	0	
806/024	1	0	0	0	0	**1**	0	0	0	
808/025	59	88	0	0	0	**147**	12	2	0	
809/024	387	369	2	1	1	**760**	41	15	0	
818/003	1	1	1	0	0	**3**	0	0	0	
818/019	37	16				**53**				
819/007	213	308	0	0	0	**521**	12	20	1	
823/936	0	0	0	0	0	**0**	0	0	0	
990/777	113	24	0	0	0	**137**	1	6	17	
996/777	0	0	0	0	0	**0**	2	0	0	
Artifact total, type	**35693**	**45039**	**424**	**296**	**56**	**81508**	**3901**	**4124**	**1726**	

the eighteenth century, most notably between 1750 and 1780, a time when Sarah Burnee was head of the household. Beyond the dating evidence the stoneware assemblage provides, it also suggests the diversity of uses that stonewares continued to play between 1750 and 1830 when they served as drinking vessels such as mugs and tankards as well as tea cups, storage vessels for liquids and other foodways related ingredients, plates, and specialized service vessels such as the two ink or stove-blacking bottles and three nineteenth-century jugs that were recovered from the site.

Faunal, unburned	Pipes	Total metal	Buttons	Organic incl. charcoal	Lithics, worked and unworked	Brick	Other	Artifact total, EU
4	3	8	0	12	0	0	2	**145**
3	0	0	1	1	0	0	3	**88**
3	0	3	1	5	2	0	0	**116**
0	0	1	0	0	0	0	0	**27**
0	0	0	0	12	0	0	0	**44**
0	0	1	3	7	6	0	0	**73**
9	0	1	6	4	4	0	0	**140**
8	0	0	1	4	15	0	1	**268**
0	0	0	0	1	0	1	0	**3**
74	0	4	0	6	6	163	0	**310**
0	0	0	0	0	0	0	0	**2**
0	0	0	0	0	3	0	0	**6**
8	4	1	3	22	4	0	0	**299**
2	0	0	0	7	0	3	0	**91**
0	1	0	1	0	0	0	2	**36**
14	2	7	0	95	5	19	6	**239**
1	0	0	1	0	0	0	0	**163**
0	0	0	0	0	6	0	0	**8**
1	0	4	15	20	17	0	0	**316**
1	0	3	0	4	12	9	0	**465**
4	0	27	1	16	11	5	0	**580**
0	0	0	0	0	0	0	0	**1**
0	0	2	0	0	5	2	0	**170**
0	0	1	2	0	5	7	3	**834**
1	0	0	0	8	0	0	0	**12**
2	0	1		7	0	1		**64**
0	0	6	0	15	11	0	1	**587**
0	0	0	0	10	0	0	0	**10**
5	4	4	0	4	0	9	11	**189**
0	0	0	0	0	0	0	0	**2**
4177	**311**	**3281**	**246**	**3825**	**1430**	**19124**	**1052**	**124705**

As noted above the stoneware assemblage also contained several specialized vessels. These included a Jackfield tea pot (Figure 8-4), a type that was particularly popular during the third quarter of the eighteenth century (Noel Hume 1969, 2001). The second is a dry-bodied, black basalt vase/bowl (Figure 8-5) that would have been popular during the latter decades of the eighteenth century into the early years of the nineteenth century (Noel Hume 1969, 2001). Both of these vessels reflect a level of style and gentility that were common among the middling sorts during the eighteenth and early

Figure 8-4. Reconstructed Jackfield-type tea pot.

Figure 8-5. Black Basalt vase base.

nineteenth century in New England (Mrozowski 2006a).

The smallest percentage of ceramics by ware type is porcelain. At SB/SB there are fewer procelains (0.36%) than any other ceramic except for the small assemblage of Native American low-fired earthenwares that make up 0.069% of the collection by sherd count. Porcelains were among the most expensive ceramics available during the eighteenth and nineteenth centuries (see Miller 1988, 1991). In most cases porcelain vessels were associated with tea wares although large punch bowl sets including cups were also produced for the American market during the later years of the eighteenth century. At the SB/SB site porcelains were represented primarily in the form of tea wares.

Pezzarossi's (2014) recently published discussion of the ceramics from the SB/SB site is based his analysis of ceramics from the 2006 field season. This was one of the more productive field seasons that involved a large crew of graduate and undergraduate students working directly for the Fiske Center in preparation for our first archaeological field school. Excavations that year had not yet focused on the foundation (Feature 37), but more on the yard and midden areas. His analysis incorporated all of the ceramics recovered during both the discovery phase of our investigations (Gary 2005) and the results of our initial field season of large-scale block excavations. A total of 23,677 ceramic sherds were examined as part of Pezzarossi's (2008, 2014) research as compared to the total of approximately 80,000 ceramic sherds recovered through the total 8 years of excavation. If Pezzarossi's analytical total of 23,677 sherds is viewed as a sample of the total site ceramic assemblage then it represents a little more than a 29% sample – more than adequate for statistical purposes. Therefore it seems safe to assume that his minimum vessel count, MVC, probably provides a more than adequate approximation of what the site assemblage looks like as a whole. A more recently completed MVC of the coarse and refined stonewares from the site completed by Jerry Warner (see below) adds further clarity to the picture of the ceramic use at the SB/SB site. The following discussion will also incorporate a more intensive examination of the hand-painted pearlware cups and saucers that were some of the most popular "chinawares," one of the more fashionable pottery types to be produced during this period. The large percentage of refined white earthenwares recovered from the site situate its inhabitants squarely in the middle of New England's emerging economic and social structure, significant in its "insignificance or commonness" as Pezzarossi (2014: 165) states. In comparing the SB/SB assemblage with those from Anglo-American sites in the surrounding region (Pezzarossi 2014:165-170) makes a strong argument for the manner in which the household members used consumption as a way of countering the varied forms of racism they faced on a daily basis. Taken as a whole the site assemblage reflects the kinds of cultural dynamics that many Native American households would have faced during the latter stages of British colonialism and early American state formation.

Ceramic Form and Function

Using the sample analyzed by Pezzarossi (2014) it is possible to gain some insights into the overall functional breakdown of the ceramic assemblage. Table 8-2 provides a snapshot of the vessel forms that have been tentatively identified. The majority of the 106 refined earthenware vessels that Pezzarossi was able to identify are foodways-related ceramics with a sizable number of serving and drinking vessels. Of particular note are the 4 punch bowls and large number of tea cups (13), tea bowls (6), tea pots (5), mugs (8), and tankards (3). Along with the punch bowls, this assemblage suggests that entertaining was a major activity at the site. Given that the vessel numbers are based on what amounts to sample of close to 30%, it seems safe to assume that the final minimum vessel count will reflect a similar percentage of eating and drinking vessels that we interpret as evidence of feasting behavior. The vessel breakdown of the complete stoneware assemblage noted above also points to the importance of ceramics used in the consumption of food and drink. Other evidence for the importance of entertaining or feasting comes from the large number of metal eating utensils (see below) and faunal analysis (Allard 2010, 2015; Pezzarossi, Kennedy and Law 2012).

Table 8-2. Identified vessel forms at the SB/SB Site.

Vessel Form	# of Vessels	% of Identified
Pan/pudding	13	12.3%
Tea cup	13	12.3%
Plate	9	8.5%
Serving bowl	8	7.5%
Cup	8	7.5%
Mug	8	7.5%
Bowl	6	5.7%
Tea bowl	6	5.7%
Tea pot	5	4.7%
Saucer	4	3.8%
Punch bowl	4	3.8%
Basin	3	2.8%
Milk pan	3	2.8%
Pitcher	3	2.8%
Tankard	3	2.8%
Bottle	2	1.9%
Chamber pot	2	1.9%
Pot	2	1.9%
Serving plate	2	1.9%
Flask/costrel	2	1.9%
Total	106	100.0%

While vessel form and function are essential for understanding the role of ceramics in the Nipmuc households of Sarah Burnee and Sarah Boston, it is the ware types and their decoration that helps in understanding ceramic consumption and its symbolic importance. Figure 8-6 provides a vessel breakdown according to ware type, and this reflects the predominance of coarse and refined earthenwares recovered from the site. In his analysis of the ceramics from the site Pezzarossi was able to extend his research by comparing the Hassanamesit Woods SB/SB assemblage with comparable assemblages through out the region of southern New England. These results, which are illustrated in Figure 8-7 compare ware type percentages from 8 rural farmsteads in the surrounding area. These data were collected as part of the CRM surveys carried out over the past decade including one site—the Pratt-Keith Farm—that was located on one of the original lots that were made available as part of the reallocation of Nipmuc lands in 1727. The collections used in the comparison represent a range of rural farmsteads that cover the period before and after the peak of occupation of

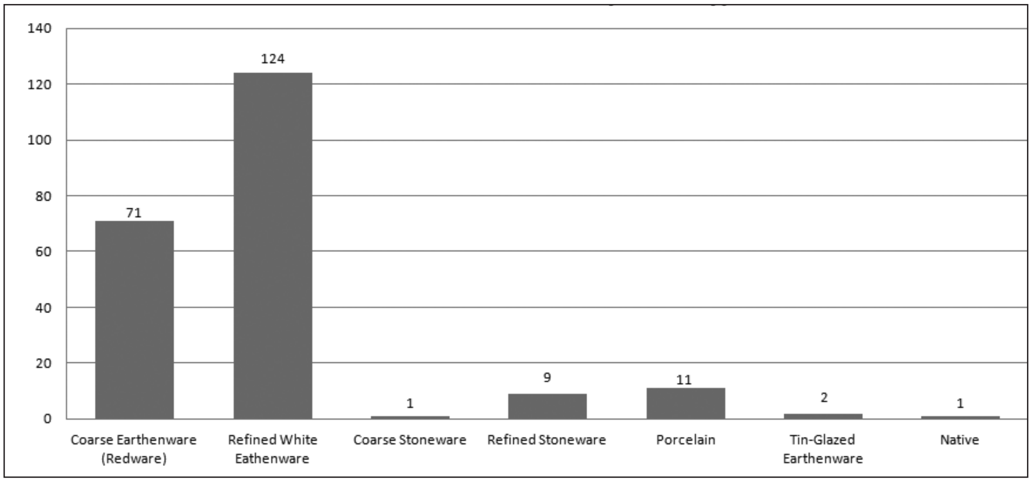
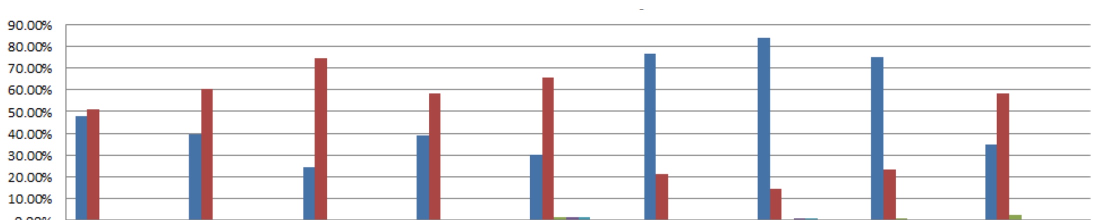


Figure 8-6. Minimum vessel count by ware type, Pezzarossi 2014.

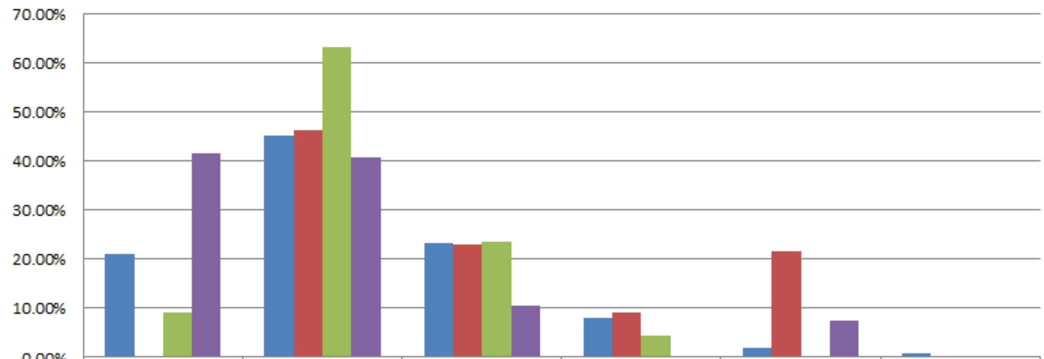


	Sarah Boston Farm	Bates-Randall Home	Cheney Farm	Clam Pudding Pond Farm	Abbott Site	Hyde/Parker Farm	Adams/Ray Farm	Pratt-Keith Farm	Elijah Hill Farm
Coarse Earthenware	47.66%	39.38%	24.43%	38.98%	30.26%	76.53%	83.79%	75.08%	35.08%
Refined White Earthenware	51.16%	60.46%	74.51%	58.42%	65.37%	21.43%	14.62%	23.44%	58.12%
Coarse Stoneware	0.16%	0.15%	0.24%	0.23%	1.46%	0.68%	0.00%	0.82%	2.62%
Refined Stoneware	0.24%	0.00%	0.08%	0.06%	1.62%	0.68%	0.79%	0.49%	0.52%
Porcelain	0.33%	0.00%	0.08%	0.26%	1.29%	0.00%	0.79%	0.00%	0.00%
Ironstone	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Tin-Glazed Earthenware	0.45%	0.00%	0.00%	0.03%	0.00%	0.68%	0.00%	0.16%	0.52%
Native Ceramics	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Figure 8-7. Ware type percentages by site, Pezzarossi 2014.

the SB/SB farmstead. As illustrated in Figure 8-7 the ceramic collections vary, but overall they are dominated by the presence of coarse and refined white earthenwares. In the case of the Pratt-Keith farmstead the large percentage of coarse earthenwares represents an artifact of time as the assemblage dates primarily to the second and third quarters of the 18th century (Pezzarossi 2014).

When all of the sites are compared, the dominance of coarse and refined earthenwares is quite obvious. There is, however, a considerable degree of variability with respect to the proportion of coarse to refined vessels. In some instances this difference is due to the date of the assemblage as noted above with respect to the Pratt-Keith farm; however there may be functional and status differences as well. Given the close proximity of the Pratt-Keith farmstead and its comparability temporally—abandoned approximately in 1805 (Fragola and Ritchie1998:35)—it is interesting to see the large percentage of coarse earthenwares (75%) compared to the 47% of the assemblage at the SB/SB farmstead. Part of this can be attributed to the earlier date of abandonment for the Pratt-Keith farm, but it more likely represents a lessened emphasis on entertaining. In the case of an assemblage such as that recovered from the Abbott Site, it appears that greater income may be the best explanation for the large percentage of refined white earthenwares as well as the highest percentages of coarse and refined stonewares and porcelain (Figure 8-7). As noted earlier, perhaps the most noteworthy observation one can offer about the SB/SB farmstead is how unremarkable it is. Its



	Edged	Handpainted	Transfer Print	Slipware	Molded	Machine Turned/Incised
Sarah Boston Farmstead	21.00%	45.20%	23.20%	7.90%	2.00%	0.80%
Cheney Farmstead Site	0.00%	46.20%	23.10%	9.20%	21.50%	0.00%
Clam Pudding Pond Farmstead	9.00%	63.20%	23.50%	4.30%	0.00%	0.00%
Abbott Site	41.50%	40.60%	10.40%	0.00%	7.50%	0.00%

Figure 8-8. Percentage of ceramic decoration types by site, Pezzarossi 2014.

percentage breakdown of ceramic ware types falls squarely in the middle of the nine households. It is worth noting that it is the only site that contained Native ceramics—not surprising given the heritage of its inhabitants.

In order to look more carefully at the assemblage of refined white earthenwares, the SB/SB assemblage was compared with three sites of similar period of occupation (Figure 8-8). Pezzarossi (2014) notes that the SB/SB assemblage appears to compare most favorably with the sites where the inhabitants practiced a mixed economic strategy of agriculture and small scale artisan activities such as the blacksmithing at the nearby Bates-Randall Homestead (Cherau et al. 1997) in Charlton, Massachusetts, approximately 30 kilometers to the west of Grafton. Comparing the four sites illustrates the level of variability that existed in the consumption patterns during the 18th and 19th centuries in rural Massachusetts. As Figure 8-8 illustrates there are differences across space, but none of these are dramatic. The comparability of transfer printed and hand painted wares is evident with the exception of the Clam Pudding Pond Farmstead where there is a larger percentage of hand painted wares and the Abbott site where there is a noticeably lower percentage of transfer printed wares. The popularity of the hand painted wares is linked to the overall appeal of the "China Wares" noted earlier. These will be addressed separately below, however the high percentage of molded wares at the Cheney Farmstead is noteworthy and probably represents a particular choice on the part of this site's inhabitants.

China Wares

The popularity of China Wares reflected the growing appeal of decoration as a marker of difference during the latter stages of the 18th and the early 19th centuries. Hunter and Miller (2001) note that this marks an important shift in ceramic production as decoration clearly replaces ware type as the measure of difference. The large number of China ware vessels recovered from the SB/SB farmstead led us to focus more intensively on this category during our analysis. We chose the blue hand painted pearlware as a particular focus in part because it seemed like a manageable segment of the greater ceramic assemblage, and also because we assumed ceramics with linear patterns and paint strokes would be easier to refit than say, plain white, or transfer print pieces. Unfortunately we were unable to reconstruct a single vessel in the blue handpainted pearlware category. However, we were able to reconstruct enough of several rim fragments to put together a catalog of all the blue hand painted rim patterns in the collection. As it turns out, the majority of blue hand painted pearlware rims fell into a, "china glaze" category that was particularly popular between 1775-1812.

These vessels were covered in a blue tinted glaze and painted with imitation Chinese patterns popularized by the more expensive Chinese porcelain they were meant to reference (www.jefpat.org).

Figure 8-9 illustrates the various patterns that were recovered from the site. As the figure shows, the collection is quite varied and contains numerous examples of different patterns. Virtually all of the vessels that are illustrated are tea saucers or small shallow bowls and so it would seem that they played a prominent role in entertaining, in particular the rather genteel practice of taking tea. This brings up an interesting question, and one that we think is very relevant for our work on the Sarah Boston Site in general: can an English ceramic, with Chinese decoration, have meaning for a Nipmuc family? The answer, as you might have guessed, is: of course it can! What we are seeing here is the entanglement of global influences (English clay and ceramic technology, Chinese styling, Native aesthetic preferences) in one local knot. This is the kind of thing we encounter all the time when we study the material dimensions of colonialism. The fact that Sarah and her mother participated in the consumption of English ceramics and Chinese patterns should not surprise us; after all, Sarah Boston and her mother Sarah Burnee did not experience colonialism in a vacuum, rather, they were a part of the early American experience, buying dishes and fabric and other goods that expressed their style and preferences, just like everyone else. That did not make them any less engaged or involved with their Nipmuc heritage, rather it is interesting to think about how their Nipmuc identities may have informed some of their consumer choices.

Glassware

The glass assemblage from 2006 and 2007 was analyzed by Heather Law (2008) for her Master's thesis. Because of the small number of artifacts that were actually diagnostic in any meaningful way, a minimum vessel count (MVC) was performed based predominantly on the bases available. This analysis yielded some interesting information about the glass vessels in the Sarah Boston household. A minimum of 6 wine bottles were identified, along with 5 small bottles, 4 other bottles, 1 case bottle, 2 vials, 1 perfume bottle, and 1 flask. Tableware vessels included 15-20 tumblers, 1-5 decanters, 2 wine glasses, and 2 candlesticks. A minimum of 45 glass vessels were determined in all.

Sarah Boston's glass tableware, excepting a few candlesticks, is completely dedicated to drinking vessels. The 15-20 tumblers, 2 wine glasses, and 1-5 decanters all speak the importance of drink in the Sarah Boston household (Law 2008). Law compared the Sarah Boston assemblage with other archaeological studies of contemporaneous tavern assemblages (Bragdon 1988; Rockman and Rothschild 1984). In her study of probate inventories from late 17th and early 18th-century New England taverns, Kathleen Bragdon claims that while tavern keepers kept large quantities of drinking and serving vessels for their patrons, colonial era yeomen often did not (Bragdon 1988). She claims that a solely domestic assemblage might be characterized by the prevalence of food preparation and storage vessels, coarse redware vessels, along with relatively fewer drinking vessels (Bragdon 1988:90). Sarah Boston's assemblage, like that of the taverns in Bragdon's study, seems to lean heavily toward accommodating large numbers of people in eating and drinking.

The rural tavern in particular was important in a number of capacities. It acted not only as a meeting place but also as a means of accommodation for people who could not easily travel home (Rockman and Rothschild 1984:114). Taking into account their mobile lifestyles and the fact that Native people were often not allowed or even banned by law from colonial taverns (Bragdon 1988:84; Conroy 1995), Law considers that the Sarah Boston house may have served the local Hassanamesit Nipmuc community as a similar yet covert tavern-like establishment for Native travelers.

One final note about the glassware concerns the presence of tumblers that were repurposed as cutting tools. Figure 8-10 illustrates one of the clearer examples of reworking. In his analysis of the lithic artifacts from the site Bagley (2013; Bagley et al in press) examined some of the glass artifacts that had been reworked, and he produced a reverse image of the same tumbler (Figure

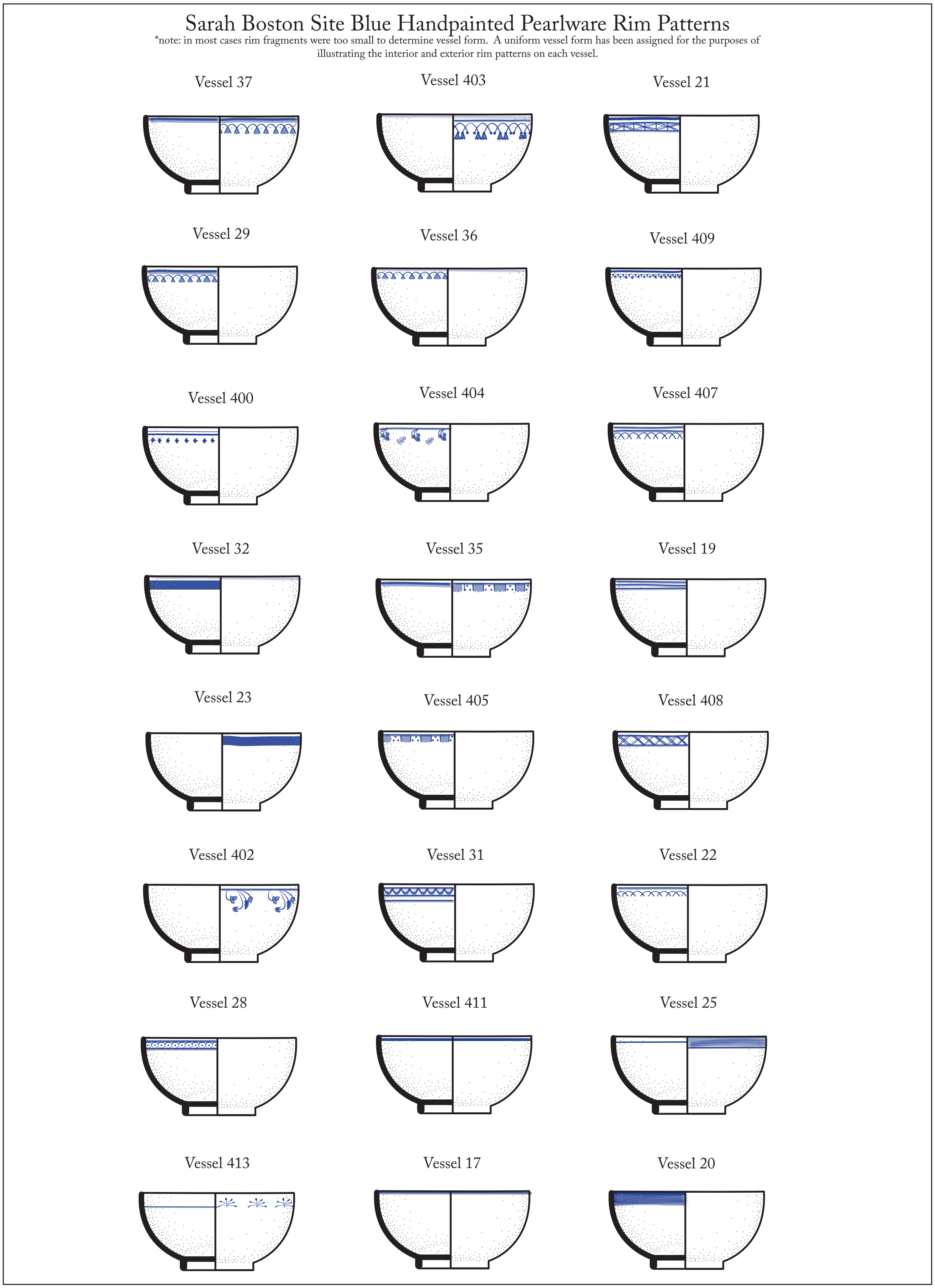


Figure 8-9. Chinaware patterns from SB/SB Site.

Figure 8-10a. Photograph of repurposed glass tumbler base.

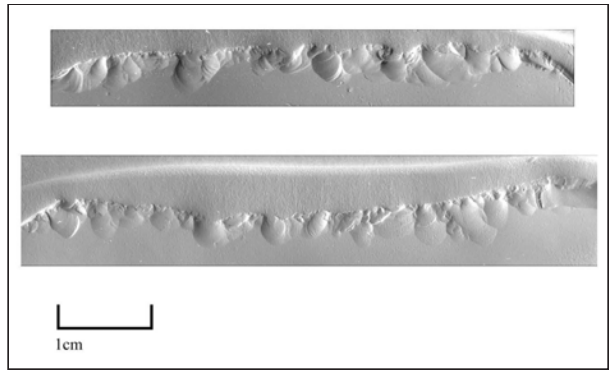


Figure 8-10b. Molded impression of flake scars on the tumbler base; exterior (top) and interior (bottom).

8-10b) that provides a detailed look at the kind of retouch flaking that is a common trait of glass tools (see Cobb 2003; Law 2008).

Foodways Implications

The evidence of a large and varied ceramic collection along with a glass collection dominated by tablewares is interpreted as indicative of large, community-consumed meals, i.e., feasting. As noted earlier, this interpretation is also bolstered by the close to 70 eating utensils that were recovered from the site as well as the faunal analysis. In her comparison of the faunal materials collected from the yard area with those from the foundation at the SB/SB farmstead, Allard (2010, 2015) found that the material from the yard represented both food preparation and food consumption while bone from the foundation seemed to only represent food preparation. This was important because it suggested that the yard was an area for feasting. At the site level Allard (2010, 2015) found that the bulk of the faunal remains were from domesticated animals, in particular cattle, caprines and pigs, that she feels were being husbanded on site. She notes that body part remnants indicate that all three species were being killed and butchered on site. She notes that all phases of butchering are evident in the collection for all domesticated animals as well as deer. The same is true of the bird, fish and amphibian remains recovered from the site. Further evidence that the domesticated animals were being raised on the site comes from the age profiles of the animals. Allard demonstrates that all ages of cattle and sheep were being slaughtered on site. This means that they played a varied role in the household economy with cows providing dairy products as well as meat sometimes obtained from prime age cattle both for consumption and possible exchange. Caprines, most likely sheep, were raised both for wool production and for consumption. Allard (2010, 2015) notes that only pigs appear to have being raised primarily for consumption.

Although much of the bone recovered from the site was from domesticated animals, the presence of a species rich collection of wild animal remains provides ample evidence of hunting and trapping (Allard 2010, 2015). She notes for example that the presence of wild fowl remains supports the idea that ducks, turkeys and pigeons were probably consumed on a regular basis as well as possibly pheasant. The presence of turtle remains also points to the trapping of these animals in the area surrounding Keith Hill. The fact that remains come from 9 individual turtles further indicates that they were actively sought after. She also notes that the remains of saltwater fish on the site indicate that trade with coastal communities was an active part of the local exchange system (Allard 2010, 2015). Pezzarossi has also made this argument using a combination of material and documentary evidence (2008, 2014) to argue that local traders and shop keepers played a central role in fostering a local economy because of their links to Boston and the region as a whole.

One of the more interesting aspects of Allard's research was her focus on the taphanomic characteristics of the collection. Evidence of weathering, burning, and animal gnawing all speak to a disposal pattern that involved throwing food remains in the yard both as broadcast trash and collecting in open features (Allard 2010, 2015). The hearth remains in the yard area are a good example of the latter, and this contributes to a picture of food being cooked, eaten and disposed of in the yard. She also raises the possibility that during the winter food being prepared and consumed in the house may have been thrown in the yard (Allard 2010).

Based on Allard's (2010, 2015) analysis, and earlier work (Law, Kennedy and Pezzarossi 2012) it seems that the households of Sarah Burnee and Sarah Boston practiced a diversified, hybrid economic strategy that took advantage of local and regional markets. It also involved a reliance on domesticated and wild animals and fish many of which were raised and slaughtered as an integral part of the household economy. The cultural facets of this evolving economic integration with the surrounding Anglo-American communities obviously played an important role in the lives of the residents of the site. Additional facets of this picture are can be gleaned from other classes of material culture such as pipes, metal artifacts, lithics and Native ceramics dicussed below.

Pipe Dating and Implications, Jessica Rymer

Clay smoking pipes became a popular dating tool among historical archaeologists when J. C. Harrington realized that pipestem bore diameters decreased by 1/64th of an inch every thirty years. As the 18th century progressed pipestems grew longer and more breakable, consequently appearing in large numbers in the archaeological record and inadvertently providing a more reliable means of dating sites than pipebowl typologies. Moreover, clay pipes are remnants of a popular pastime in 18th-century Anglo-America, and by studying their stem bores, bowl types, marks, and disposal patterns, we can learn something about the behavior of individuals in the past. In this case, the pipe data adds another intriguing layer to the interpretation of the Sarah Burnee/Sarah Boston site as a communal gathering place.

Analysis of Pipestem Distribution

For the purpose of analysis, the site was divided into four analytical areas, summarized in Figure 8-11: the "yard," the cellar/foundation, the midden, and "other." The "yard" area was defined in the 2006-2007 report as containing features related to outdoor cooking and a sheet midden. The category of "other" refers to any excavation units not considered part of the first three activity areas, primarily consisting of non-block units on the edges of the site. As expected for an area that saw large gatherings, the cellar/foundation contained the highest number of pipe fragments out of the four areas.

In 1938, however, the site was bulldozed in order to knock down the by then dilapidated structure. Since an initial statistical analysis using SPSS showed a correlation between curved glass (bottles, containers, tablewares) and pipe bowls in the foundation and ceramics and flat (window) glass in the midden, these categories were chosen for a comparison of counts versus weights of artifacts with the hypothesis that the deposition of pipes and curved glass was the result of smoking and drinking and the deposition of flat glass and ceramics was the result of trash disposal. Ten bags of each artifact type from excavation units within the foundation were counted and weighed against their counts and weights in the midden and the yard/ "other" combined. The result was that counts and weights for curved glass and pipe fragments in the cellar were generally correlated (Table 8-3). The count of curved glass was not significantly correlated with its weight (Figure 8-12), though the R2 was still high (0.43) despite the sample being somewhat smaller (n=9) than the pipe sample (n=17). The count of pipe stems and pipe bowls were highly correlated with their total weights.

The most significant correlation was the count of flat glass against its weight, where the counts explained over 98% of the samples total weight (R2 of 0.98, Figure 8-13), suggesting that curved glass was the anomalous category. Steinberg (January 28, 2014, pers. comm) states that the correlation "is complex and probably the result of behavioral differences in different contexts, rather than post-depositional processes, and that all correlations are highly significant." These data indicate that the cellar deposits, rather than being

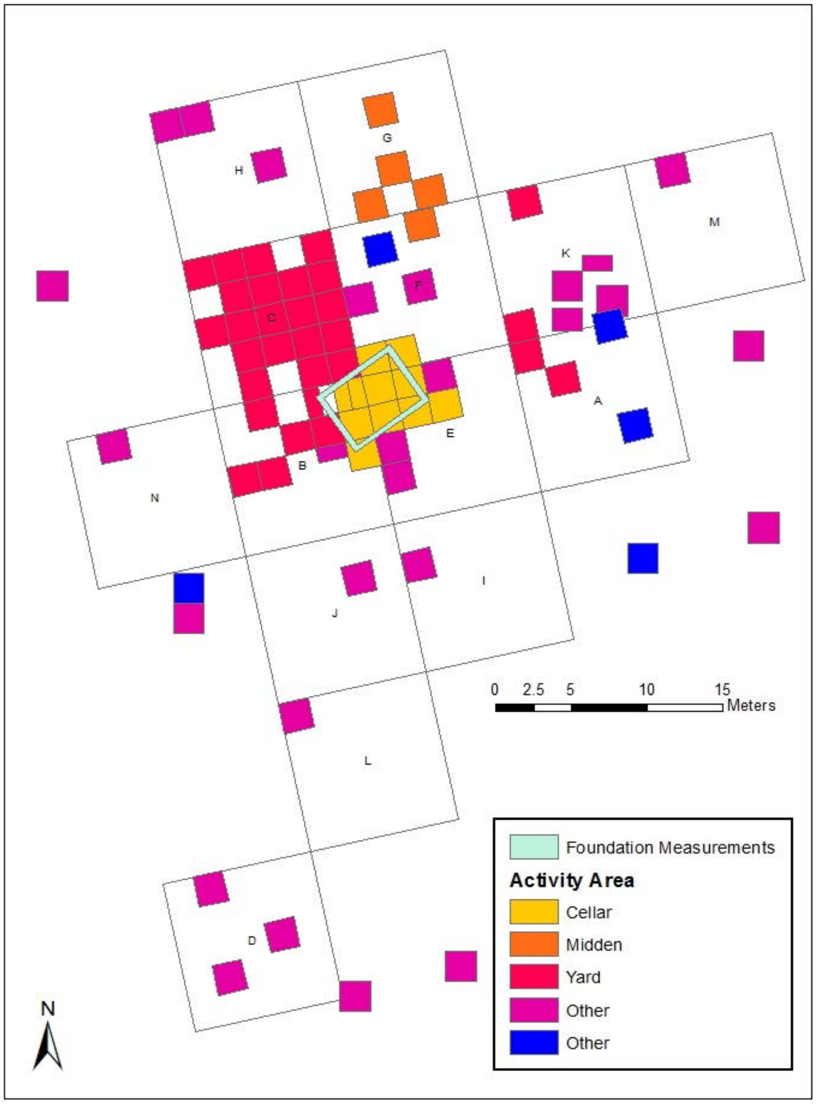


Figure 8-11. Pipe distribution across the SB/SB site.

disturbed by the bulldozer in 1938, are primary depositions that are the product of human behavior in 18th century. It also suggests that while smoking and drinking likely occurred simultaneously in the context of the Nipmuc gatherings at the homestead, curved glass was subject to a different disposal pattern than pipes. While a pipestem is easily broken, unlike a broken bottle it is not a danger to humans walking, sitting, or sleeping, if local memories of Sarah Boston's home are to be believed, on the floor (Fiske #11, [n.d.]:6). The count of pipestems was also highly correlated with the count of pipe bowls, suggesting that bowls and stems were subject to the same disposal patterns.

Clay pipe studies have suggested that a clay pipe, when the stem is broken, is still useable (Noel Hume 1969:301-302, Bradley 2000:126). Stems are consequently typically spread across sites, being found wherever people have smoked. For stems and bowls to be so highly correlated in one area, in this case a house foundation, smokers must have been smoking, breaking, continually using, and ultimately discarding their pipes in the same place. The counts and weights of the pipestems had an R^2 of 0.81 (Figure 8-14), indicating that the count of pipestems explained it weight 81% of the time, while the R^2 between the count and weight of pipebowls was 0.47 (Figure 8-15).

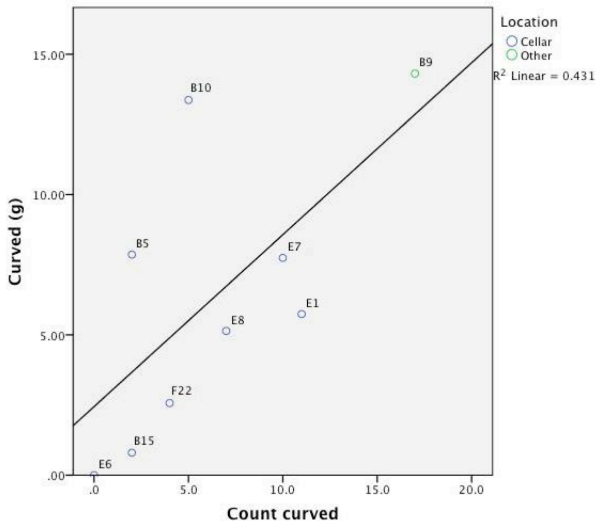


Figure 8-12. Significance test for curved glass and pipes.

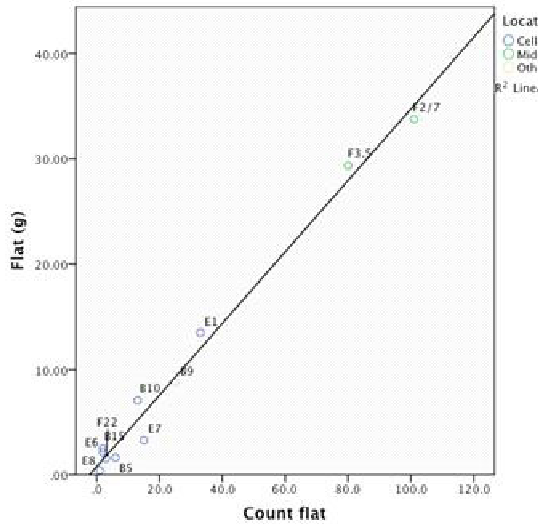


Figure 8-13. Significance of correlation of flat glass counts and weights.

Table 8-3. Pearson correlations of counts vs. weights of a sample of unit-levels. Bold numbers indicate the correlations between an artifact category's counts and weights. Table courtsey of John Steinberg, Andrew Fiske Memorial Center for Archaeological Research.

		Curved (g)	Count curved	Flat (g)	Count flat	Stem (g)	Count stem	Bowl (g)
Curved (g)	Pearson Correlation							
	Sig. (2-tailed)							
	N							
Count curved	Pearson Correlation	**0.656**						
	Sig. (2-tailed)	0.055						
	N	9						
Flat (g)	Pearson Correlation	0.472	0.639					
	Sig. (2-tailed)	0.2	0.064					
	N	9	9					
Count flat	Pearson Correlation	0.56	.793*	**.993****				
	Sig. (2-tailed)	0.117	0.011	0				
	N	9	9	11				
Stem (g)	Pearson Correlation	-0.112	-0.422	.774**	.794**			
	Sig. (2-tailed)	0.774	0.257	0.005	0.003			
	N	9	9	11	11			
Count stem	Pearson Correlation	0.326	-0.097	.867**	.873**	**.905****		
	Sig. (2-tailed)	0.391	0.803	0.001	0	0		
	N	9	9	11	11	17		
Bowl (g)	Pearson Correlation	-0.341	-0.426	0.562	0.587	.539*	0.36	
	Sig. (2-tailed)	0.37	0.253	0.072	0.058	0.026	0.155	
	N	9	9	11	11	17	17	
Count bowl	Pearson Correlation	-0.33	-0.376	.622*	.656*	.797**	.757**	**.691****
	Sig. (2-tailed)	0.385	0.318	0.041	0.028	0	0	0.002
	N	9	9	11	11	17	17	17

*** Correlation is significant at the 0.05 level (2-tailed).**
**** Correlation is significant at the 0.01 level (2-tailed).**

Such a high value for pipestems strongly suggests that stems were broken and discarded in the cellar/foundation on a regular basis, while bowls were smoked and occasionally discard elsewhere, such as in the midden with the rest of the trash. As discussed elsewhere in this volume, the SB/SB homestead was a place where members of the local Hassanamisco Nipmuc could come to eat, drink, and perhaps even plan for their various legal encounters with the town trustees. This kind of gathering, especially if frequent, would be one such environment where pipes were smoked and discarded largely in the same place.

Discussion of Binford Regression Results and Potential Problems

Three-hundred and eleven smoking pipe fragments were recovered from excavations at the SB/

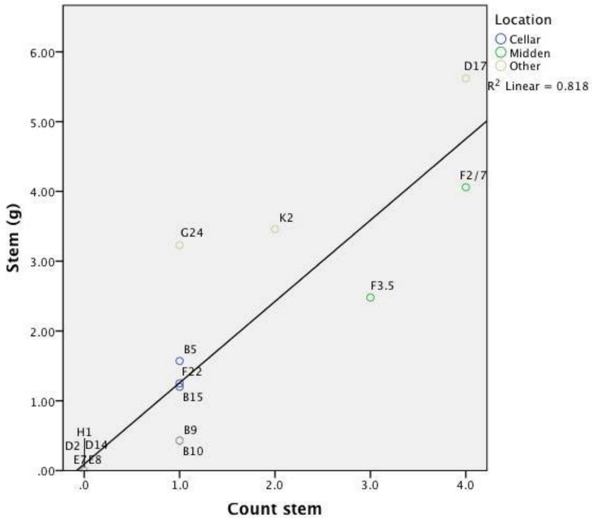


Figure 8-14. Comparison of counts and weights of pipe stems.

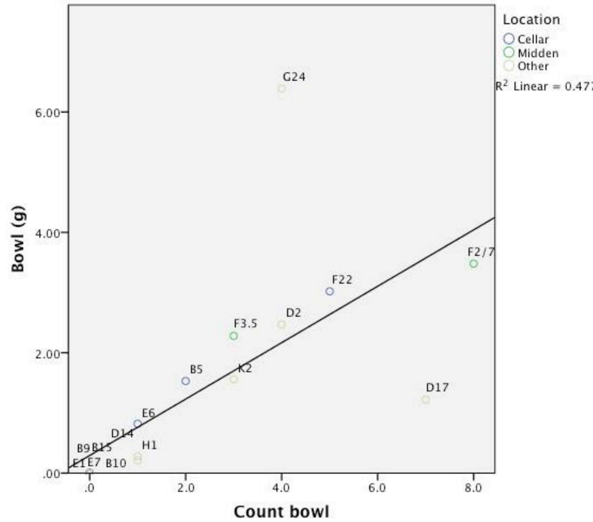


Figure 8-15. Count and weight of pipe bowls.

Table 8-4. Stem bore diameters and Harrington dates.

D. in 64ths of an inch	Count	Harrington dates
4	26	1750-1800
5	53	1710-1750
6	4	1680-1710
8	1	1620-1650

SB site, including 122 stem fragments and 189 bowl fragments. A minimum number of individuals was calculated by counting the number of fragments with the jointure between the shank and the bowl still intact (14) and the number of bowl fragments with recognizable maker's marks not already included in the first category (5), for a MNI of 19. This number can be increased to 22 when three other bowl fragments complete enough to be typed are included.

Of the stem fragments, 84 had measurable stem bore diameters. After Harrington discovered that the stem bore diameters in English white clay pipes decreased by one 64th of an inch every 30 years, Louis Binford created a regression formula based on this linear relationship. Using Binford's formula, Y = 1931.85-38.26X, where 1931.85 is the theoretical date when the stem bore would disappear completely, 38.26 is the number of years between each 64th of an inch decrease in stem bore diameter, and X represents the mean stem bore diameter for the sample (4.77) (Noel Hume 1969:299), a mean date of approximately 1749 is reached. In 1969 Hanson revised Binford's formula, proposing that the relationship between stem bore diameters and time was not linear, as Binford had supposed (Mallios 2005:91). He created a set of formulae for different date ranges; the SB/SB site falls into the last category, that for 1710-1800. Using Hanson's formula, Y = 2026.12-58.97X, a mean date of approximately 1745 is reached. Both dates fit within the historically documented ownership of the property by a succession of Nipmuc women between 1728 and 1860 (Law, Pezzarossi, and Mrozowski 2008:5), but fall shy of the 1790-1830 date of the majority of the material culture recovered by the close of excavations in 2013.

Harrington (1954) offered two caveats to stem bore dating that Binford (1962), Bradley (2000), and others have echoed: that only English pipes should be used, and that towards the last quarter of the 18th c. some pipestems begin to shrink in length, eventually resulting in the Scottish "cutty" pipe that was in vogue in the 19th century. Bradley agrees with Harrington in his 2000 overview of clay pipe studies, specifically cautioning against using samples manufactured after 1770. Table 8-4 shows the breakdown in stem bore diameter of the 84 pipestems recovered according to J. C. Harrington's original histogram, on which Binford's formula was based. A portion of the stems with bore diameters measuring 4/64ths of an inch have the potential to be manufactured after 1770 and

Figure 8-16. Raised vine pipe bowl decoration, scale in cm.

Figure 8-17. TD mark with vine and grape design, scale in cm.

therefore to be shorter than those manufactured before that date. The potential for shorter than average stems for the period likely accounts for a mean date closer to 1750 rather than one falling between 1790 and 1830. As such, we might question the usefulness of using Binford's regression formula on this particular site, particularly in light of the dates of the decorated pipe bowls discussed below.

Decoration

Stem bore dating can provide valuable information in terms of site dating, but pipe decoration and maker's marks provide a second level of datable material that can serve as a check against mean stem bore diameter dating. Fifty-five pipe fragments were decorated or had some kind of maker's mark. The following contains a discussion of these decorations and what they mean for the interpretation of the site.

Decorated Pipestems

Six pipestem fragments were decorated, all with geometric patterns containing dots, lines, or both. One of these fragments had letters alternating with the dots and lines; the letters "K" and "H" were the only letters on the fragment. The practice of stamping pipestems with their maker or place of origin did not become commonplace until the 19th century; however, these were usually enclosed in some form, similar to a cartouche, which this example is not. Additionally, it has a stem bore diameter of 5/64ths of an inch, placing its date of manufacture between 1710 and 1750 according to Harrington. .

Decorated Pipebowls

Forty pipebowls had some form of decoration. Fourteen had a raised vine (Figure 8-16); of these, five fragments were also ribbed and two fragments contained starbursts in addition to the vine. One additional fragment had starbursts without the vine. Pieffer refers to this design as the "spiked frond." Pieffer (1982), Larrabee (1971), and Pierson (2010) document these two designs as occurring separately and together on pipes from various 19th c. military sites in North America.

Twelve bowl fragments were fluted, three examples of which contained complete shanks. One bowl was complete, and its shape matched Atkinson and Oswald's (1969) type #29, which they date to 1840-1880. This places this pipe slightly after the rest of the material culture. Though Sarah Boston's daughter, Sarah Mary, did not reside on the property, she returned to pick apples from the orchard. The second and third bowls were not complete, but the spurs suggest that they are Atkinson and Oswald type #27, which dates to between 1780 and 1820. A fourth example with the same decoration and spur but with little left of the bowl may also be type #27. Bradley refers to both the vine and fluted decorative types as examples of the "heavy baroque style of decoration which would come to dominate the Victorian period" toward the end of the 18th century (2000:114). Over all these examples fit with the 1790-1830 dates established by the rest of the material culture.

A clear example of Noel Hume's Type 21 (1969:303), which he places between 1780 and 1820, also fits well with late 18th-early 19th century date of the overall assemblage. Six fragments were ribbed with no other mark, however these fragments were too small to yield a positive identification of the design or date of manufacture.

Six bowls have rouletting around the rim, and one similar example appears to have been unintentional. Both Bradley and Noel Hume describe this as a distinctly 17th c. Dutch decoration, however of the three fragments complete enough to ascribe bowl shapes, only one could be the small, bulbous type #5 or #6 that Noel Hume lists as 17th century. The remaining two are much longer and not bulbous at all. Baker, however, mentions recovering elbow (or "trade") pipes from a 17th century settlement in Maine with rim rouletting (Emerson 1985:24). The elbow form was made specifically for export to the Anglo-American colonies as early as 1635 by Dutch pipemaker Edward Bird, but Noel Hume gives this form a range of 1720 to 1820. With the bottom portion of the bowl missing it is difficult to definitively define a type; however, replicating, buying, and outright stealing of maker's marks was not uncommon in the pipemaking industry. The elbow pipe was no exception, and these bowls could very well be later 18th century results of the competitive nature of the pipemaking industry.

Maker's Marks

Five bowl fragments had identical maker's marks, the impressed "TD" mark with "vine and grape design" (Harris and Smith 2005:58) (Figure 8-17). The "TD" mark is traditionally cited as originating with Thomas Dormer, an English pipemaker working between 1748 and 1770, however, there were multiple pipemakers working in England with the initials "TD" during this time (Oswald 1975). Oswald lists 37 types of the "TD" mark that were manufactured by various Scottish firms in Glasgow by 1900, none of which match the "vine and grape" description. A brief survey of the available pipe literature revealed examples of this design at the Fortress of Louisbourg in Nova Scotia (Larrabee 1971), a study which included examples of the design from five other North American sites in contexts dating from 1750-1770, a New Zealand whaling station established in 1840, and in late 18th c. contexts at St. Mary's City, MD. This wildly popular and widely spread mark could have been acquired at any point after 1750; however, the shape of the most complete bowl fragment with this mark closely matches Oswald and Atkinson type #26, which was manufactured between 1740 and 1800 but had a midpoint of 1770. While these examples therefore cannot be placed firmly within the 1790-1830 date range, they should not be considered to be curated objects either.

Marks on Heels/Spurs

Flat feet or heels on pipes are common on 17th century pipes. Maker's marks in the form of a symbol, initials, or a full name appear on the bottom of the heel, but towards the end of the century they begin to be placed on the back of the bowl facing the smoker. Spurs are rare during this time, but are common in the 18th century, with initials appearing one letter on either side of the spur. In the 19th century maker's marks appear on the sides of the shank, the part of the pipe that joins the bowl and the stem (Bradley 2000).

Three of the spur fragments were complete enough to provide an identifiable maker's mark. One of these is an example recovered from the area identified with the midden and has "W" and "G" on either side of the spur with a stem bore diameter of 5/64ths. This mark is commonly dated between 1770 and 1825 (Pfeiffer 1982:105, Walker 1972:37). Oswald (1966) suggests that the "WG" originated with William Goulding of London, who may have shared a shop with Thomas Dormer and entered into a partnership with him, explaining why the "WG" and "TD" marks are frequently found together on 19th century pipes.

The remaining two examples with marked spurs have the coat of arms of the Dutch city of Gouda on the spur, one from the cellar and the other from blocks designated as "yard." Both have stem bore diameters of 4/64ths of an inch, placing their date of manufacture after 1750. The Gouda coat of arms was used beginning in 1740 to distinguish the higher quality, highly polished "porcelain" pipes from pipes marked as "fine" or "ordinary". This evidently caused buyers to assume that "fine" pipes were in fact "ordinary," causing to sales to drop to such an extent that both varieties began to be marked with the coat of arms while the higher quality "porcelain" pipes went unmarked (Larrabee 1971:62).

Conclusions

While the majority of pipe bowl decoration supports an occupation during the late 18th and early 19th centuries, the presence of maker's marks from the mid-18th century combined with 53 stems with measurable bores of 5/64ths of an inch strongly suggests that clay pipes were among the objects being curated at the Sarah Burnee/ Sarah Boston farmstead.

Law, Pezzarossi, and Mrozowski argued in 2008 that the small percentage of stonewares and tin-glazed earthwares recovered from the site represented curated objects. White salt-glazed stoneware was produced as early 1720 but was replaced as the tableware of choice in the creamware revolution of the later 18th century, a trend we see in the SB/SB assemblage (see above). Tin-glazed earthenwares had reached their peak popularity by 1750; in 2008 three distinct tin-glaze patterns had been identified, dating to 1708-1786 and 1750-1770/1742-1760 (2008:69-70). These data were used to argue that despite the household clearly having access to fashionable ceramics, certain out-dated vessels were kept by the daughters after receiving the property from their mothers. This idea can also be applied to the clay pipes whose dates are out of sync with the rest of the material culture.

A second possibility is that out-dated clay pipes were being curated, or rather, accumulated, for entertaining. The high correlation between counts of pipebowls and pipestems in cellar/foundation supports the idea that the Sarah Burnee/Sarah Boston home was a gathering place for the local Hassanamisco Nipmuc community, and while Sarah Boston was remembered for liking hard cider (which she was occasionally paid in), she was also remembered for her hospitality. Tavernkeepers in the 17th and 18th centuries were known to clean used pipes by re-firing them (Bragdon 1981:29); Sarah Burnee and Sarah Boston may have cleaned pipes in a similar manner in order to have extras to bring out during gatherings. Given the number of late 18th/early 19th c. pipebowl designs and the many fashionable creamwares and pearlwares, it is obvious that the household could afford the trappings of material culture in vogue with their Anglo-American neighbors. It is therefore unlikely that Sarah Burnee and her daughter had to re-use an object as personal as a pipe out of monetary necessity, but rather did so out of practicality.

Iron Assemblage

The iron assemblage from the Sarah Boston Site is quite extensive (n=890) and well preserved for a New England archaeological site with 45% of the assemblage identifiable to object or object category. Only 32% of the assemblage was entirely unidentifiable in terms of associated activity or activity area. We were also able to determine the method of manufacture for 90% of the assemblage, which broke down into 34% wrought, 55% cast and 1% sheet metal. While this may seem like a low success rate for identification, rust and decay usually hinders or completely prohibits the identification of most iron artifacts in the Northeast. We owe our success in this endeavor to the aggressive preservation techniques employed by Dennis Piechota at the Fiske Center, and the numerous graduate students who have undertaken painstaking tannic acid treatment over the course of the last 7 years (for procedure see Methodology chapter). While iron conservation has taken place at the Fiske Center, analysis has predominantly been undertaken at the University of California under the supervision of site archaeologist Heather Law Pezzarossi. She has analyzed the iron subassemblage, both for congruencies in the broader communal dining trend noted across the entire assemblage (see also Pezzarossi et al. 2012), and for its utility in basketmaking.

In 2010, an analysis of the iron cookware and hearth related artifacts (n=89)(including pots and kettle fragments, tableware and small finds) from the 2006-2009 seasons was undertaken at the University of California by Heather Law and Annelise Morris. Because of previous materials analyses that implied that the Sarah Boston Farmstead

Figure 8-18. Iron cooking vessels including kettle, skillet and Dutch oven.

served as a gathering place (Law 2008), researchers sought to determine if the iron assemblage revealed anything about cooking practices at the Sarah Boston Farmstead and/or bore out that claim in any other way.

Pots and Kettles

Pot and kettle fragments made up 64% of the iron cooking related subassemblage at the time it was analyzed in 2010 (n=57), with 35% (n=20) rim fragments, 16 of which were large enough to determine diameter. A minimum vessel count was calculated using rim diameters as the diagnostic attribute, with a result of 12 cooking vessels ranging in diameter from 10 cm to 32 cm, with the heaviest frequency at 14 cm, 20 cm and 25 cm respectively. A back-up MVC was conducted using pot/kettle feet measurements, with a result of MVC=6, so the rim MVC was considered to be more accurate. Initial analysis was not in depth enough to determine which of the MVC vessels were pots and which were kettles, the former being characterized by unrestricted mouths and the latter exhibiting restricted mouths smaller than the maximum diameter of the vessel (Figure 8-18). Some of the rim fragments were too small to make a distinction. Some of the largest kettle fragments were recovered from the area of Units B10 and B5 in the western most portion of the foundation. This included a sizable portion of a skillet and the cover of a "Dutch Oven" (Figure 8-18). Ultimately, these findings show that Sarah Boston had quite a variety of sizes of cookware, with some small enough for personal use and some large enough for cooking for a crowd. In 2012, Pezzarossi, Kennedy and Law mentioned this trend in their discussion of Native cooking practices and cuisine at the Sarah Boston Site (Pezzarossi et al. 2012).

Figure 8-19. Some of the iron knives recovered from the SB/SB Site.

Knives and Forks

Knives and other tableware accounted for 33% of the kitchen subassemblage and 13% of the entire iron assemblage at the time. Eight of the total 31 knives were identified positively as table knives on the basis of their possession of both bolster and tang (Dunning 2000; see Figure 8-19), one of which was further identified as a Continental style table knife due to its distinctive blade shape. The knives without bolsters (n=18) were a bit more ambiguous to positively identify in terms of intended use. Most bolsterless knives were not kitchen knives but utility knives, like those used in the military in the 18th century (Neumann and Kravic 1975:118). They could have been used in a number of capacities, including eating, agricultural tools, hunting tools, basketmaking tools (see below discussion), or in butchery practices. Knives may also not have had bolsters because they were originally something else and re-fashioned into a knife by a blacksmith later. Usually the tools chosen to be repurposed as knives were of high quality steel, throughout, like a file, and would not have needed a bolster to strengthen the connection between the steel blade and the normally lesser quality iron tang (Light 2000). One file (Rec #2165) was identified in the collection.

A total of 12 forks were found, as of the completion of the 2012 iron analysis (Figure 8-20). While no two forks were identical, all of the forks were of the two-tined variety. This is a rather anachronistic trend, as three-tined forks were readily available on the market during Sarah Burnee's lifetime. Law (2008) noted that (as was the case with the glass assemblage) when comparing the Sarah Boston assemblage against contemporaneous tavern assemblages, the SB/SB material culture matches more closely to that of public gathering places. An archaeological survey of The Rising Son Tavern in Stanton, Delaware which closed in 1805 recovered 25 forks which was considered to be a large number in comparison to neighboring farms (Cunningham 2008). These findings, together with the knives (and other material culture discussed above) further strengthen the potential for the SB/SB house as a gathering place for the local Hassanamesit community.

Potential Basketmaking Tools

Heather Law Pezzarossi (2014) considered the

Figure 8-20. Some of the iron forks recovered from the SB/SB Site.

utility of a broad spectrum of iron objects from the Sarah Boston assemblage in the practice of basketmaking. This analysis (carried out in 2012) was meant to consider repurposing and innovative reuse in the evaluation of Sarah Boston's position in the burgeoning industry in the early 19th century. Based on previous anthropological research and observation of contemporary Native basketmakers, Law Pezzarossi identified ten separate activities necessary for making and selling woodsplint baskets and a spectrum of tools and implements that have some utility in carrying out these tasks: 1) harvesting the wood (axe and knife); 2) stripping the bark (peeling iron, axe, drawshave); 3) prepping the log (mallet, hatchet, splitting wedges); 3) Pounding the log to release the growth rings (mallet, axe, sledgehammer); 4) seperating the rings; 6) planing the splints (handplanner, knife); 7) riving the splints (knife, splitter) ; 8) cutting the splints (hand guage, knife, scissors); 7) soaking the splints; 8) weaving the basket (knife, awl, mold); 9) carving rims and handles (drawshave, knife, shaving horse) 9) decorating the basket (brush, stamps); 10) selling the baskets. Based on these categories, her analysis of the assemblage revealed several non-basket specific tools that would have been useful in basket production.

Harvesting—Two axe heads were found in the Sarah Boston assemblage. The first (rec #2347) is a well preserved New England style felling axe. An axe of this kind would have come in handy on any New England farmstead, and been crucial to a basketmaker, who would need it to harvest ash trees from the wetlands. McFeat (1987:66) claims that Maliseet basketmakers in New Brunswick relied on men to gather basketmaking materials. They knew the precise locations of stands of ash and would harvest these resources regardless of the property owner's wishes. While ash trees do indeed grow on the SB/SB Site today, it is unclear at this time whether she would have been able to find black ash on her property while she resided there. Archaeobotanical analysis done by Dr. Heather Trigg has confirmed the presence of ash in the assemblage of charred macrobotanical remains (see chapter 7).

Stripping—As mentioned above, any number of tools might be used to remove the bark from the ash tree once it was harvested. An axe (or hatchet) like Rec #2347 would have worked well for ash as long as the bark was pounded beforehand. A peeling iron, and a drawshave are also common choices. In the Sarah Boston collection we identified one object that could have served well as a peeling iron (Rec #2114). This object may or may not have been meant as such; it actually looks a lot like an oven peel as well, meant for use in the hearth. While we found no evidence of a traditional drawshave, we did recover an altered scythe blade that might have been repurposed as a drawshave. While the scythes are some of the most definitive agricultural artifacts found in the

Figure 8-21. Repurposed scythe blade.

iron collection (along with the ox shoes), their presence in the Sarah Boston cellar feature and the alterations apparent on the blade suggests that they continued to serve a purpose within the household even after the family gave up their agricultural enterprises. Specifically Rec #2330 seems to have undergone some kind of post-production alteration in which the tang and the blade have both been bent inward to form a "C" shaped curve (Figure 8-21). These alterations, especially those to the tang, are too dramatic and seamless to have been accomplished without having reheated the iron (Kelleher personal communication 2014), which means that Sarah likely would have brought this blade to her neighbor Amos Ellis for reshaping. While the new shape does not resemble the typical form of any tool that could be found, this blade, in its altered state, could have potentially been used as a drawknife-type tool, with the reshaped tang and the bent over end forming the handles. Scythes were often re-made into other tools like hooks, corn knives, and even hinges (Kelleher personal communication 2014), so it would not have been especially unusual for Sarah to repurpose her old scythe blade when she sought to shift her occupation toward basketmaking in the early years of the 19th century.

Prepping—Once the bark is removed; the basketmaker must prepare the log in order to get the splints a uniform width, which is accomplished in a few different ways, depending on the kind of wood being prepared. In the case of ash, some basketmakers prefer to split their log into manageable and uniform sized "billets" before pounding (Follansbee 2012), others prep the log in its entirety, using a hatchet and mallet to drive short, deep cuts perpendicular to the annual growth rings on one end of the log, at uniform distances. Once the rings are pounded loose, the strips can be peeled the distance of the log at this predetermined width. While no hatchets or mallets were found, Sarah could easily have used her axe to score the log, if she was preparing black ash. Tantaquidgeon (1935:43) notes that Brown or Black ash was (and is) the most popular choice of raw material for basketmakers, alternatively called, "hoop, swamp, or basket ash" (Tantaquidgeon 1935: 43). She also mentions White oak (Quercus alba Linnaeus) and Swamp Maple (Acer rubrum Linnaeus) as alternative, but less desirable options among Mohegan basketmakers. If Sarah was preparing oak she would have required a mallet or sledgehammer and a pair of splitting wedges which were used to split the log lengthwise in half, and in half again, until the sections were a manageable size for the drawshave, as the oak does not naturally come apart in rings when pounded like ash does. We did recover a pair of splitting wedges (Recs #2137 and #2385) in the Sarah Boston assemblage, one large (12 cm) and one small (7 cm). While splitting wedges would undoubtedly have had many uses around the homestead, their presence suggests that Sarah was equiped to prepare both ash and oak splints in her basketmaking practice.

Pounding—At this stage, the basketmaker must pound every inch of the surface of the ash log in order to release the summer growth rings. Some basketmakers use a sledgehammer, but evidence in the Sarah Boston collection suggests she used the butt end of an axe. The second axe

Figure 8-22. Axe head showing warping from use.

found at the Sarah Boston Farmstead Site (rec #2232) was barely recognizable as an axe, as it was just the butt portion and it was quite drastically warped, exhibiting a concave dip in the butt, running the full length of the back surface, and a concomitant slumping of the outer side body (Figure 8-22). After some research, Law Pezzarossi recognized that this posterior warping and use wear was highly consistent with the repeated pounding of the butt end against the cylindrical surface of logs. Lismer (1941) reports that Seneca men use the butt end of an axe in pounding the ash logs in preparation for separating the growth rings, and there are video clips of a Maliseet basketmaker that showed not only the pounding activity, but the strikingly similar use wear on the butt of his axe (Bear 2011). This finding is highly significant because it suggests that a) Sarah Boston was harvesting her own ash and preparing her own splints, and b) based on the curvature of the warping, Sarah pounded her splints out straight from the log (the cylindrical shape of which contributed to the concave deformation of the iron), rather than carving her ash into billets first, which would likely have initiated a different warping pattern (as demonstrated by Follansbee 2012).

Planing—Once the splints have been removed from the log, both the back and the front of the splint is shaved to create a smooth and even surface. Some basketmakers use a tool known as a hand plane, while others rely simply on a utility knife pulling each side of the splint swiftly between their knife and a piece of leather strapped to their leg to shave off irregularities in the surface. Lismer (1941) notes that many Seneca basketmakers preferred a straight bladed jackknife to a crooked knife, specifying that the blade not be very sharp in the event that it slips and nicks the preparer or the splint itself. Handsman and McMullen (1987:18) also note that mostly straight-bladed knives and folding knives were used for this step, excepting the case of heavy oak splints, where the drawshave was sometimes employed. There are two folding knives in the Sarah Boston Collection (Rec #2226 and #2392), both of which would have been suitable for planing splints and had the added benefit of being better for travelling than the other knives in the collection. Including the two folding knives, we counted 35 full or partial knives in the assemblage. 24 exhibited the joining of the tang to the blade, while 11 of the cataloged knives were only represented by blades. This confirmed that at minimum, the assemblage represents at least 24 knives. In some cases, like in that of the table knives (n=8), it was simple to determine their intended purpose based on their shape and profile, but for most of the assemblage either the corrosion or the common shape of the knife prevented Law Pezzarossi from further identifying the knives' intended use, ie: utility knives, kitchen knives, etc., and indeed, many of them were likely meant for multipurpose use. Further inspection of the condition of the knives revealed that 11 of 35 knives were noticeably bent either at the tang or the blade or both. The repeated pressure of pushing the side of the blade down against one's leg (as done in the planing action) could feasibly cause the blade to eventually bend close to the tang, depending on the force and quality of the iron. Six knives in total showed bending at the blade/tang intersection in varying degrees, interestingly, all six bent to the right, indicating a right handed user.

Riving—The riving step is performed after the splint has been planed on both sides: the basketmaker scores the end of the splint, cutting the flesh of the wood across the grain about halfway through the thickness of the splint. They then fold back the tab they have created and peel the splint in half lengthwise along the grain, creating a thinner, more flexible splint and exposing a uniformly smooth "satin" interior that becomes the desired exterior "finished" side of the basket. Riving would only have required the use of any small utility knife (see above) and possibly that of a splitter, a wooden guide of sorts composed of two pieces of wood, meant to squeeze together with the knees, that would have facilitated the even separation of the splint and spared the basketmaker's fingers and toes many splinters when preparing large numbers of splints at once (see McMullen 1987:171 and Pelletier 2009). Pelletier (2009) claims that the splitter was only adopted after 1850, when the tourism industry began demanding baskets in wholesale quantities.

Cutting—The next step involves trimming the splints into various widths. Splints in the main bodies of the baskets, at least in Southeastern New England, were often of one uniform width; however splints of narrower widths were often used in reinforcing base corners and the rims, and occasionally incorporated into the body as an aesthetic choice (see McMullen 1987). To trim the splints into various smaller sizes, a basketmaker might use a knife, scissors, or a hand gauge. The combined abilities of the three pairs of scissors represented in the Sarah Boston assemblage (a small pair of embroidery scissors, an un-identifiable medium pair and a larger pair of shears, possibly meant for cutting animal hair [Sellen 2002:429]) could probably handle all of Sarah Boston's cutting needs which may have included activities such as sewing, knitting, basketweaving, grooming etc. Could she have cut wooden splints with the larger pair? Lismer (1941) maintains that some basketmakers separate their narrow splints using shears rather than a knife or a guage, claiming they make less waste and also result in a more finished, smoother edge to the splints. The hand gauge was composed of a set of small blades, often made from clock spring teeth, mounted onto a wooden handle and capped with an iron fitting. The basketmaker would draw the wide splint through the guage, which would quickly and easily slice the splint into several smaller ones. Speck points out that the hand gauge was "highly prized" by the artisan and in some cases, especially among the Schagticoke, the handles were carefully carved for both aesthetic and ergonomic effect (Speck 1915:7). But most evidence points to the introduction of the hand guage to the basketmaking industry relatively late, around the same time as the splitter (1850), when the industry called for more wholesale production of baskets. While the wooden handle would not have survived in the archaeological record, we have in the Sarah Boston collection a set of 4 small iron "teeth" less than one cm long (rec #2378) that were found delicately clinging to a section of corroded sheet metal (rec #2377). It is worth considering that Sarah Boston played a role in the development of the hand guage before her death in 1837.

Weaving—While weaving itself does not require many tools, basketmakers often employed their knives in trimming splints as they were woven into the body of the basket. Lismer also mentions the use of a screwdriver, or some similarly "blunt tool is used to separate the warps in order to draw the binding with through to the other side" (Lismer 1942: 9). While initially, two tined forks do not seem related to any tools in the basket business, the presence of only two-tined forks in the assemblage seemed odd. Two tined forks went out of style in the mid to late 18th century (Dunning 2000), and 3 tined forks were readily available and more common during the known occupation of the house. This anachronistic trend might be explained by an alternative use. Perhaps there was a task related to basketmaking for which a two-tined fork was well suited? The forks may have been useful in uniformly spacing basket splints, and they may also have been useful in straightening or bending

Figure 8-23. Bent knife blade handle.

Figure 8-24. Drill bits, possibly serving as chairmaker's bits.

basket splints. The "commander" was a dedicated tool, meant to serve a similar purpose (Sellens 2002: 142). There is no way to determine if Sarah Boston's two-tined forks were used in basketmaking or eating or both. However, the anachronistic trend in the sub-assemblage (which has not been present in any other sub-assemblage studied to date), in concert with the relative abundance of forks in comparison with other domestic sites of this era and occupation length (see Law 2008), seems to suggest not only a social component, but possibly a multi-purpose component as well. More research into the specific mechanical movements and challenges of basketmaking could further support this claim.

In the parallel practice of chair caning, a table knife is often used to aid in the feeding of splints through the already established warp. At least 8 of the 35 total knives in the Sarah Boston collection were identified as "table" knives, but whether they were used at the table or in the practice of chair-caning or both is impossible to determine.

Carving—After the body of the basket was woven, the basketmaker would have needed to carve the rims and handles. These were often made of ash or oak and would likely have required the use of the crooked knife, or the drawshave. As mentioned above, "crooked knives" were usually home-made (Sellens 2002), and would probably have been fashioned from more readily available tools or other knives. While they varied in shape and size according to the preferences and limitations of their makers; Handsman and McMullen (1987:18) note that most basketmakers preferred their crooked knives to bend at the handle rather than the blade. This is because the angle of the handle facilitates holding the knife so the blade points inward and downward, allowing the user to draw the knife toward the body, which was especially desirable for increased control in carving. So for carving purposes, a right handed user would have preferred a tang bent toward the left, facilitating a shallower, more comfortable wrist angle (Figure 8-23). Interestingly, 7 tangs in the Sarah Boston knife collection bent to the left, and just 2 bent to the right. While more research is needed to determine the potential for peri and post-depositional site formation processes to contribute to the warping of these objects, the 7 knives with tangs bent to the left compared against 2 bent to the right suggest more than a coincidental trend.

In addition to the various knives and the drawshave mentioned above, Law Pezzarossi also identified not one, but two very specialized drill bits, one large and one small (Figure 8-24). These "Spoon" or "Chairmaker's" bits were, "especially suited for boring the holes for cane-seat chairs" (Salaman 1997:79). They were traditionally used with a brace, and were valued in the chair making industry because they allowed the artisan to adjust the angle of the bore at any time in the drilling process. As mentioned above, Native basketmakers in New England in the early 19th century were known to have also sought work re-caning chairs, or making brooms and brushes because their skills as basketmakers made them uniquely suited to these other tasks, as well. As such, these bits represent some of the most definitive material evidence

Figure 8-25. Ice creepers or ice cleats.

we have to connect Sarah Boston to the broader industry of Native fiber arts in the late 18th and early 19th century. The bits appear to be identical, but for a difference of about 5 cms in length and 0.5cm in width. Because of the corrosion on the surface of the bit, it is difficult to calculate an accurate bore width for each bit.

Selling—Basketmakers like Sarah Boston made a living from their art by travelling regionally selling their wares from farm to farm. In this endeavor, artisans would likely have needed many things including warm clothing, good shoes, and a trustworthy network of customers and family to harbor them along the way. Perhaps some of the most telling iron artifacts in the collection were two mismatched iron shoe fittings, called "ice creepers" or "ice cleats" (Figure 8-25). These items speak not directly to the practice of basketmaking, but more to the continued practice of mobility, possibly through basket selling. Ice creepers attached to the bottom of the shoe, just in front of the heel, and provided the traction needed for the wearer to walk stably on ice. One (rec #2340) dates roughly to the Revolutionary War period, when soldiers (like Sarah Boston's uncle Joseph Aaron) were issued ice creepers so they could walk long distances on New England's frozen waterways and icy roads. The other one (rec #2325) is similarly constructed, but obviously not a match to the Revolutionary War pair. Perhaps Sarah Boston had her own pair made for her winter travels throughout the region. Basket sellers like Sarah may have taken to New England's frozen roads in the wintertime, selling their wares from door to door, but she may also have thought to travel on New England's frozen rivers in the colder months, finding them a faster and flatter highway to get easily from one town center to another. Especially with New England's mill towns developing as rapidly as they were in the Blackstone River Valley during Sarah Boston's lifetime, it stands to reason that she might find it easier to travel the Blackstone Canal to get quickly from one town center to the next, with the help of her ice creepers.

Admittedly, each of the objects discussed above was meant for another purpose and was likely used in that regard as well. However, when we view this assemblage as a whole, the combined potential for the expression of agency through the practice of basketmaking is strong. The assemblage communicates a combined sense of "making do" and innovation that you might expect from someone starting out in basketmaking and helping to develop it as a trade.

Early Native Materials by Joseph Bagley

Quartz flakes and knapping debris was recovered from the SB/SB Farmstead beginning with its earliest intensive survey in 2003 (Gary 2005). Extensive archaeological surveys including 14 professional excavations in the vicinity of Keith Hill have resulted in the identification of 24 Native American cultural sites (Figure 8-26) (Fragola and Ritchie 1996; Gary 2005; Mulholland et al. 1986; Pagoulatos 1988; Glover 1990; Ritchie and Van Dyke 2005; Tritsch 2006). These sites are dominated by lithic processing sites where flakes and stone tool production-related materials were most if not all of the materials recovered during excavations, though rock shelters, a petroglyph, and raw material quarries were also identified. While these sporadic surveys do not account for all of the probable Native sites in the region, together the sites demonstrate that Keith Hill was extensively used by Native peoples for thousands of years prior the arrival of Europeans. The presence of numerous lithic and pottery fragments identified within the

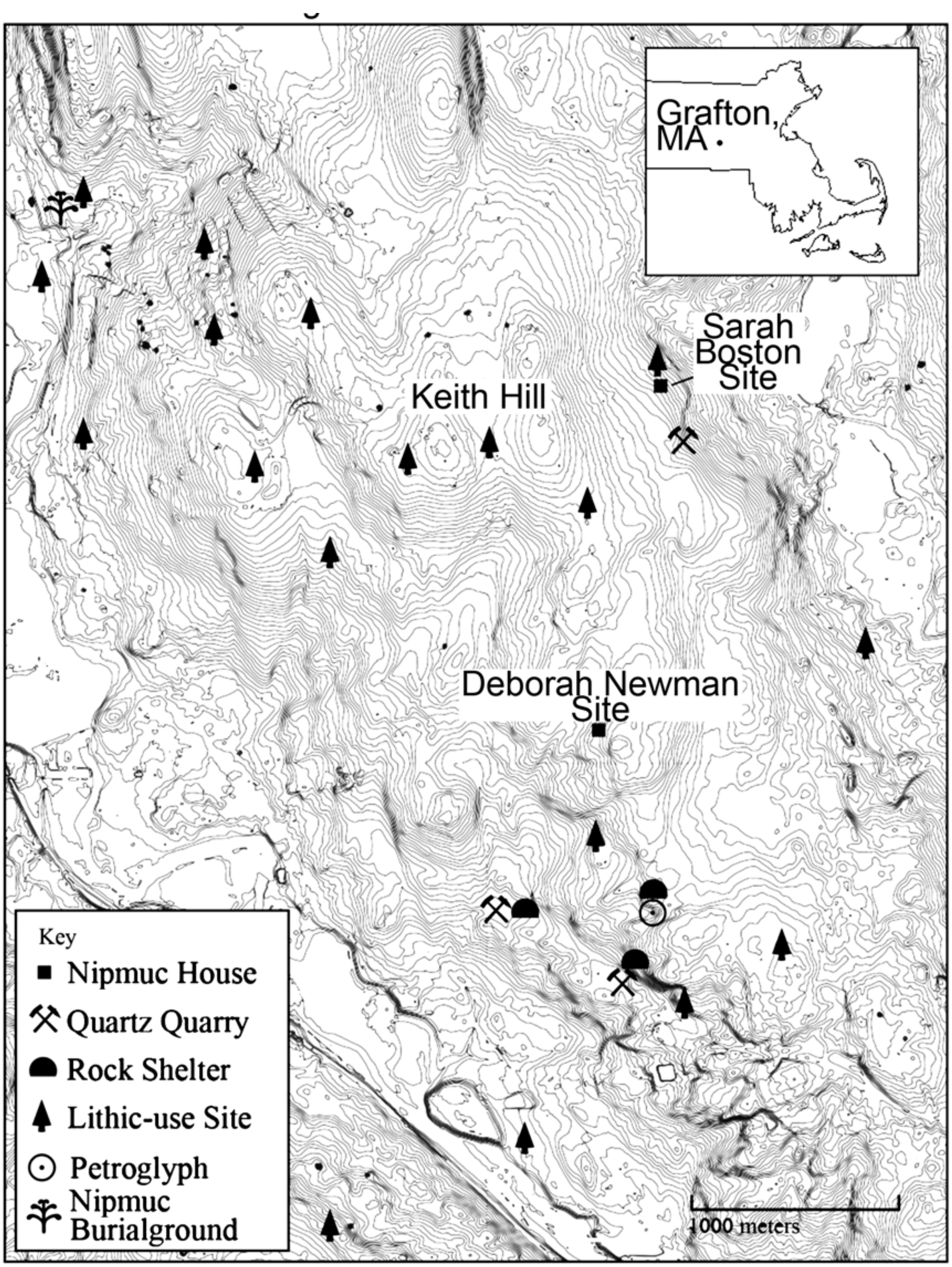


Figure 8-26. Native American sites in the Keith Hill area.

Farmstead assemblage presented an opportunity to determine if these tools represented earlier occupations of the site, contemporary use of stone tools during the 18th and 19th centuries, or some combination of the two. The artifacts, analysis, and results presented here demonstrate that the Nipmuc family living in the Farmstead was simultaneously creating new stone tools, re-using stone tools

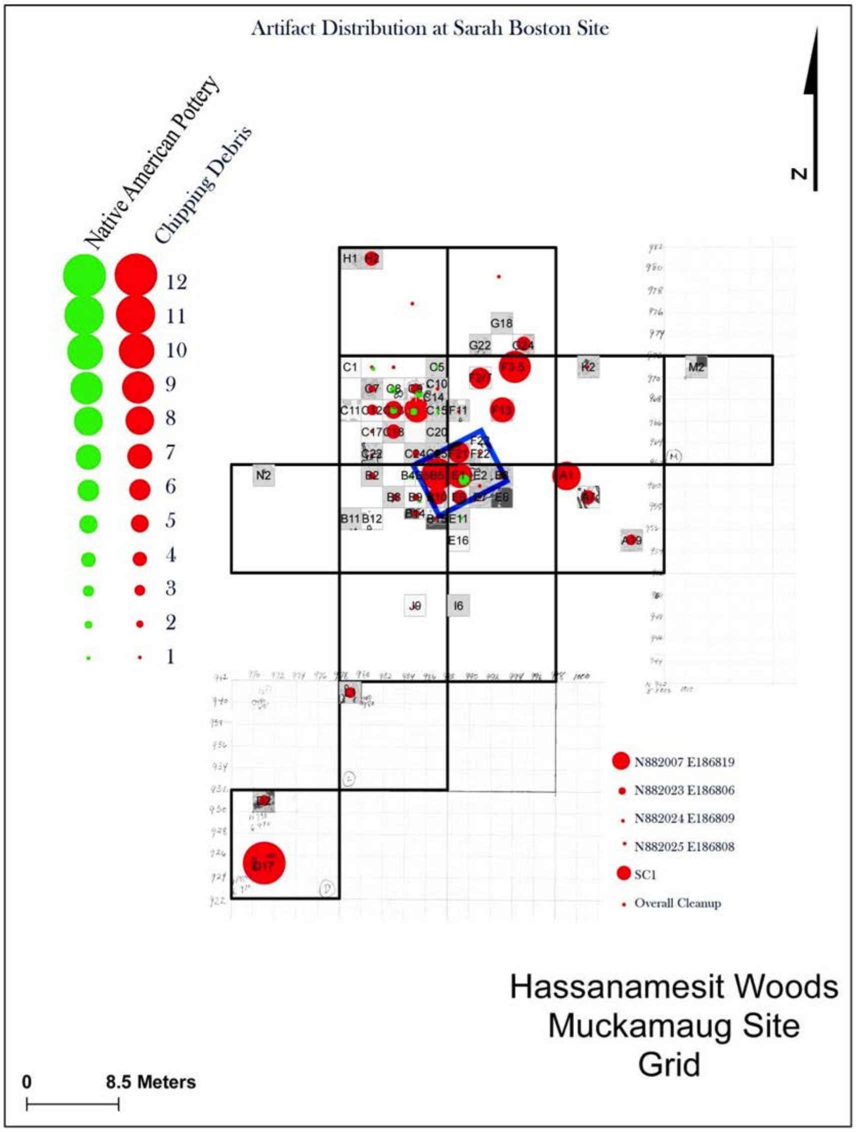


Figure 8-27. Density of lithics and Native American ceramics per unit.

likely found nearby, and living on top of a site containing artifacts dating to the time before the farmstead was established in the mid-18th century.

Lithics

In total, 169 quartz and quartzite flakes and cores and 7 ground stone tools were recovered at the SB/SB Farmstead. All of these lithics were found within the kitchen midden located in Blocks F and C, within the house foundation (Blocks B and E), the area immediately surrounding the foundation (Figure 8-27).

The quartz located on the property was likely quarried at the three known quarry sites located in the vicinity of the house (Figure 8-26). One of these quarries is located just 1000 feet south of the house foundation representing an ideal source. The vast majority of the flakes and cores recovered were made from quart. Quartzite, the second material used, occurs in massive outcrops in the vicinity of Grafton. While no formal tools made from this material were found, a Middle Archaic quartzite biface was recovered about 100 meters north of the foundation during the Intensive survey. Together, these flakes and cores appear to represent an expedient tool production site.

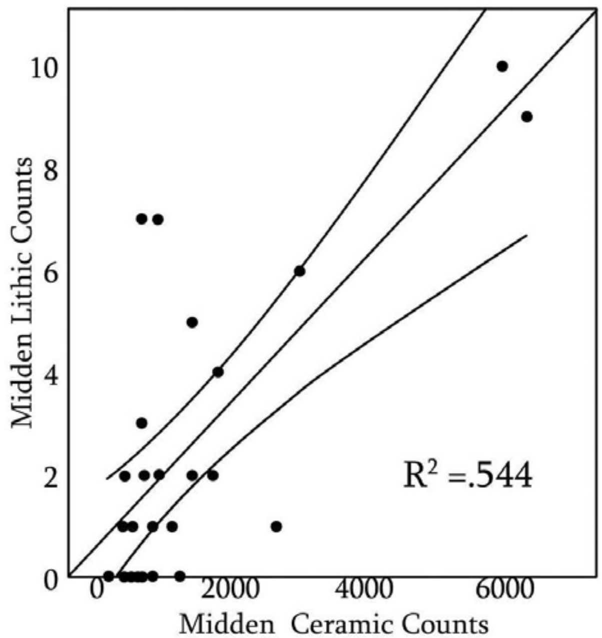


Figure 8-28. Percentage of lithics and historic ceramics by unit in the kitchen midden. A Pearson's coefficient (R2) greater than .5 indicates a strong positive relationship between density of ceramic and lithics within the midden deposit.

Figure 8-29. Ground stone tools recovered from the SB/SB Site.

Only two flakes within the assemblage appear to be recovered from an intact B horizon. These two flakes represent a cultural deposit that definitively pre-dates the arrival of Europeans to the region. If stone tools were re-used on-site, this earlier site as well as the numerous early sites in the vicinity could have been a source for stone tools.

To determine if flakes found within the vicinity of the foundation were present due to the mixing of an earlier site into the midden and house deposits, a correlation study was conducted using relative densities of lithics and historic ceramics located within the midden. The results of this study (Figure 8-28), show a high correlation (R2>.5) of lithics to ceramics indicating that the two categories of material were deposited as part of the same depositional events that created the midden. Therefor it seems the materials are contemporaneous.

Within the lithic assemblage, seven ground stone objects were recovered including a hammer stone, two whetstones, a mortar, a possible ground stone biface (or whetstone) (Figure 8-29), and two steatite fragments that refit to form a partial lugged steatite bowl (Figure 8-30). It is probable that the pestle and steatite fragments are ancient, while the two whetstones and possible bifacial groundstone tools are of undetermined age as whetstones were present on sites before and after the arrival of Europeans.

The pestle is fragmentary. Overall, its form is an elongated rod with a rounded end. Its original length is unknown. The rounded end is pecked, and one side of its length is flattened. Similar examples at the Robins Museum of Archaeology in Middleboro, Massachusetts indicate these were multi-purpose tools. The rounded end served as a mortar in a pestle and could also double as a hammer stone. The flattened surface could have been used as a grinding stone in a metate, which would account for the wear to one surface. These

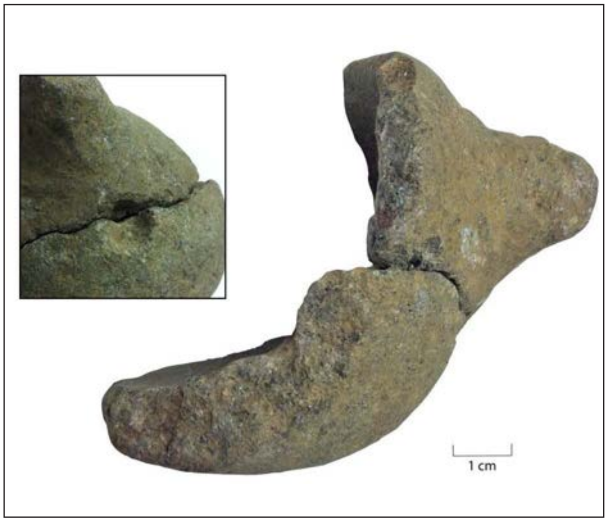


Figure 8-30. Steatite vessel.

tools are not associated with any particular period in Native history, though their function associated with food processing makes them more likely to be found in what archaeologists define as Woodland period (3,000-400 BP) contexts when agriculture became prevalent.

The steatite fragments represent a stone bowl carved with a distinct lug handle that is similar to those made approximately 3,000 years ago during the peak of steatite bowl production in the Late Archaic (Truncer 2004). While vessels were made before and after this period, the dramatic rise in prevalence of stone bowls, just before the invention of pottery making technology/technique, indicates a probable origin date of this artifact. The two fragments were found several meters apart in the densest portions of the kitchen midden. A possible drill hole that only partially penetrated the thickness of the vessel wall indicates a probable attempt at repair, though the break through this mark indicates the repair was not successful. It is possible that these two fragments were part of a larger more-usable vessel, though the fragments of the vessel that were recovered could have served a practical function as a very shallow storage container. Overall, this fragment of a vessel would not have been able to hold nearly as much volume as its original size, so its function in the 18th or 19th century, if any, would have been different if no other portions of the vessel are elsewhere on the site.

Lithic Discussion

The presence of lithics at the SB/SB Farmstead presented the need to determine the temporal origin and potential function of these tools to answer if they were merely mixed earlier artifacts, or represented a reuse or lithic production in the 18th and 19th centuries. The correlation study presented earlier gives some insights into the mixing issue. While this correlation does not represent causation, the most likely reason for it is that these flakes and cores were part of the family's daily household artifact assemblage and were discarded in similar concentrations and locations as other household refuse in the midden. The presence of flakes in intact B soils, the presence of the steatite vessel, and the stone pestle may indicate the presence of earlier materials in the site. The location of the ground stone tools within the midden and foundation fills indicate that at some point during the occupancy of the house, these objects were being curated and potentially reused on the property by the Nipmuc family living at the house, possibly thousands of years after their original creation.

Finally, the question of whether the family themselves were willing or able to make stone tools was proposed. Joseph Bagley (2013) utilized the presence of modified gunflints and worked glass to determine that the family living in the house was able to utilize flintknapping practices to produce tools. Therefore, the concentration of quartz flakes within the kitchen midden were very likely to have been made by the Sarah Burnee and Sarah Boston families from local lithic materials readily available to them rather than collecting and re-using stone tool flakes that were found on sites nearby.

Native Pottery

Several fragments of Native pottery were recovered from the site area (Figure 8-31). In total, these 16 fragments of pottery represent a minimal number of vessels. Native pottery production arose approximately 3,000 years ago, and continued until and after the arrival of Europeans around 400 years ago.

Native Ceramic Analysis

All of the pottery fragments were found within

Figure 8-31. Rim fragment from a Native American ceramic vessel.

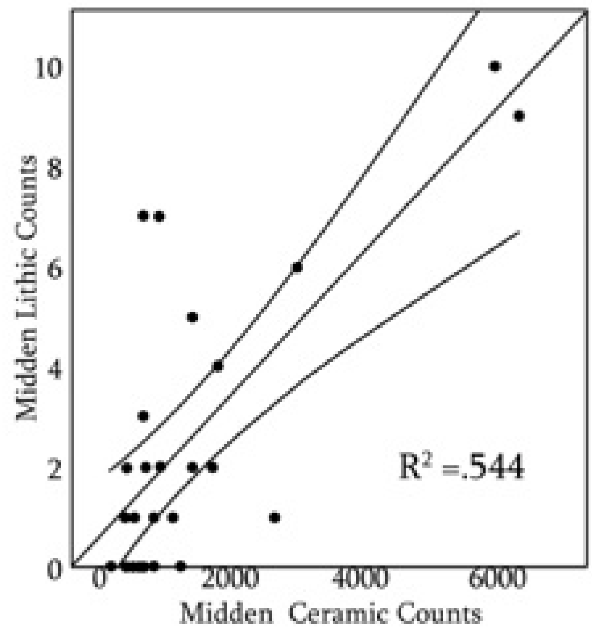


Figure 8-32. Spatial correlation of Native ceramics, lithics and English/Anglo American ceramics.

the kitchen midden or secondary house fill of redepostied materials inside the house foundation. No Native pottery was recovered outside of the immediate vicinity of the house site. Of the fragments, three pieces were rim sherds. Each of the fragments were quite small, none exceeding 2 cm in width, which likely indicates that none of these pottery fragments were of a size that would allow them to have a storage function. A correlation study (Figure 8-32) indicated that Native pottery fragments were not correlated to lithics or European manufactured ceramics. The overall size of Native pottery fragments and the lack of correlation to the ceramics indicate that these pottery fragments may have been components of an earlier Woodland period site that was inadvertently mixed into later deposits.

Discussion

The lithics and pottery found at the SB/SB Farmstead provide a unique opportunity to study several facets of Native history in one location. Context data shows that an earlier site, likely Woodland in age, was formerly located within close proximity of the current farmhouse foundation. Upon the arrival of Sarah Burnee, her family began reusing some ground stone tools, possibly found on her site or in the nearby vicinity. They utilized flintknapping, a technique either passed on for thousands of years to make stone tools using quartz, likely found at the nearby outcrop and quarry, and also used similar flintknapping techniques to produce and modify glass tools and gunflints. Together, these artifacts represent a minor but significant component of daily practices within this Nipmuc family that clearly demonstrate their Native identity through the continuity of lithic practice.

Interpretive Conclusions

The material culture recovered from the SB/SB Farmstead provides a rich picture of life in the multi-generational household for approximately 90 years (1749-1840). The assemblage is dominated by material that can be safely dated to this period with a noticeable spike in purchases between 1790 and 1830. During this period the household would have been comprised of Sarah Burnee, her daughter Sarah Boston and any number of associated family. The presence of material culture that dates to the third quarter of the 18th century, although not large in proportion to later material, nevertheless points to a likely starting date of the mid-18th century for the occupation period of both the dwelling and surrounding farm lot bounded on the north, south and east by stone walls. Part of the original 1727 lot, the homelot was continuously occupied from circa 1749 when documentary evidence suggests Sarah Burnee Philips and Fortune Burnee may have first constructed a house on the property. Although there are a small number of items that may be linked to an earlier phase of occupation – in particular the silver plated spoon thought to date to the late 17th century – there is no strong evidence of an occupation prior to the mid-18th century. There is of course evidence of a deeper history on the property that is part of the much longer Native history of Keith Hill more generally.

Taken as a whole the material assemblage from the site clearly reflects its hybrid character. There is evidence of long standing Native practices of lithic use along with the use of European material culture. By the mid-18th and early 19th century, indigenous foodways had incorporated European material culture as well as Old World domesticated animals and plants. Analysis of the same data sets provides strong evidence of feasting and communal meals being prepared and shared on the site as well. The significance of these findings as they relate to the larger political history of the farmstead and its inhabitants is something that will be discussed in greater detail in the following chapter, yet it deserves mentioning here that the evidence suggests a household fully integrated into the broader local and regional economy as well as culturally dynamic. When viewed through the larger lens of identity construction and flexibility it seems that the Nipmuc families who lived on the site may have used material culture as a bulwark against the racism they would have encountered in their economic, political and cultural life. This has been a consistent conclusion of analyses carried out during the length of the project that have focused on the manner in which material culture not only camouflages inequality but helps to counter it (Law 2008; Law Pezzarossi 2014a&b; Law, Kennedy and Pezzarossi 2012; Mrozowski, Gould and Law Pezzarossi 2015; Pezzarossi 2008, 2014). The same studies conclude that members of the Nipmuc households may have mimicked Anglo-American, middle class cultural practices more as a way of reinforcing their own identity rather than as a form of conscious emulation.

The presence of material culture that could potentially represent a long span of time opens up several interesting interpretive possibilities. An item such as the small soapstone bowl (Figure 8-30), for example, most likely represents an ancient piece that may have been recovered by some member of the SB/SB household and either repurposed or curated. Another assumption that could be attached to this item is that its last owners had some understanding of both its antiquity and connection to their own history. Perhaps the bowl was used daily or perhaps its primary function was symbolic – a memory device to extend the past into the present and beyond. In either instance the importance of the item should not be under valued because it is a single object.

Such does not appear to have been the case for some of the lithic debitage and stone tools that were recovered during our excavations. Thanks to the statistical and spatial analysis carried out by Bagley (2013; Bagley et al in press) it seems safe to assume that most of these lithic items were used on a daily basis as part of regular household activities. Whether they functioned in multiple contexts is not clear as they all exhibit use wear. Perhaps they carried a symbolic connotation that was not shared by other classes of material culture, but there is nothing contextual—their purposeful burial, for example—to suggest such an interpretation. Perhaps their best interpretive value is as further evidence of the hybrid quality of the cultural dynamics that characterized the members of the household.

If there is a single image that emerges from the large and varied assemblage that was recovered from the SB/SB Farmstead it is the evidence of cultural hybridity and feasting that stand out. We have already noted evidence of a culturally dynamic household, however it warrants repeating that the results of our analysis do not suggest household members who sought to maintain a "traditional lifeway." Quite the opposite seems to be the case: a household that had the resources and network to obtain a rich array of material goods. These included the foodways related ceramics, glassware and utensils that were recovered in abundance. Combined with the results of the faunal analysis carried out as part of the project (Allard 2010, 2015; Law, Kennedy and Pezzarossi 2012), there is strong evidence for large-scale communal meals being prepared and consumed on the site. There is also strong evidence for tools being repurposed possibly for use in the production of baskets. The large collection of iron tools includes several examples of items that appear to have been altered for use in a manner consistent with wood working, in particular basket making or chair repairs.

The picture of a female-headed Nipmuc household that was involved in agriculture and the production of items for exchange seems consistent with images that emerge from a wide variety of written sources as well as local folklore. The connections between Sarah Burnee and blacksmith—and possible housewright—Amos Ellis may have extended to a second generation of the Ellis family. Amos' son Lewis Ellis was a boot maker who lived within easy walking distance on Keith Hill. Excavations currently being carried out at the site of the Lewis Ellis homestead may provide further evidence in support of household to household exchange. The same categories of evidence also contribute to a picture of Nipmuc mobility: Sarah Boston traveling through Worcester County trading baskets and other goods (Law-Pezzarossi 2014, in press). The strong evidence of long term indigenous use of the Keith Hill area chronicled by Bagley (2013; see Bagley et al in press) adds an interesting and informative complement to the work Law-Pezzarossi (2014, in press) has done in fleshing out the regional exchange network that Sarah Boston and other indigenous basket makers were a part of. This juxtaposition of mobility and long-term residence provides an important counterweight to the over emphasis of either side of this equation. It also serves as a point of entry into the idea of counter narratives and landscapes being continuously renewed and developed by the Anglo-American and Native American residents of the region. Given Grafton's location in the Blackstone River Valley and the role of the area in the early history of American industry, the evidence from Hassanamesit Woods presents a critical piece of a larger narrative of converging histories that involved newly arriving Europeans, Native born Anglo-Americans, enslaved and then freed African Americans along with the long-standing indigenous populations of New England all engaged in an interwoven economic and cultural landscape that would have looked very different depending upon one's cultural location.

Chapter 9: Conclusions And Recommendations

Stephen Mrozowski, Heather Law Pezzarossi, Dennis Piechota and Heather Trigg

There are many insights and archaeological and historical vignettes that emerge from our years of work examining the SB/SB farmstead on the eastern slope of what is now Keith Hill in Grafton, Massachusetts. In drawing to a close field work, research and analysis that has been on-going for close to a decade it is difficult to decide what constitute the primary conclusions and recommendations that stem from the project. Although part of the overall project goals include the writing of an accessible description of the project – in book form – that combines work done on other Nipmuc properties in the region including Magunkagoug (Mrozowski et al 2005, 2009) and the Printer Property that Rae Gould has examined (2010, 2013), here our focus is on the evidence that has been uncovered at the SB/SB site. In attempting to pull these various threads together it has been helpful to conceptualize them in spatial terms. By using space to unpack what is a complex archaeological and historical record, we have sought to use an approach that transcends boundaries such as past and present, prehistory and history, mobility and sedentism, stasis and change. We have also tried to balance our interpretations of agency on the part of the individuals who lived and worked at the SB/SB farmstead with those that focus on the broader structures of English government, the flexing of power and the violence –both physical and cultural – characteristic of a society that was characterized by inequalities. Space provides one focus that helps in overcoming some of the evidentiary challenges and issues of scale that come with trying to understand the past at individual, local, regional, and global levels simultaneously through the lens of archaeology.

Taken as a whole, the evidence represents the residue of actions by humans and other members of the biotic community that vary in spatial scale. Much of our excavation and analysis has focused on the fairly circumscribed area of the foundation, its adjoining yard and midden areas as well as the larger homelot as bounded by the stone walls that surround it on the north, south and east. This homelot was obviously part of a larger reality. In spatial terms it represents what urban geographers call a relational space (e.g. Jacobs 2011; Latham and McCormack 2004; Mrozowski 2012) because of its links to a global economic network. The SB/SB farmstead was indeed connected to a large, global market as evidenced by the rich array of manufactured items the site's residents had in their possession. But the same sense of connectedness extends to the physical space produced through an architecture that was itself open to the hydrology of Keith Hill. In this regard the house may have been more open than we imagine. Piechota's analysis found no evidence of a cellar floor layer that was purposely established and maintained. A space through which water regularly flowed perhaps on a seasonal basis could have provided a convenient way to keep foodstuffs and drink cool, but was probably not ideal as a storage space.

Other forms of evidence fill in these spatially distant realities. The global economy that brought ceramics from Europe was linked to the Nipmuc household by a network of economic, political and cultural structures that were controlled by the English and American governments. Through the use of documentary sources and local histories it is fairly easy to flesh out the local, regional and global connections and the large governmental structures that would play an integral part in the experience of the Nipmuc over the past 400 years. The narrative that emerges from this body of information is that of the Anglo-American community. This stands in some contrast to the narrative that emerges from the archaeological research that has been conducted at the site.

The depth of the excavation and analysis has generated a rich body of information that challenges our ability to distill its contours and details into a finite set of conclusions and recommendations. Much of the challenge stems from trying to compare information of widely varying spatial scales. Analyses carried out of material collected from the foundation and surrounding yard include fine-grained, microscopic techniques such as soils micromorphology, paleoethnobotany and palynology. These more purely archaeological analyses have helped in supplying a highly detailed understanding of the events and processes that created the archaeological site we have been investigating for close to a decade as well as information concerning the foodways of the site's residents. Yet this is far from the extent of the project's focus. Through comparisons with other archaeological sites in the region and a rich documentary record, the results of our excavations have been extended in several important dimensions.

If we think of the project's interpretive extent in spatial terms then it is helpful to think in terms of residence and mobility. One other concept that has proven useful is that of historical gravity – the sum total of the historical and depositional events that have contributed to the existential weight of the former homelot of Sarah Burnee and Sarah Boston. One measure of a space's historical gravity is that it is actively memorialized. The home lot of Sarah Burnee and Sarah Boston is not such as space. With the filling of the foundation in 1938, it became more of a forgotten space. It is not much of a stretch to see such an event as a concrete example of the erasure of history. This is not to suggest that there was a conscious effort to erase the site from history in the same way that other, more overt efforts to erase history have been documented (see Connerton 1989, 2008; Trouillot 1995). Yet regardless of intent, the result was the same – the loss of historical memory by many in the area. This was not true of everyone, but more than likely for the overwhelming majority of people living in Grafton today. Its rediscovery represents an important step toward the site's proper memorialization and protection. In this instance its protection will hopefully serve as the ultimate measure of respect and reverence.

The excavations at Hassanamesit Woods have focused primarily on the house remains and home lot of two Nipmuc households who lived at the site between 1749 and 1840. Although there is material evidence of an earlier Native presence on the site, the overwhelming conclusion is that the foundation on the northeast slope of Keith Hill is the "Indian House" that appears on the 1831 map of the area (Figure 2-6). Beyond the foundation remains and stone walls that form the bounds of the home lot, additional details of the landscape were provided by a combination of archaeological and historical evidence. Excavation and geophysical data suggest that there may have been a well-worn path along the eastern portion of the home lot that extended north to south and seems to have ended at a place along the wall separating the home lot and pasture to the south. It is also possible that evidence of a barn was uncovered through geophysical and soil chemistry, but excavation could not confirm this. Excavation and phosphate analysis along a portion of the wall revealed a loosely laid cobble surface that may contain stones that could have been dislodged over time by animals crossing on a daily basis. What we know concerning the pasture and the area known as Swego comes almost exclusively from Trigg's botanical analysis. It indicates that the area was a patchwork of pasture and fields some of which may have been seeing early successional changes. Trees included a variety of hard and softwoods that would have supplied nuts for eating as well as woods for fuel and other uses such as basket making. In terms of the home lot itself a combination of documentary, archaeological and geophysical evidence indicates that it was itself a patchwork of heavily traveled areas where animals were moved from barn to pasture as well as the heavily trafficked area surrounding the dwelling and yard. There is archaeological and botanical evidence to suggest that gardening was taking place in close proximity to the house and while no firm structural evidence of the barn mentioned in documents was unearthed, it is possible it was located to the southeast of the house site itself; however, no real structural evidence to support such an interpretation was uncovered.

The structure that served as the dwelling for the households of Sarah Burnee and Sarah Boston may have been built by Amos Ellis. There is both documentary and archaeological evidence of his role in the 1799-1801 construction that repaired, improved, or expanded the dwelling. He worked as a house wright as well as a blacksmith so it is possible he was involved in the original house construction that we believe took place sometime around 1750. No documentary evidence to support this last assertion has been found, however. The foundation appears to have been rectangular with an uncellared, stone-supported chimney base in the northwest corner of the structure. The cumulative evidence from the southwest corner of the foundation, units B5 and B10, seems to indicate that the western portion of the house held a hearth and was where food preparation took place. The accumulation of material culture, especially the iron cooking vessels, charred botanical materials – both wood and plant remains – and other items recovered from this portion of the foundation suggest that this portion of the dwelling collapsed into the foundation over time resulting in it being deposited in the cellar. Trigg found that the charred wood recovered from units B5 and B10 differed with smaller size fragments and diversity suggesting fuel woods rather the construction related woods. She also notes that the same lower levels that produced the fuel woods contained some of the better examples of foodways related botanical remains. Taken together the artifacts and botanical remains recovered from units B5 and B10 indicate that cooking related residues were making their way through the floor boards of the house and became embedded in cellar floor deposits.

Feature 24, the hearth unearthed in the yard area immediately north of the foundation also appeared to have been used for cooking. One additional note is Trigg's interpretation that the small number of plant remains recovered from the site being the result of shifts in cooking patterns with greater use of metal pots and cooking indoors. These, she surmises, may provide a better explanation for the limited number of charred remains than the traditional assumption that acidic soils resulted in poor preservation. While preservation issues are not ruled out as a contributing factor, the idea that indoor cooking may have resulted in fewer charred remains making their way into the archaeological record warrants further consideration. Microstratigraphic analysis of what we believe to be a drip-line that surrounds the foundation indicates that a small lean-to shed may have extended off the southwest corner of the house.

The dry-laid foundation did include a culvert that channeled water through the cellar from west to east. The eastern portion of the culvert/drain extended beyond the foundation and downslope. The microstratigraphic evidence that wash water was being purposely channeled from outside the eastern side of the dwelling into the culvert suggests that it served as an integral part of the dwelling. The microstratigraphic evidence also suggests that the cellar floor was not used continuously. This indicates that the cellar was not a locus activity in the same way that the yard appears to have been. Much of the material recovered from the foundation cavity appears to have been deposited in the yard or virtually left in place.

The presence of a wood such as Ash should not be surprising, but it does draw a potential connection between the botanical analysis and the array of tools recovered from the site that might be linked to wood working activities such as furniture repair or basking making. The tools associated with such activities are evocative on several levels. First their presence provides strong corroborative support for memories of Sarah Boston as a basket maker. Some of the tools recovered from the site also point to the repurposing of tools such as the scythe into a draw knife for use in the cutting of shingles or basket parts. This tool provides a powerful image of what cultural hybridity looks like. In this particular instance, an iron tool most likely made by a local English smith – perhaps Amos Ellis – is then repurposed for use in the production of wooden baskets that are then sold by Sarah Boston to long-standing English families. Law-Pezzarossi's (2014, in press) examination of Native basket makers, including Sarah Boston, and the way they traveled the region selling their wares and the role the baskets played in the English households – the cultural patina that provided to an emerging Anglo-American historical narrative – stands as a prime example of the power of multi-scalar research. It also supplies one of the more concrete lines of information concerning the role of the Nipmuc in the local and regional economies.

There is a wealth of evidence to support a strong picture of Nipmuc identity as expressed in the lives of Sarah Burnee and Sarah Boston and their families. Much of the material culture recovered from the site was manufactured either in Britain, Europe or locally; there is also ample evidence of the kind of cultural inversion consistent with the hybridity common in colonial settings. But this level of abstraction also detracts somewhat from the level of detail that emerges from the material evidence. Combined, the evidence points to a large household engaged in a variety of economic activities. There is, for example, documentary and archaeological evidence of animals being husbanded, slaughtered and consumed on the site. Most of the animals that were eaten were domesticated species such as pig and cow, but there are also wild species, including several examples of turtle, that speak to the cultural hybridity of the diet. The macrobotanical evidence, though more limited in scope, nevertheless found similar evidence of domesticated and wild species. In some instances species such as knotweed have a deep history of use by indigenous peoples in North America, while other represent introduced species. The faunal analysis (Allard 2010, 2015; Pezzarossi, Kennedy and Law 2012) also provides strong evidence of feasting having taken place at the site and that food was both prepared and eaten much in the yard of the property.

The presence of a rich assemblage of of food preparation and consumption vessels – both iron and ceramic – including a large collection of metal eating utensils confirms that the households possessed the material necessities to entertain large groups. While the sure quantity of material is impressive it is also worth noting that the quality of the assemblage was impressive as well. The large numbers of transfer-printed vessels as the variety of forms suggest a well-appointed kitchen that would have been comparable to any middle-class household during the early decades of the 19th century. The Nipmuc household of Sarah Burnee/Sarah Boston looks more comparable to the agent's households of a large industrial city such as Lowell, Massachusetts than it does the households of skilled or unskilled workers (Mrozowski 2006a). Pezzarossi (2014) compared the SB/SB site assemblage with those from a collection of rural households of varying status and found that the Nimpuc households fell squarely in the middle of the group. Here again it seems that the Nipmuc assemblage does not seem to reflect a lower status that might be expected for what the literature of the period would have classified as a "marginal" household. Gould (2010, 2013; see also Doughton 1997; Mrozowski, Gould and Law-Pezzarozzi 2015) has argued that the notion of Native American households being economically marginalized is not supported by a careful review of either documentary or archaeological evidence. If Pezzarossi (2014) is correct then it may be best to interpret the "middle class" materiality of the household assemblage as evidence of a form of cultural camouflage designed to mitigate the racism that indigenous peoples would have faced on a daily basis. By surrounding themselves with the trappings of middle class life the Nipmuc could have sought to lessen the sting of racist perceptions that their children or elders faced. Boston Philips – Sarah Boston's father – pridefully stated that he was a descendent of Metacomet, better known as King Philip who led the rebellion against the English in the 17th century. More than a century after the end of hostilities between the English and the Native peoples of Southern New England, the name of King Philip appears to have carried some level of esteem. Couple that with a materiality comparable to that of many of the households in either rural or urban New England and we may be seeing evidence of the manner in which material culture helped in maintaining Native identities.

Given the strong cultural dimensions of foodways practices, the hybrid quality of the diet as evidenced by the faunal and floral analyses, and the quality and quantity of dining-related material culture, it seems logical to interpret this as evidence of feasting. It also provides evidence of the ability of archaeology to address issues of political relevancy. If we consider the idea of feasting as having been part of a larger political discussion, then we believe an argument can be made for the SB/SB Farmstead having served as a political and cultural gathering place for the Hassanamisco Nipmuc. We would also like to suggest that with the death of Sarah Boston in 1837, the political center for the group may have moved to the Printer Property that has been the focus of intensive research by Rae Gould (2010; 2013). Taking something as basic as chronology we hypothesize a connection between Sarah Boston's death and the movement of the political center of the Hassanamissco Nipmuc shortly there after (see also, Mrozowski 2012, 2013). We are not arguing that this was a formal transition, but more of a continuation of households serving as the gathering places for a group who continued to share a common history and identity.

When the project began, it was approached as a step-by-step process and along the way we maintained consistent engagement with the Nipmuc tribal council and Rae Gould. Her work on the Printer property and overall knowledge of local history made her an ideal collaborator. Early in the project the Nipmuc people played little role beyond listening to a yearly report and request for continued support. This they always granted, but that was the extent of the collaboration. Two developments helped in enhancing our collaboration, one was the establishment of a project blog, and the second was a refocusing of overall project goals to align them with Nipmuc interests. The blog facilitated a dialogue between the project personnel and the Nipmuc, in particular Cheryl Holly one of the Tribal elders who now serves as Chief. It also helped in linking the project with activities of the Institute of New England Native American Studies that was established at UMass Boston in 2009. This included summer programs for high-school aged indigenous students from the region. Between a combination of site visits and then artifact washing events it became clear that archaeology, for all its connections with a colonial and imperialist past (Schmidt and Mrozowski 2013), nevertheless stimulated an interest in Nipmuc history on the part of these students and this held great meaning for the Tribal Elders. This event resulted in a new level of collaboration that culminated in a public program and exhibition of archaeological materials recovered from Hassanamesit Woods and those from the Eastern Pequot Reservation in Connecticut that has been the focus of collaborative research by Stephen Silliman of UMass Boston (see Figure 3-1).

The benefits of the collaboration have been manifold. From a research perspective it has involved something as fundamental as household-to-household comparisons between the SB/SB site residents and the Printer/Cisco family who Rae Gould (2010, 2013) has researched. Set along side the initial acknowledgement and then reversal of the petition of the Hassanamisco Nipmuc for Federal Tribal Status, the results of the archaeological and documentary research at both properties provides strong evidence of continuous political identity (Adams 2004; Gould 2013; Mrozowski 2012, 2013; Mrozowski et al 2009; Mrozowski, Gould and Law Pezzarozzi 2015). The basically chronological history of the two properties and the strong evidence of feasting counters what has been portrayed as a lack of "written evidence" of political continuity (Adams 2004). Given the long and documented history of mistreatment and outright embezzlement of Nipmuc funds as thoroughly evidenced by John Milton Earle at the request of the Governor of Massachusetts in 1859 (Earle 1861:87-101), it seems safe to argue that archaeology provides a more empirical basis upon which to determine political continuity. Combined with the extensive documentary research and study of local histories, it seems that the archaeology at Hassnamesit Woods has contributed to a narrative of Nipmuc history that has actively erased the broader contours of Anglo-American, Massachusetts, Connecticut, and United States history. But that history has not ended. Despite consistent attempts on the part of governments extending back to the colonial period to relegate indigenous history to the path of cultural and political extinction, the Hassanamisco Nipmuc continue to live and work in the same area that their ancestors have lived for thousands of years. Archaeological evidence from Hassanamesit Woods and the surrounding area document an indigenous presence for at least 9,000 years. There are strong traces of the cultural and political life the Hassanamisco Nipmuc that have been unearthed from the home site of Sarah Burnee and her daughter Sarah Boston, and these are empirical proof of a continuing indigenous identity. Linked with the larger history of indigenous peoples of Southern New England it stands as strong testimony of a continuing presence and cultural vibrancy. This reality must, however be tempered with the equally compelling evidence of the continuing racism and political disenfranchisement that has been a constant of Nipmuc life for close to 400 years. If the archaeology at Hassanamesit Woods has helped to illuminate and document that history in an effort to aid the contemporary political aims of the Hassanamisco Tribe, then it has demonstrated the value of archaeology as a tool of social change. No greater aspiration can be hoped for.

Recommendations

The archaeological collection unearthed from around the Sarah Burnee/Sarah Boston homelot should continue to serve as a source of educational study. Given its importance it should continue to be conserved in a manner suitable for the eventual transfer to the Hassanamisco Indian Museum in Grafton, Massachusetts. Recent renovations to Cisco Homestead on the Hassanamisco Reservation in Grafton offer hope that it will eventually serve as a home for the SB/SB site collection. Funding should be sought to complete the conservation of the collection while it continues to be curated at UMass Boston.

Working with Rae Gould, there are plans to write a summary of the research carried out at Hassanamesit and Magunkaquag in the form of a book manuscript that will be geared for a popular audience. This book is envisioned as a series of historical narratives concerning the archaeology of these two communities and the individual histories that have emerged from research associated with the two communities. The production of this volume – which is currently being negotiated with the University Press of Florida – is a second recommendation of this report.

Archaeological and historical research concerning the Deb Newman and Lewis Ellis homesteads on Keith Hilll will continue and will be summarized in a separate report. The report will include a discussion of the fieldwork, historical research, archaeogeophysical and pollen analysis carried out on the southern area of Keith Hill.

The excavation of the Sarah Burnee/Sarah Boston foundation has taken close to six years and the remaining site needs to be properly filled and preserved. Steps should be taken to insure that the foundation is preserved and filled in a manner that will ensure its continuing stability. Once this is completed then the site should be protected while its story is fully integrated into the public memory of Grafton, through the school system, historical society, the Grafton Land Trust, the Town of Grafton, and the Nipmuc Nation as part of the community's cultural legacy. Funding should be sought to insure that the foundation is properly filled and the landscape is allowed to return to its previous, ecologically determined condition. Protected by the Town and local community, it can serve as a memorial to Nipmuc history and the continuing vitality of the Nipmuc people.

Summary of Recommendations

1) Conserve and curate archaeological collection in preparation for the eventual transfer to the Hassanamisco Indian Museum.

2) Complete Popular Book summarizing the archaeological work at Hassanamesit Woods as part of a larger discussion of Nipmuc History.

3) Complete Research at Deb Newman and Lewis Ellis Properties and submit separate report

4) The foundation of the Sarah Burnee/Sarah Boston Farmstead should be properly filled and the site continues to be protected and preserved as part of the larger Hassanamesit Woods Property.

Bibliography

Adams, J.
2004 Nipmuc Say BIA Got the Facts Wrong. Indian Country. http://www.indiancountrytoday.com/achieve/28175229.html. Accessed October 6, 2008.

Allard, Amelie
2010 Foodways, Commensality and Nipmuc Identity: An Analysis of Faunal Remains from Sarah Boston's Farmstead, Grafton, MA, 1790-1840. M.A. Thesis. University of Massachusetts Boston, Department of Anthropology.
2015 "Foodways, Animal Husbandry and Nipmuc Identity: Faunal Analysis from Sarah Boston's Farmstead, Grafton, MA, 1790-1840." *International Journal of Historical Archaeology* 19(1): 208-231.

Arnold, J. N.
1891 *Vital Records of Rhode Island: 1636-1850: first series: births, marriages and deaths: a family register for the people*. Narragansett Historical Pub. Co., Providence, RI.

Atalay, S.
2006 "Indigenous Archaeology as Decolonizing Practice," *American Indian Quarterly* 30(3 & 4): 280–310.

Atkinson, David and Adrian Oswald
1969 "London Clay Tobacco Pipes." *Journal of the Archaeological Association* 3(32)

Bagley, Joseph
2013 Cultural Continuity in a Nipmuc Landscape. M.A. Thesis, University of Massachusetts Boston, Department of Anthropology.

Bagley, Joseph M., Stephen Mrozowski, Heather Law Pezzarossi, and John Steinberg
In press "Continuity of Lithic Practice at the Eighteenth- through Nineteenth-Century Nipmuc Homestead of Sarah Boston, Grafton, Massachusetts" *Northeast Historical Archaeololgy.*

Bagley, L. H.
1949 *Manual of Cultivated Plants: Most commonly grown in the continental United States and Canada*. The Macmillan Company, New York.

Baert, P.
2005 *Philosophy of the Social Sciences: Toward Pragmatism*. Polity Press, Cambridge.

Baker, Emerson
1985 *The Clarke & Lake Company: The Historical Archaeology of a Seventeenth-Century Maine Settlement*. Augusta, Maine Historic Preservation Commission

Barker, David
1999 The Ceramic Revolution, 1650-1850," in Geoff Egan and R. L. Michael, eds., *Old and New Worlds*. Oxford: Oxbow Books, 226-234.
2001 "'The Usual Classes of Useful Articles': Staffordshire Ceramics Reconsidered," in Robert Hunter, ed. *Ceramics in America*. Hanover and London: Chipstone Foundation and University Press of New England, 72-93.

Barker, David, and Teresita Majewski
2006 "Ceramic Studies in historical archaeology," in *The Cambridge Companion to Historical Archaeology,* ed. by Dan Hicks and Mary Beaudry. Cambridge: Cambridge University Press, 205-231.

Baron, D. K., Hood, J. E., and Izard, H. V.
1996 "They Were Here All Along: The Native American Presence in Lower-Central New England in the Eighteenth and Nineteenth Centuries," *The William and Mary Quarterly* 53(3): 561-586.

Bear, J.
2011 SAMAQAN: Water Stories Extended Scenes (Ep 8 Posonut: Baskets - Black Ash). Retrieved April 03, 2014, from https://www.youtube.com/watch?v=MDw0rwL2wDQ

Bendremer, Jeffery C.
1999 "Changing strategies in the pre- and post-Contact subsistence systems of southern New England: Archaeological and ethno-historical evidence" in *Current Northeast Paleoethnobotany,* ed. John Hart. New York State Museum, 133-155.

Benedict, W., and H. Tracey
1878 *The History of the Town of Sutton from 1704-1808*. Sanford & Co., Worcester, MA.

Bergland, R. L.
2000 *The National Uncanny: Indian Ghosts and American Subjects*. University Press of New England.

Binford, Lewis
1962 "A New Method for Calculating Dates from Kaolin Pipe Stem Fragments," *Newsletter of the Southeastern Archaeological Conference* 9(1): 19-21.

Bonner, Jennifer L., and Elizabeth Kiniry
2003 Archaeological Reconnaissance Survey: The Robinson Property, Grafton, Massachusetts. Cultural Resources Management Study No. 10, Center for Cultural and Environmental History, University of Massachusetts Boston, Boston.

Bradley, Charles S.
2000 "Smoking Pipes for the Archaeologist," in *Studies in Material Culture Research,* ed. K. Karklins. Society for Historical Archaeology, 104-133.

Bragdon, Kathleen Joan
1981 "Occupational Differences Reflected in Material Culture," *Northeast Historical Archaeology* 10(1): 27-39

Brigham, W.
1835 *An Address Delivered Before the Inhabitants of Grafton, on the First Centennial Anniversaray of that Town, April 29, 1835*. Light and Horton, Boston, MA.

Britton, Nathaniel and Addison Brown
1896 *An Illustrated Flora of the Northern United States, Canada and the British Possessions*. Charles Scribner's Sons, New York.

Bullock, P. et al
1985 *Handbook of Thin Section Description*. Waine Research, Albrighton, England.

Butler, J.
1993 *Bodies that Matter*. Routledge, London.

Cappers, R. T. J., Bekker, R. M., and J. E. A. Jans
2006 *Digitale zadenatlas van Nederland. Digital Seed Atlas of the Netherlands*. Barkhuis Publishing & Groningen University Library, Groningen.

Cherau, S., Macpherson, J., and M. Kierstead
1997 Archaeological Sit Examination, Bates-Randall Homestead Site (Formerly Historic Site 1), Millennium Power Project. Charlton, Massachusetts. On file at Massachusetts Historical Commission, Boston.

Chilton, E. S.
2002 "Towns they have none": Diverse Subsistence and Settlement Strategies in Native New England" in *Northeast Subsistence-Settlement Change: AD 700, 1300,* ed. J. Hart and C. Rieth, pp. 289-300. New York State Museum Bulletin 496.

Cobb, Charles R.
2003 "Introduction: Framing Stone Tool Traditions after Contact," in *Stone Tool Traditions in the Contact Era,* ed. C. Cobb, p. 127-150. University of Alabama Press, Tuscaloosa.

Collections of the Worcester Society of Antiquity
1895 *Proceedings of the Worcester Society of Antiquity for the year 1894*. Vol 14:261. Private Press of Franklin P. Rice, Worcester, MA.

Colwell-Chanthaphonh, C., T. J. Ferguson, D. Lippert, R. H. McGuire, G. P. Nicholas, J. E. Watkins, and L. Zimmerman
2010 "The Premise and Promise of Indigenous Archaeology," *American Antiquity* 75(2): 228-238.

Connerton, P.
1989 *How Societies Remember.* Cambridge University Press, Cambridge.
2008 Seven types of forgetting. *Memory Studies* 1(1): 59-71.

Conroy, David
1995 *In Public Houses: Drink and the Revolution of Authority in Colonial Massachusetts*. Chapel Hill: University of North Caolina Press.

Conyers, L. B.
2005 *Ground-Penetrating Radar for Archaeology*. Altamira Press, Lanham, MD.

Courty, Marie-Agnes
2001 "Microfacies Analysis Assisting Archaeological Stratigraphy," in *Earth Sciences and Archaeology,* ed. Paul Goldberg, Vance T. Holliday, and C. Reid Ferring pp. 205-239. Kluwer Academic/Plenum Publishers, New York.

Crane, J. C.
1897 "The Nipmucks and their Country," *The Worcester Society of Antiquity Collections and Proceedings,* 101-117.

Cunningham, K.
2008 A Small History of the Forgotten and Never Known. Historic Sites: Riseing Son Tavern. Delaware Department of Transportation: Archaeology, online.

Cutler, U. W.
1912 "Town Histories and Historians," *Proceedings of the Worcester Society of Antiquity* 25(1): 273-289.

Daehnke, J. D.
2007 "A Strange Multiplicity of Voices: Heritage Stewardship, Contested Sites and Colonial Legacies on the Columbia River," *Journal of Social Archaeology* 7(2): 250–275.

Dalan, R. A.
1991 "Defining archaeological features with electromagnetic surveys at the Cahokia Mounds State Historic Site," *Geophysics* 56: 1280-1287.

Daniels, G. F.
1892 *The History of the Town of Oxford, Massachusetts with Genealogies and Notes on Persons and Estates*. G.F. Daniels Publisher, Sutton.

Department of the Interior
2001 "Summary under the Criteria and Evidence Proposed Finding: Nipmuc Nation." United States Department of the Interior: Office of Federal Acknowledgement.

Doughton, Thomas
1997 Notes on the Nipmuc Indian Reservation at Hassanamesit or Hassanamisco and the Nipmuc People of Hassanamesit later Grafton, Massachusetts. Hassanamesit or Place of Small Stones. http://freepages.geneology.rootsweb.com/~massasoit/grafton1.htm

Dudley, P.
1893 *Town Records of Dudley, Massachusetts, 1732-1754*. The Adam Sutcliffe Co., Pawtucket, RI.

Duffy, J.
1972 *Epidemics in Colonial America*. Kennikat Press, Port Washington, NY.

Dunning, Phil
2000 "Composite Table Cutlery from 1700 to 1930," in *Studies in Material Culture Research*, ed. by Karlis Karklins. California, PA: Society for Historical Archaeology, 32-45.

Dwight, T.
1823 *Travels in New-England and New-York*.

Earle, A.M.
1900 *Stagecoach and Tavern Days*. The Macmillan Company, New York.

Earle, J.M.
1652-1863 John Milton Earle Papers, Manuscripts Department. American Antiquarian Society, Worcester, MA.
1861 Report to the governor and Council, concerning the Indians of the Commonwealth, under the act of April 6, 1859 (No. 96). White, Printer to the State, Boston, MA.
1862 John Milton Earle Papers (Vol. manuscript). American Antiquarian Society, Worcester, MA.

Echo-Hawk, R. C. and L. J. Zimmerman
2006 "Beyond Racism: Some Opinions about Radicalism and American Archaeology," *American Indian Quarterly* 30(3&4): 461-485.

Eidt, R. C.
1973 "A rapid field test for archaeological site surveying," *American Antiquity* 38: 206-210.

Estes, D.F.
1894 *The History of Holden Massachusetts 1684-1894*. Press of CF Lawrence & Co., Worcester, MA.

Ferguson, Kelly
2010 Macrobotanical analysis of Native American maize agriculture at the Smith's Point site. M. A. Thesis, University of Massachusetts Boston, Department of Anthropology.

Ferguson, T. J.
2003 "Anthropological Archaeology Conducted by Tribes: Traditional Cultural-Historical Perspectives and Cultural Affiliation" in *Archaeology Is Anthropology,* ed. S. Gillespie and D. Nochols, pp. 137–144. Archaeological Papers of the AAA, Vol. 13. American Anthropological Association, Washington, D.C.
2004 "Academic, Legal, and Political Contexts of Social Identity and Cultural Affiliation Research in the Southwest" In *Identity, Feasting, and the Archaeology of the Greater Southwest,* ed. B. J. Mills, pp. 27–41. University of Colorado Press, Boulder.

Ferguson, T.J. and C. Colwell-Chanthaphonh
2006 *History Is in the Land: Multivocal Tribal Traditions in Arizona's San Pedro Valley.* University of Arizona Press, Tucson.

Fiske, Ella M. Williams
No Date. Early History of Keith Hill (Hassanamisco) and its part of the Old Connecticut Roadway. The Grafton History Club, Records of Grafton, MA 1735-1943. American Antiquarian Society, Worcester, MA.

Follansbee, P.
2012 Pounding Ash for Basket Splints HD. YouTube. Available at: https://www.youtube.com/watch?v=9WtdXCpq_ok (accessed 5 April 2015).

Forbes, Harriette Merrifield
1889 *The Hundredth Town, Glimpses of Life in Westborough, 1717-1817*. Rockwell and Church, Boston.

Foster, David R
1992 "Land-use History (1730-1990) and Vegetation Dynamics in Central New England, USA." *Journal of Ecology* 80:753-771.

Foster, David R., Aber, John D., Melillo, Jerry M., Bowden, Richard D., and Fakhri A. Bazzaz
1997 "Forest response to disturbance and anthropogenic stress." *BioScience* 47: 437-445.

Foster, D. R., Zebryk, T., Schoonmaker, P., and A. Lezberg
1992 "Post-settlement history of human land-use and vegetation dynamics of a Tsuga canadensis (hemlock) woodlot in central New England." *Journal of Ecology* 80:773-786.

Fragola, Patricia S., and Duncan Ritchie
1996 Intensive (Locational) Archaeological Survey, Highfields of Grafton, Grafton, Massachusetts. Report to Massachusetts Historical Commission, Boston. Public Archaeology Laboratory, Pawtucket, RI.
1998 Site Examination Archaeological Investigation Highfields 1 and Pratt-Keith Sites Highfields of Grafton Project. Grafton, Massachusetts. Public Archaeology Laboratory, Pawtucket, RI. On File at Massachusetts Historical Commission

Fritz, Gayle, Virginia Whitekiller, and James McIntosh
2001 "Ethnobotany of Ku-nu-che: Cherokee Hickory Nut Soup." *Journal of Ethnobiology* 23:1-27.

Gary, Jack
2005 Phase 1 Archaeological Intensive Survey of Hassanamesitt Woods, Grafton, Massachusetts. Cultural Resources Management Study No. 14. Center for Cultural and Environmental History, University of Massachusetts Boston, Boston.

Glover, Suzanne
1990 Intensive Archaeological Survey, Crescent Green Condominium Development, Grafton, Massachusetts. Report to Massachusetts Historical Commission, Boston. Public Archaeology Laboratory, Pawtucket, RI.

Goldberg, P.
1983 "Applications of Micromorphology in Archaeology" in *Soil Micromorphology,* ed. P. Bullock and C.P. Murphy, pp. 139-150. AB Academic Press, Berkamsted.

Goodman, D., S. Piro, Y. Nishimura, K. Schneider, H. Hongo, N. Higashi, J. Steinberg and B. Damiata
2008 GPR Archaeometry. In *Ground Penetrating Radar Theory and Applications,* edited by H. Jol, pp. 479-508. Elsvier, New York.

Goodman, D., J. Steinberg, B. Damiata, Y. Nishimura, S. Piro and K. Schneider
2007 GPR Imaging of Archaeological Sites. In *Reconstructing Human-Landscape Interactions, Dig 2005 Conference, Developing International Geoarchaeology,* edited by L. Wilson, P. Dickinson and J. Jeandron, pp. 202-217. Cambridge Scholars Publishing, Cambridge.

Gookin, Daniel
1674 *Historical Collections of the Indians in New England: of Their Several Nations, Numbers, Customs, Manners, Religion and Government, Before the English Planted There. Collections of the Massachusetts Historical Society for the year 1792*, Vol. 1 Boston.

Gould, Rae
2010 *Contested Places: The History and Meaning of Hassanamisco*. Ph.D. Dissertation, Department of Anthropology, University of Connecticut.
2013 Cultural Practice and Authenticity: The Search for Real Indians in New England in the "Historical" Period in *The Death of "Prehistory": Deep-Time Non-Western Histories and Issues of Representation: Their Implications for "Prehistory."* ed. Peter Schmidt and Stephen Mrozowski. Oxford University Press.
2013b The Nipmuc Nation, Federal Acknowledgment, and a Case of Mistaken Identity. In *Recognition, Sovereignty Struggles, and Indigenous Rights in the United States: A Sourcebook,* edited by Jean O'Brien and Amy E. Den Ouden, pp. 213-31. University of North Carolina Press, Chapel Hill.

Hall, B., Motzkin, G., Foster, D.R., Syfert, M., and J. Burk
2002 "Three hundred years of forest and landuse change in Massachusetts, USA." *Journal of Biogeography* 29(1011):1319-1335.

Hall, D.
1741 *Diary of Rev. David Hall*. Pre-revolutionary Diaries on Microfilm, Massachusetts Historical Society, Reel 5, Vol. 1

Handsman, R., and A. McMullen
1987 "An Introduction to Woodsplint Basketry and its Interpretation," in A. McMullen and R. Handsman (Eds.), *A Key into the Language of Woodsplint Baskets* (pp.17–35). Washington, CT: American Indian Archaeological Institute.

Harrington, J.C.
1954 "Dating Stem Fragments of Seventeenth and Eighteenth Century Clay Tobacco Pipes." *Quarterly Bulletin, Archaeological Society of Virginia* 9(1):10-14.

Harris, Jaden, and Ian Smith
2005 The Te Hoe Shore Whaling Assemblage. Otago Archaeological Laboratory Report: Number 2. Anthropology Department, University of Otago.

Hayes, Katherine Howlett
2007 "Field Excavations at Sylvester Manor.", in *The Historical Archaeology of Sylvester Manor*. Ed. K.H. Hayes and S.A. Mrozowski, Special Issue, *Northeast Historical Archaeology* 36: 34-50.

Hayes, Katherine H. and Stephen A. Mrozowski, eds.
2007 *The Historical Archaeology of Sylvester Manor. Special Issue, Northeast Historical Archaeology*.

Hoadley, R. Bruce
1990 *Identifying Wood: Accurate Results with Simple Tools*. The Taunton Press, Taunton.

Howard, J.
1996 "Unraveling Regions, Unsettling Periods: Sarah Orne Jewett and American Literary History. *American Literature* 68(2):365-384.

Huisman, J.L. et al
2014 “Micromorphological study of Early Neolithic (LBK) soil features in the Netherlands.” *Journal of Archaeology in the Low Countries* 5(1):107-133.

Ives, Timothy H
2013 “Remembering Stone Piles in New England,” *Northeast Anthropology* 79-80: 37-80.

Jacobs, Jane M.
2011 Urban Geographies I: Still Thinking Cities Relationally. *Progress in Human Geography* 36(3):412–422.

Karkanis, Panagiotis and Paul Goldberg
2007 “Micromorphology of Sediments: Deciphering archaeological context.” *Israel Journal of Earth Sciences* 56:63-71

Kawashima, Yasu
1969 “Legal Origins of the Indian Reservation in Colonial Massachusetts.” *The American Journal of Legal History* 13(1):42-56.

Kelsey, D.P.
1980 Early New England Farm Crops: Small Grains—Barley, Rye, Oats, Buckwheat and Wheat. Old Sturbridge Village Documents, Papers, and Manuscripts.

Lambert, F.
1992 “I Saw the Book Talk: Slave Readings of the First Great Awakening.” *Journal of Negro History* 77(4):185-198.

Landon, D. and T. Bulger
2013 “Constructing Community: Experiences of Identity, Economic Opportunity, and Institution Building at Boston’s African Meeting House.” *International Journal of Historical Archaeology* 17(1):119-142

Larrabee, Edward
1971 *Archaeological Research at the Fortress of Louisbourg, 1961-1965. Canada National Parks Service*. Canada: Ottowa.

Latham, Alan, and Derek P. McCormack
2004 Moving Cities: Rethinking the Materialities of Urban Geographies. *Progress in Human Geography* 28(6):701–724

Law, H.
2008 Daily Negotiations and the Creation of an Alternative Discourse: The Legacy of a Colonial Nipmuc Farmstead. M.A. Thesis, Department of Anthropology, University of Massachusetts, Boston.

Law Pezzarossi, H
2014 *Traces of Residence: Indigenous Mobility and Materiality in 19th c. New England*. Ph.D. dissertation Department of Anthropology, University of California, Berkeley.
In Press “Native Basketry and the Dynamics of Social Landscape in Southern New England” in *Things in Motion: Object Histories, Biographies and Itineraries,* ed. R. Joyce and S. Gillespie. School of Advanced Research Press, Santa Fe, NM.

Law, H., Pezzarossi, G. and S. Mrozowksi
2008 Archaeological intensive excavations: Hassanamesit Woods property, The Sarah Boston Farmstead, Grafton, Massachusetts. Report to Massachusetts Historical Commission, Boston. Andrew Fiske Memorial Center for Archaeological Research, Cultural Resource Management Study 24. Boston: University of Massachusetts.

Leighton, Ann
1986 *American Gardens in the Eighteenth Century: “For Use or for Delight”*. Houghton Mifflin Company, Boston.

Leveillee, Alan, Ron Dalton, and Curtis Hoffman
1994 Site Examination of Cedar Swamp No. 1, No.2 and No. 24 in the Cedar Swamp Archaeological District, Westborough, Massachusetts Report to Massachusetts Historical Commission, Boston. Public Archaeology Laboratory, Pawtucket, RI

Liebmann, M.
2008b “Postcolonial Cultural Affiliation: Essentialism, Hybridity, and NAGPRA,” in *Archaeology and the Postcolonial Critique,* eds. M. J. Liebmann and U. Z. Rizvi, pp. 73–90. AltaMira, Walnut Creek, CA.

Light, John D.
2000 “A Field Guide to the Identification of Metal,” in *Studies in Material Culture Re-*

search, ed. K. Karklins. Society for Historical Archaeology, 3-19.

Lightfoot, Kent G., Panich, Lee M., Schneider, Tsim D., Gonzalez, Sara L., Russell, Matthew A., Modzelewski, Darren, Molino Theresa, and Elliot H. Blair
2013 "The Study of Indigenous Political Economies and Colonialism in Native California: Implications for Contemporary Tribal Groups and Federal Recognition." *American Antiquity* 78(1):89-103.

Lilley, I.
2006 "Archaeology, Diaspora, and Decolonization." *Journal of Social Archaeology* (1):28-47.

Logue, B.J.
1991 "In Pursuit of Prosperity: Disease and Death in a Massachusetts Commercial Port, 1660-1850." *Journal of Social History* 25(2):309-343. doi: 10.2307/3788754

Lismer, M., and W. W. Beatty
1941 *Seneca splint basketry.* Newkirk, Oklahoma: Printing Dept., Chilocco Agricultural School.

Logan, Judy, Lyndsie Selwyn, Clifford Cook and Tara Grant
2013 *Tannic Acid Treatment, CCI Notes 9/5*. Ottawa, ON: Canadian Conservation Institute, 2013.

Lydon, J.
2006 "Pacific Encounters, or Beyond the Islands of History" in *Historical Archaeology,* ed. M. Hall and S.W. Silliman, pp. 293-312. Blackwell, Malden.

Majewski, Teresita, and Michael J. O'Brien
1987 "The Use and Misuse of Nineteenth-Century English and American Ceramics in Archaeological Analysis," in *Advances in Archaeological Method and Theory*, Volume 11, ed. Michael Schiffer. New York: Academic Press, 98-209.

Mandell, D. R.
2008 *Tribe, Race, History: Native Americans in Southern New England, 1780-1880*. Johns Hopkins University Press.
2004 "The Indian's Pedigree (1794): Indians, Folklore, and Race in Southern New England". *William and Mary Quarterly* 3rd Ser (61):519-536.
1998 "The Saga of Sara Muckamugg: Indian and African American Intermarriage in Colonial New England" in *Sex, Love, Race: Crossing Boundaries in North American History,* ed. Martha Hodes, p. 72-90. New York University Press, New York.
1996 *Behind the Frontier: Indians in 18th Century Eastern Massachusetts*. University of Nebraska Press, Lincoln and London.
1991 "To Live More Like My Christian English Neighbors': Natick Indians in the Eighteenth Century." *William and Mary Quarterly* 3rd Ser (48):552-579.

Mallios, Seth
2005 "Back to the Bowl: Using English Tobacco Pipebowls to Calculate Mean Site-Occupation Dates." *Historical Archaeology* 39(2):89-104.

Martin, Alexander C., and William D. Barkely
1973 *Seed Identification Manual*. University of California Press, Berkely.

Massachusetts Archives Collection
1603-1705 Indians Vol. XXX. Massachusetts State Library, Boston.
1701-1750 Indians Vol. XXXI. Massachusetts State Library, Boston.
1750-1757 Indians Vol. XXXII. Massachusetts State Library, Boston.
1757-1775. Indians Vol. XXXIII. Massachusetts State Library, Boston.
1693-1729 Towns Vol. CXIII. Massachusetts State Library, Boston.

Massachusetts, Office of the Secretary of State
1904 *Massachusetts Soldiers and Sailors of the Revolutionary War: A compilation from the archives, prepared and published by the Secretary of the Commonwealth in accordance with chapter 100, resolves of 1891,* Vol. 12. Wright and Potter Printing Co., State Printers, Boston, MA.

McGhee, R.
2008 "Aboriginalism and the Problems of Indig-

enous Archaeology." *American Antiquity* 73(4):579–597.
2010 "Of Strawmen, Herrings, and Frustrated Expectations." *American Antiquity* 75(2):239-243.

McLouglin, William G.
1986 *Rhode Island: A History*. W.W. Norton and Co., New York.

McFeat, T.
1987 "Space and Work in Maliseet Basket-Making," in A. McMullen & R. Handsman (Eds.), *A Key into the Language of Woodsplint Baskets*. (pp. 60-73).Washington, CT: American Indian Archaeological Institute.

McMullen, A.
1987 "Looking for People in Woodsplint Basketry Decoration," in A. McMullen & R. G. Handsman, eds., *A Key into the Language of Woodsplint Baskets*, 102-123. Washington, CT: American Indian Archaeological Institute.

McNeill, J. D.
1980 *Electromagnetic terrain conductivity measurement at low induction numbers. Technical Note TN-6*. Geonics Limited, Mississaunga.

Medve, Richard J. and Mary Lee Medve
1990 *Edible Wild Plants of Pennsylvania and Neighboring States*. The Pennsylvania State University Press, University Park.

Mehlich, A.
1984 Mehlich 3 soil test extractant: A modification of the Mehlich 2 extractant. *Commun. Soil Sci. Plant Anal*. 15(12):1409-1416.

Meyers, Ciana and Heather Trigg
2011 "Macrobotanial Remains from Faneuil Hall, Boston: A report on the materials recovered during the 2010 excavations." Report submitted to URS Corporation.

Miller, B. G.
2003 *Invisible Indigenes: The Politics of Non-recognition*. University of Nebraska Press, Lincoln.

Miller, George L.
1988 "Classification and Economic Scaling of Nineteenth-Century Ceramics," in *Documentary Archaeology in the New World*, ed. by Mary C. Beaudry. Cambridge University Press, 172-183.
1991 "A Revised Set of CC Index Values for Classification and Economic Scaling of English Ceramics from 1787 to 1880," *Historical Archaeology* 25: 1-23

Miller, George L., and Robert R. Hunter
2001 "How Creamware Got the Blues: The Origins of China Glaze and Pearlware," in *Ceramics in America,* ed. by Robert R. Hunter. Milwaukee: Chipstone Foundation, 135-161.

Miller, M. E.
2004 *Forgotten Tribes: Unrecognized Indians and the Federal Acknowledgement Process*. University of Nebraska Press, Lincoln.

Miller, Naomi F.
1989 "What Mean These Seeds: A Comparative Approach to Archaeological Seed Analysis." *Historical Archaeology* 23(2):50-59.

Mrozowski, S. A.
1994 "The discovery of a Native American cornfield on Cape Cod." *Archaeology of Eastern North American* 22:47-62.
2006a *The Archaeology of Class in Urban America*. Cambridge University Press, London.
2006b "Environments of History: Biological Dimensions of Historical Archaeology" in *Historical Archaeology,* ed. Martin Hall and Stephen W. Silliman, pp. 23-41. Blackwell, Oxford.
2010 "New and Forgotten Paradigms: The Environment and Economics in Historical Archaeology." *Historical Archaeology* 44(3):117-127.
2012 "Ethnobiology for a Diverse World: Spaces and Natures: Archaeology and the Political Ecology of Modern Cities." *Journal of Ethnobiology* 32(2):129-133
2013 "The tyranny of prehistory and the search for a deeper history" in *The Death of Prehistory,* ed. P.R. Schmidt and S.A. Mrozowski, p. 220-240, Oxford University Press, Oxford.
2014 "Imagining an Archaeology of the Future:

Capitalism and Colonialism Past and Present." *International Journal of Historical Archaeology* 18(2):340-360.

Mrozowski, S. A., Herbster, H., Brown, D., and Priddy, K. L.
2009 "Magunkaquog Materiality, Federal Recognition, and the Search for a Deeper History". *International Journal of Historical Archaeology* 13(4):430-463.

Mrozowski, S. A., R. Gould, and H. Law Pezzarossi
2015 "Rethinking Colonialism: Indigenous Innovation and Colonial Inevitability," K. Howlett-Hayes & C. Cipolla, eds., *Colonial Narratives*. Gainsville, FL: University of Florida Press.

Mulholland, Mitchell T., Savulis, Ellen-Rose, and D. Richard Gumaer
2005 "Magunkaquoag: Native American Conversion and Cultural Persistence" in *Eighteenth Century Native Communities of Southern New England in the Colonial Context,* ed. Jack Campsi, p. 57-71. The Mashantucket Museum and Research Center Occasional Paper No. 1, Mashantucket, CT.
1986 Archaeological Remote Sensing and Historical Research Survey for the Yeadon Parcel at the Hassanomisco Indian Burying Ground, Grafton, Massachusetts. Report to Massachusetts Historical Commission, Boston.

Neumann, George C., and Frank J. Kravic
1975 *Collector's Illustrated Encyclopedia of the American Revolution*. Stackpole Books, Harrisburg, PA.

Noël Hume, Ivor
1969 *A Guide to Artifacts of Colonial America*. University of Pennsylvania Press, Philadelphia.
2001 *If These Pots Could Talk: Collecting 2,000 Years of British Household Pottery*. University Press of New England.

Nicholas, G., ed.
2010 *Being and Becoming an Indigenous Archaeologist*. Left Coast Press, Inc., Walnut Creek, CA.

Nichols, Gary
2009 *Sedimentology and Stratigraphy*. Wiley-Blackwell, West Sussex.

O'Brien, J.M.
2010 *Firsting and Lasting: Writing Indians out of Existence in New England*. University of Minnestoa Press, Minneapolis and London.
1997 *Dispossession by Degrees: Indian Land and Identity in Natick, Massachusetts, 1650-1790*. University of Nebraska Press, Lincoln.

Oswald, Adrian
1975 *Clay Pipes for the Archaeologist*. *British Archaeological Reports* 14. England: London.

Pagoulatos, Peter
1988 Intensive Archaeological Survey, Oakmont Farms, Grafton, Massachusetts. Report to Massachusetts Historical Commission, Boston.

Paine, L.M.
1914 My ancestor; a memorial of Johne Paine and Mary Anne May of East Woodstock, Conn. Printed for private circulation, digitized by Brigham Young University, Chicago, IL.

Panich, Lee M.
2013 "Archaeologies of Persistence: Reconsidering the Legacies of Colonialism in Native North America." *American Antiquity* 78(1):105-122.

Patalano, Marisa D.
2009 Food for Thought: Analysis of the Macrobotanical Remains from the African Meeting House in Boston; a Thesis. MA thesis (Historical Archaeology), University of Massachusetts Boston, Boston.

Peck, T., Siegfried, E., and G.A. Oetelaar, eds.
2003 *Indigenous People and Archaeology. Proceedings of the 32nd Annual Chacmool Conference*. The Archaeological Association of the University of Calgary, Calgary.

Pelletier, G.
2009 Neat Work. Retrieved April 03, 2014, from http://archive.constantcon-

tact.com/fs041/1102168755489/archive/1102561917709.html

Perry, W.S.
1871 *Historical Collections Relating to the American Colonial Church*. Privately Published, PA.

Petrides, George A.
1988 *A Field Guide to Eastern Trees*. Houghton Mifflin Company, Boston and New York.

Pezzarossi, Guido
2008 Consumption as Social Camouflage: "Mimicry" and Nipmuc Survival Strategies in the Colonial World. MA Thesis, Department of Anthropology, University of Massachusetts Boston.
2014 "Camouflaging Consumption and Colonial Mimicry: The Materiality of a Colonial Nipmuc Household." *International Journal of Historical Archaeology*, 18(1): 146-174

Pezzarossi, Guido, Ryan Kennedy, and Heather Law
2012 "Hoe Cakes and Pickerel": Cooking Traditions and Community at a Nineteenth Century Nipmuc Farmstead" in *The Menial Art of Cooking: Archaeological Studies of Cooking and Food Preparation*. Ed. Sarah R. Graff and Enrique Rodriguez-Alegria, pp. 201-230. University of Colorado Press, Boulder

Pfeiffer, Michael A.
1982 Clay Tobacco Pipes and the Fur Trade of the Pacific Northwest and Northern Plains. Master's thesis, Department of Anthropology, University of Idaho Graduate School.

Pierce, F.C.
1879 *The History of Grafton, Worcester County, Massachusetts, From its Early Settlement by the Indians in 1647 to the Present Time, 1879. Including the Genealogies of Seventy-Nine of the Older Families*. Press of Chas. Hamilton, Worcester, MA.

Pierson, Heidi
2010 *Within the Collection: A Look Inside the Fort Vancouver Museum. NCRI Curation Series No. 2: Tobacco Pipes*.

Preucel, R. W. and Bauer, A. A.
2001 Archaeological pragmatics. *Norwegian Archaeological Review* 34: 85-96.

Preucel, R.W. and S.A. Mrozowski, eds.
2010 *Contemporary Archaeology in Theory: The New Pragmatism*. Wiley-Blackwell, Malden, MA.

Prude, J.
1999 *The Coming of Industrial Order: Town and Factory Life in Rural Massachusetts, 1810-1860*. University of Massachusetts Press.

Raibmon, P.
2005 *Authentic Indians: Episodes of Encounter from the Late Nineteenth-Century Northwest Coast*. Duke University Press, Durham, NC.

Reinhard, Karl J., Mrozowski, S.A., and K. A. Orloski
1986 "Privies, pollen, parasites, and seeds, a biological nexus in historic archaeology." *Masca Journal* 4(1):31-36.

Rhode Island Parks Association
1987 *Working Water- A Guide to the Historic Landscape of the Blackstone River Valley.* Rhode Island Parks Association, Providence, RI.

Rice, F.P.
1906 *Vital Records of Grafton, Massachusetts, to the end of the year 1849*. Stanhope Press, Boston, MA.

Richmond, T.L. and A. Den Ouden
2003 "Recovering Gendered Political Histories" in *Reinterpreting New England Indians and the Colonial Experience*, ed. C.G. Calloway and N. Salisbury, pp. 174-231,. University of Virginia Press, Charlottesville, VA.

Ritchie, Duncan, and Kirk Van Dyke
2005 Intensive (Locational) Archaeological Survey, Brookmeadow Subdivision, Grafton, Massachusetts. Report to Massachusetts Historical Commission, Boston. Public Archaeology Laboratory, Pawtucket, RI

Roelker, W.G.
1952 Eleazer Arnold. *Rhode Island History*, July 1962, 3-4.

Rockman, Diana and Nan A. Rothschild
1984 "City Tavern, Country Tavern: An Analysis of Four Colonial Sites". *Historical Archaeology* 18(2):112-121

Samuelson, L. J. and M. E. Hogan
2006 *Forest trees: a guide to the eastern United States*. Prentice Hall.

Sainsbury, J.A.
1975 "Indian Labor in Early Rhode Island". *The New England Quarterly* 48(3):378-393.

Schimidt Peter R. and Stephen A. Mrozowski
2013 "The Death of Prehistory: Reforming the Past, Looking to the Future" in *The Death of Prehistory*, ed. Peter R. Schmidt and Stephen A. Mrozowski. Oxford University Press, Oxford.

Sellens, A.
2002 *Dictionary of American Hand Tools: A Pictorial Synopsis*. Atglen, PA: Schiffer Publishing Ltd.

Silliman, Stephen W.
2009 Change and Continuity, Practice and Memory: Native American Persistence in Colonial New England. *American Antiquity* 74(2): 211-230.
2010 The Value and Diversity of Indigenous Archaeology: A Response to McGhee. *American Antiquity* 75(2), pp. 217-220.
2012 "Between the longue durée and the short purée: Postcolonial archaeologies of Indigenous history in colonial North America" in *Decolonizing Indigenous Histories: Exploring "Prehistoric/Colonial" Transitions in Archaeology,* ed. Siobhan M. Hart, Maxine Oland, and Liam Frink, pp. 113-132. University of Arizona Press, Tuscon.

Silliman, Stephen W., editor
2008 *Collaborative Archaeology at the Trowels Edge: Learning and Teaching in Indigenous Archaeology*. Tucson: University of Arizona Press.

Smith, C. and G. Jackson
2006 "Decolonizing Indigenous Archaeology: Developments from Down Under." *American Indian Quarterly* 30(3 & 4):311-349.

Smith, L.
2000 'Doing Archaeology': Cultural heritage management and its role in identifying the link between archaeological practice and theory. *International Journal of Heritage Studies* 6(4): 309-316.
2001 "Archaeology and the Governance of Material Culture: A Case Study from South-Eastern Australia." *Norwegian Archaeological Review* 34(2): 97-105.

Smith, L., Morgan, A., and A. van der Meer
2003 "Community-driven Research in Cultural Heritage Management: the Waanyi Women's History Project." *International Journal of Heritage Studies* 9(1): 65-80.

Speck, F. G.
1941 "Art processes in birchbark of the River Desert Algonquin, a circumboreal trait," Smithsonian Institution, Bureau of American Ethnology bulletin, no. 128; *Anthropological papers*, no. 13-18. Washington D.C.: United States Government Printing Office.

Stein, Julie
2001 "Archaeological Sediments in Cultural Environments" in *Sediments in Archaeological Context*, ed. Julie K. Stein and William R. Farrand, pp. 1-28. University of Utah Press, Salt Lake City.

Steinitz, Michael
1989 "Rethinking Geographical Approaches to the Common House: The Evidence from Eighteenth Century Massachusetts," *Perspectives in Vernacular Architecture* 3: 16-26.

Stone, Janet R. and Byron D. Stone
2006 Surficial Geologic Map of the Clinton-Concord-Grafton-Medfield 12-quadrangle area in East Central Massachusetts. Open-File Report 2006-126-A. USGS, Reston, VA.

Stoops, George and M.J. Vepraska
2003 *Guidelines for Analysis and Description of Soil and Regolith Thin Sections*. Soil Science Society of America, Madison, WI.

Tantaquidgeon, G.
1935 "Notes on Mohegan-Pequot Basketry Designs," *Indians at Work*, 2(17), 43–45.

Taylor, W.H.
1998 *Soil Survey of Worcester County, Southern Part*. Natural Resources Conservation Services. US Department of Agriculture, Washington, D.C.

Teetor, H.D.
1920 *The Early History of the Daniels Families in Europe and American*. William M. Clemens, Pompton Lakes, NJ.

Tinker, George E.
2003 "John Eliot: Conversion, Colonialism, and the Oppression of Language", *Missionary Conquest: The Gospel and Native American Cultural Genocide*. Augsburg Fortress, Minniapolis, MN.

Toll, M. S.
1989 "Flotation sampling: Problems and some solutions, with examples from the American Southwest" in *Current paleoethnobotany: Analytical methods and cultural interpretations of archaeological plant remains*, ed. C. Hastorf and V. Popper, pp. 36-52. University of Chicago Press.

Trigg, H.
2007 An Examination of Botanical Materials from Mashantucket Pequot Site 72-58. A report submitted to the Mashantucket Pequot Tribal Nation Museum and Research Center.

Trigg, H. and A. Leasure
2007 "Cider, Wheat and Maize: Paleoethnobotany at Sylvester Manor." *Northeast Historical Archaeology* 36:113-126.

Trigg, H. and D. Landon
2010 "Labor and Agricultural Production at Sylvester Manor Plantation, Shelter Island, New York." *Historical Archaeology* 44(3): 36-53.

Trigg, H., McBride, K., and M. Smith
2007 Botanical Indications of the Impact of the Reservation System on the Mashantucket Pequot. Paper presented at the 30th Annual Meeting of the Society of Ethnobiology. Berkeley.

Tritch, Electa
2006 The History of Hassanamesit Woods. Manuscript 2nd Draft. Report to Town of Grafton, Massachusetts.

Trouillot, M-R.
1995 *Silencing the Past: Powers and the Production of History*. Boston: Beacon Press.

Truncer, James
2004 "Steatite Vessel Age and Occurrence in Temperate Eastern North America," *American Antiquity,* 69(3): 487-513.

Turnbaugh, Sarah Peabody
1985 *Domestic Pottery of the Northeastern United States, 1625-1850*. Academic Press.

Ulrich, Laurel Thatcher
2001 *The Age of Homespun: Objects and Stories in the Creation of an American Myth*. Alfred A. Knopf, Random House Inc.

United States Department of Agriculture.
1948 *Woody-Plant Seed Manual*. USDA Miscellaneous Publication No. 645.

USDA, Forest Service
Fire Effects Information System. http://www.fs.fed.us/database/feis/plants/. Verified 2014.

USDA, NRCS
2015 The PLANTS Database. National Plant Data Team, Greensboro, NC 27401-4901 USA. http://plants.usda.gov, 24 February 2015.

University of Michigan, Dearborn
2003 Native American Ethnobotany: A database of foods, drugs, dyes, and fibers of Native American peoples, derived from plants. http://herb.umd.umich.edu. Verified March 2014.

Walker, I. C.
1970 "Nineteenth-Century Clay Tobacco Pipes in Canada." *Ontario Archaeology* 16:19-29.

Walsh, Gregory J., Aleinikoff, John. N., and Michael J. Dorais
2011 Bedrock Geologic Map of the Grafton Quadrangle, Worcester County, Massachusetts. Prepared in cooperation with the

Commonwealth of Massachusetts, Massachusetts Geological Survey. USGS, Reston, VA.

Warren, Catherine M.
1922 Brigham Hill, Grafton, Massachusetts. The Grafton History Club. *Records of Grafton, MA 1735-1943*. American Antiquarian Society, Worcester, MA.

Watkins, J.
2005 "Through Wary Eyes: Indigenous Perspectives on Archaeology." *Annual Review of Anthropology* 34:429-449.
2000 *Indigenous Archaeology: American Indian Values and Scientific Practice*. Alta Mira Press, Walnut Creek, CA.

Watkins, Lura Woodside
1950 *Early New England Potters and Their Wares*. Cambridge, MA: Harvard University Press.

Wilcox, M.V.
2009 *The Pueblo Revolt and the Mythology of Conquest: An Indigenous Archaeology of Contact*. University of California Press, Berkeley.

Wilkinson, I.
1869 *Memoirs of the Wilkinson family in America: comprising genealogical and biographical sketches of Lawrence Wilkinson of Providence, RI, Edward Wilkinson of New Milford, Conn., John Wilkinson of Attleborough, Mass., Daviel Wilkinson of Columbia Co., N.Y.* Davis & Penniman, Printers, Jacksonville, IL.

Whipple, Charles M. and Barbara R. Carroll
2003 Yeoman Princes Benjamin, David. And Joseph, Sons of Captain John Whipple. Website accessed 2/6/2015. http://www.whipple.org/charles/yeomenandprinces/

Whitney, Peter
1793 *Worcester County: America's First Frontier.* Isaiah Thomas, Worcester.

Worcester Society of Antiquity
1891 Visit to Grafton. *Proceedings of the Worcester Society of Antiquity for the year 1888*. Worcester Society of Antiquity Publishing, Worcester, MA.

Yentsch, A. E., and J. M. Kratzer
1994 Techniques for Excavating and Analyzing Buried Eighteenth-Century Garden Landscapes. In *The Archaeology of Garden and Field*, edited by N. F. Miller and K. L. Gleason, pp. 168-201. University of Pennsylvania Press, Philadelphia.

Appendix A: Data Tables

Table A-1. Total station points.

Point Name	East	North	Elevation	Code
BIG_GPS	186758.679	882086.144	140.479	GPS_BENCH
ROCK_GPS	186745.633	882044.837	144.416	GPS_BENCH
RR_GPS	186806.37	882068.256	137.174	GPS_BENCH
SB_GPS	186782.608	882020.446	143.075	GPS_BENCH
051712 BASE1	186776.812	882050.427	143.2	OCCUPIED
ROCK	186745.463	882044.87	144.02	BENCH
SB	186782.771	882020.396	142.916	BENCH
RR	186806.247	882068.047	136.753	BENCH
BIG	186758.584	882086.315	141.489	BENCH
051712 BASE2	186776.809	882050.411	143.201	OCCUPIED
E992N972	186795.183	882028.617	141.447	GRIDNAIL
N964E990	186794.959	882020.396	142.076	GRIDNAIL
N964E986	186791.134	882019.584	142.309	GRIDNAIL
N964E982	186787.161	882018.657	142.642	GRIDNAIL
N960E1000	186805.52	882018.54	141.106	GRIDNAIL
ELEVSTAKE	186805.984	882016.473	141.397	WOODSTAKE
N970E1000	186803.434	882028.318	140.337	GRIDNAIL
IDEAL1	186795	882020	0	IDEAL
NEWGRID1	186795	882020	0	IDEAL
NEWGRID1_stk	186794.997	882020.011	141.75	IDEAL
NEWGRID3	186795	882030	0	IDEAL
NEWGRID3_stk	186794.998	882029.995	141.317	IDEAL
NEWGRID4	186785	882030	0	IDEAL
NEWGRID4_stk	186785.006	882030.003	142.181	NEWGRID
NEWGRID5	186785	882020	0	IDEAL
NEWGRID5_stk	186784.998	882019.99	142.715	NEWGRID
CHEMUNITSW1	186811	882005	0	IDEAL
051712 BASE3	186804.61	882011.27	143.04	OCCUPIED
CHEMCRNR1	186811	882005	0	CHEM
CHEMCRNR1_stk	186811.005	882004.998	141.446	CHEM
CHEMUNITSW2	186852	881982	0	IDEAL
CHEMCRNR2	186811	882007	0	CHEM
CHEMCRNR2_stk	186811	882007.002	141.313	CHEM
CHEMCRNR3	186813	882005	0	IDEAL
CHEMCRNR3_stk	186812.997	882005	141.269	CHEM
CHEMCRNR4	186813	882007	0	IDEAL
CHEMCRNR4_stk	186813.003	882007.01	141.215	CHEM
CHEMCRNR5	186852	881982	0	IDEAL

Table A-1 cont. Total station points.

CHEMCRNR5_stk	186852.007	881981.99	141.691	CHEM
CHEMCRNR6	186852	881984	0	IDEAL
CHEMCRNR6_stk	186851.998	881984.003	141.381	CHEM
CHEMCRNR7	186854	881982	0	IDEAL
CHEMCRNR7_stk	186854.007	881981.998	141.289	CHEM
CHEMCRNR8	186854	881984	0	IDEAL
CHEMCRNR8_stk	186854.011	881983.996	141.026	CHEM
NAIL1	186843.09	881988.01	141.427	XTRA-REF
NAIL2	186827.224	881997.02	141.53	XTRA-REF
N960E994	186799.726	882017.318	141.884	GRIDNAIL
N962E994	186799.305	882019.243	141.773	GRIDNAIL
N964E992	186796.886	882020.793	141.878	BENCH
N957E986	186792.579	882012.54	142.456	GRIDNAIL
DATUMROCK	186789.421	882019.834	142.373	BENCH
CHEMUNITSW3	186821	881938	0	IDEAL
051712 BASE4	186830.877	881982.589	144.187	OCCUPIED
CHEMUNITNE3	186823	881938	0	
051712 BASE5	186826.364	881979.469	144.582	OCCUPIED
CHEMCRNR13	186821	881938	0	IDEAL
CHEMCRNR13_stk	186821.007	881938.002	148.248	CHEM
CHEMCRNR14	186823	881938	0	IDEAL
CHEMCRNR14_stk	186822.995	881937.992	148.343	CHEM
CHEMCRNR15	186823	881940	0	IDEAL
CHEMCRNR15_stk	186823	881940	147.781	CHEM
060712OCC_1	186822.298	882000.103	142.921	GRIDNAIL
R2	186821.841	882002.193	141.265	RS_GRID
R3	186821.694	882003.184	141.142	RS_GRID
R4	186821.567	882004.18	141.045	RS_GRID
R5	186821.477	882005.083	141.096	RS_GRID
R6	186821.393	882006.136	141.067	RS_GRID
R7	186821.308	882007.147	140.95	RS_GRID
R8	186821.218	882008.133	140.89	RS_GRID
R9	186821.128	882009.105	140.797	RS_GRID
R10	186821.008	882010.114	140.69	RS_GRID
R11	186820.896	882011.126	140.584	RS_GRID
R12	186820.808	882012.074	140.458	RS_GRID
R13	186820.703	882013.087	140.301	RS_GRID
R14	186809.359	882013.429	141.088	RS_GRID
R15	186809.4	882012.492	141.168	RS_GRID
R16	186809.564	882011.458	141.208	RS_GRID
R17	186809.708	882010.481	141.212	RS_GRID
R18	186809.849	882009.463	141.261	RS_GRID

Table A-1 cont. Total station points.

R19	186809.975	882008.465	141.319	RS_GRID
R20	186810.133	882007.505	141.373	RS_GRID
R21	186813.196	882006.526	141.261	RS_GRID
R22	186813.229	882005.506	141.252	RS_GRID
R23	186810.546	882004.544	141.516	RS_GRID
R24	186810.63	882003.556	141.626	RS_GRID
R25	186810.77	882002.555	141.658	RS_GRID
R26	186810.904	882001.574	141.667	RS_GRID
R1	186821.969	882001.199	141.33	RS_GRID
Y27	186821.902	882001.565	141.326	RS_GRID
Y28	186821.751	882002.508	141.226	RS_GRID
Y29	186821.655	882003.496	141.111	RS_GRID
Y30	186821.567	882004.459	141.055	RS_GRID
Y31	186821.425	882005.484	141.162	RS_GRID
Y32	186821.4	882006.474	141.007	RS_GRID
Y33	186821.288	882007.467	140.929	RS_GRID
Y34	186821.186	882008.476	140.858	RS_GRID
Y35	186821.088	882009.457	140.735	RS_GRID
Y36	186820.973	882010.467	140.658	RS_GRID
Y37	186820.878	882011.429	140.538	RS_GRID
Y38	186820.778	882012.433	140.415	RS_GRID
Y39	186809.34	882012.758	141.117	RS_GRID
Y40	186809.524	882011.796	141.184	RS_GRID
Y41	186809.668	882010.797	141.194	RS_GRID
Y42	186809.811	882009.818	141.241	RS_GRID
Y43	186809.961	882008.819	141.289	RS_GRID
Y44	186810.089	882007.83	141.331	RS_GRID
Y45	186813.206	882006.844	141.226	RS_GRID
Y46	186813.224	882005.851	141.257	RS_GRID
Y47	186810.524	882004.863	141.496	RS_GRID
Y48	186810.668	882003.891	141.573	RS_GRID
Y49	186810.723	882002.873	141.65	RS_GRID
Y50	186810.864	882001.875	141.649	RS_GRID
W51	186821.862	882001.859	141.3	RS_GRID
W52	186821.721	882002.864	141.193	RS_GRID
W53	186821.581	882003.833	141.07	RS_GRID
W54	186821.514	882004.813	141.077	RS_GRID
W55	186821.457	882005.834	141.106	RS_GRID
W56	186821.332	882006.811	140.985	RS_GRID
W57	186821.237	882007.808	140.912	RS_GRID
W58	186821.137	882008.803	140.817	RS_GRID
W59	186821.022	882009.789	140.718	RS_GRID

Table A-1 cont. Total station points.

W60	186820.94	882010.771	140.635	RS_GRID
W61	186820.832	882011.751	140.504	RS_GRID
W62	186820.752	882012.717	140.352	RS_GRID
W63	186809.297	882013.093	141.108	RS_GRID
W64	186809.438	882012.124	141.162	RS_GRID
W65	186809.617	882011.135	141.196	RS_GRID
W66	186809.765	882010.136	141.219	RS_GRID
W67	186809.888	882009.174	141.292	RS_GRID
W68	186810.047	882008.146	141.313	RS_GRID
W69	186810.147	882007.156	141.388	RS_GRID
W70	186813.231	882006.184	141.275	RS_GRID
W71	186813.206	882005.183	141.243	RS_GRID
W72	186810.589	882004.207	141.403	RS_GRID
W73	186810.71	882003.219	141.643	RS_GRID
W74	186810.823	882002.216	141.652	RS_GRID
B75	186815.933	882002.778	141.307	RS_GRID
B76	186816.046	882003.003	141.28	RS_GRID
B77	186816.976	882002.483	141.315	RS_GRID
B78	186815	882006.106	141.215	RS_GRID
B79	186815.005	882006.102	141.215	RS_GRID
B80	186816.258	882006.105	141.153	RS_GRID
B81	186818.584	882010.572	140.811	RS_GRID
B82	186819.888	882010.558	140.774	RS_GRID
Y83	186811.245	882007.341	141.292	RS_GRID
R84	186811.897	882007.342	141.231	RS_GRID
Y85	186804.525	882024.487	140.571	RS_GRID
R86	186805.125	882024.729	140.495	RS_GRID
R87	186806.047	882025.11	140.312	RS_GRID
61212_OCC1	186808.069	882009.191	142.924	OCCUPIED
R90	186815.657	882021.755	139.444	RS_GRID
R91	186815.506	882022.747	139.296	RS_GRID
R92	186815.318	882023.737	139.173	RS_GRID
R93	186815.133	882024.703	139.076	RS_GRID
R94	186814.973	882025.686	138.969	RS_GRID
R95	186814.776	882026.666	138.842	RS_GRID
R96	186814.58	882027.631	138.809	RS_GRID
R97	186814.4	882028.562	138.735	RS_GRID
R98	186804.483	882024.462	140.587	RS_GRID
R99	186804.739	882023.541	140.745	RS_GRID
R100	186805.002	882022.598	140.853	RS_GRID
R101	186805.268	882021.613	140.947	RS_GRID
R102	186805.503	882020.642	140.959	RS_GRID

Table A-1 cont. Total station points.

Table A-1 cont. Total station points.

R103	186805.766	882019.676	141.028	RS_GRID
R104	186805.984	882018.708	141.063	RS_GRID
R105	186806.227	882017.723	141.061	RS_GRID
W106	186815.597	882022.103	139.398	RS_GRID
W107	186815.422	882023.069	139.254	RS_GRID
W108	186815.225	882024.03	139.152	RS_GRID
W109	186815.077	882025.018	139.035	RS_GRID
W110	186814.878	882025.988	138.921	RS_GRID
W111	186814.706	882026.963	138.836	RS_GRID
W112	186814.529	882027.961	138.796	RS_GRID
W113	186804.662	882023.856	140.7	RS_GRID
W114	186804.931	882022.909	140.818	RS_GRID
W115	186805.192	882021.949	140.905	RS_GRID
W116	186805.423	882020.987	140.964	RS_GRID
W117	186805.653	882019.983	141.002	RS_GRID
W118	186805.917	882019.036	141.067	RS_GRID
W119	186806.156	882018.041	141.017	RS_GRID
Y120	186815.568	882022.423	139.334	RS_GRID
Y121	186815.348	882023.385	139.208	RS_GRID
Y122	186815.181	882024.383	139.107	RS_GRID
Y123	186815.001	882025.343	138.997	RS_GRID
Y124	186814.855	882026.317	138.878	RS_GRID
Y125	186814.647	882027.294	138.822	RS_GRID
Y126	186814.465	882028.288	138.737	RS_GRID
Y127	186804.565	882024.174	140.643	RS_GRID
Y128	186804.843	882023.228	140.784	RS_GRID
Y129	186805.119	882022.274	140.881	RS_GRID
Y130	186805.353	882021.301	140.972	RS_GRID
Y131	186805.578	882020.329	140.968	RS_GRID
Y132	186805.835	882019.354	141.062	RS_GRID
Y133	186806.083	882018.376	141.014	RS_GRID
B135	186806.054	882024.411	140.395	RS_GRID
B136	186806.225	882021.292	140.868	RS_GRID
DRAIN_CENTER1	186797.758	882017.695	141.07	FEATURE
DRAIN_CENTER2	186797.978	882017.873	141.094	FEATURE
DRAIN_CENTER3	186798.3	882018.149	141.116	FEATURE
DRAIN_CENTER4	186798.585	882018.437	141.056	FEATURE
DRAIN_CENTER5	186798.735	882018.655	141.048	FEATURE
DRAIN_CENTER6	186803.857	882021.355	140.833	FEATURE
DRAIN_CENTER7	186804.031	882021.439	140.751	FEATURE
DRAIN_CENTER8	186804.152	882021.526	140.68	FEATURE
DRAIN_CENTER9	186804.389	882021.671	140.677	FEATURE

Table A-1 cont. Total station points.

DRAIN_CENTER10	186804.639	882021.871	140.682	FEATURE
61212_OCC_2	186815.542	882009.629	142.446	XTRA-REF
DRAIN_CENTER11	186803.412	882021.1	140.805	FEATURE
DRAIN_CENTER12	186803.109	882020.893	140.91	FEATURE
BARN_B1	186811.142	882019.86	140.308	TOPO
BARN_B2	186810.921	882020.849	140.231	TOPO
BARN_B3	186810.806	882021.784	140.078	TOPO
BARN_B4	186810.43	882023.685	139.919	TOPO
BARN_B5	186810.07	882025.811	139.604	TOPO
BARN_B6	186809.875	882026.718	139.531	TOPO
BARN_B7	186807.085	882025.771	139.99	TOPO
BARN_B8	186807.365	882024.6	140.12	TOPO
BARN_B9	186807.773	882022.996	140.346	TOPO
BARN_B10	186808.262	882021.229	140.453	TOPO
BARN_B11	186808.634	882020.267	140.531	TOPO
BARN_B12	186809.068	882019.083	140.604	TOPO
BARN_B13	186813.94	882021.03	139.684	TOPO
BARN_B14	186813.474	882021.899	139.631	TOPO
BARN_B15	186813.16	882022.779	139.497	TOPO
BARN_B16	186812.835	882024.378	139.404	TOPO
BARN_B17	186812.147	882026.708	139.228	TOPO
BARN_B18	186811.897	882027.557	139.16	TOPO
B134	186806.883	882024.762	140.145	RS_GRID
BARN_B19	186805.992	882025.217	140.335	TOPO
BARN_B20	186806.234	882024.025	140.442	TOPO
BARN_B21	186806.861	882022.405	140.602	TOPO
BARN_B22	186807.502	882020.179	140.83	TOPO
BARN_B23	186807.732	882019.205	140.92	TOPO
BARN_B24	186808.026	882018.262	140.887	TOPO
BARN_B25	186810.149	882019.555	140.428	TOPO
BARN_B26	186809.961	882020.592	140.333	TOPO
OCC	186807.053	882015.053	142.919	OCCUPIED
EX_819_007_1	186818.998	882006.993	141.02	EX_UNIT
EX_819_007_2	186820.937	882007.001	141.084	EX_UNIT
EX_819_007_3	186820.929	882008.964	140.912	EX_UNIT
EX_819_007_4	186818.953	882008.968	140.982	EX_UNIT
A19_1	186812.931	882014.443	140.848	EX_UNIT
A19_2	186811.016	882013.891	140.862	EX_UNIT
A19_3	186810.448	882015.761	140.798	EX_UNIT
A19_4	186812.333	882016.301	140.632	EX_UNIT
K21_1	186803.237	882020.102	141.203	EX_UNIT
K21_2	186805.139	882020.511	140.992	EX_UNIT

Table A-1 cont. Total station points.

K21_3	186804.694	882022.464	140.886	EX_UNIT
K21_4	186802.804	882022.059	141.114	EX_UNIT
025_808_1	186809.858	882025.965	139.653	EX_UNIT
025_808_2	186809.887	882025.047	139.794	EX_UNIT
025_808_3	186807.899	882025.004	140.009	EX_UNIT
809_024_1	186808.952	882021.971	140.273	EX_UNIT
809_024_2	186808.93	882023.989	140.01	EX_UNIT
809_024_3	186810.898	882023.987	139.942	EX_UNIT
809_024_4	186810.951	882021.978	140.099	EX_UNIT
806_023_1	186806.009	882023.013	140.744	EX_UNIT
806_023_2	186805.96	882024.961	140.414	EX_UNIT
806_023_3	186807.96	882023.009	140.354	EX_UNIT
S_FND_WA_R1_1	186797.339	882016.273	141.266	FEATURE
S_F_WA_R1_2	186797.457	882016.038	141.279	FEATURE
S_F_WA_R1_3	186796.943	882015.841	141.267	FEATURE
S_F_WA_R1_4	186796.906	882016.071	141.292	FEATURE
S_F_WA_R2_5	186796.864	882015.79	141.268	FEATURE
S_F_WA_R2_6	186796.809	882016.008	141.268	FEATURE
S_F_WA_R2_7	186796.524	882015.796	141.278	FEATURE
S_F_WA_R3_8	186796.406	882015.311	141.321	FEATURE
S_F_WA_R3_9	186795.972	882014.99	141.062	FEATURE
S_F_WA_R3_10	186795.811	882015.238	141.044	FEATURE
S_F_A1	186796.333	882015.028	141.479	TOPO
S_F_A2	186797.748	882015.853	141.449	TOPO
OCC 13_1	186800.902	881999.356	144.335	OCCUPIED
STAKE 13_1	186797.191	881994.396	143.414	GRIDNAIL
STAKE 13_2	186808.796	881985.098	143.582	GRIDNAIL
STAKE 13_3	186793.497	881973.15	146.144	GRIDNAIL
STAKE 13_4	186780.267	881979.532	147.126	GRIDNAIL
800 990	186800	881990	0	IDEAL
795 994	186795	881994	0	IDEAL
800 980_stk	186799.985	881980.023	144.435	CHEM
790 980	186790	881980	0	IDEAL
790 980_stk	186789.999	881980.006	145.42	CHEM
790 990	186790	881990	0	IDEAL
790 990_stk	186790	881990.015	144.635	CHEM
800 990_stk	186799.994	881989.998	143.502	CHEM
D BLOCK DATUM	186782.265	881982.93	146.216	GRIDNAIL
800 994	186800	881994	0	IDEAL
805 995	186805	881994	0	IDEAL
805 990	186805	881990	0	IDEAL
805 985	186805	881985	0	IDEAL

Table A-1 cont. Total station points.

805 980	186805	881980	0	IDEAL
800 975	186800	881975	0	IDEAL
795 975	186795	881975	0	IDEAL
790 975	186790	881975	0	IDEAL
795 975_stk	186795	881974.984	145.466	CHEM
800 975_stk	186799.992	881975.001	145.117	CHEM
805 985_stk	186805.006	881984.99	143.819	CHEM
805 990_stk	186804.989	881989.988	143.286	CHEM
805 995_stk	186805.001	881994.009	142.863	CHEM
800 994_stk	186800.011	881994.013	143.162	CHEM
795 994_stk	186794.985	881994.007	143.521	CHEM
OC 13_2	186795.156	881978.734	146.445	GRIDNAIL
790 975_stk	186790.006	881974.99	145.93	CHEM
805 980_stk	186804.992	881980.003	144.053	CHEM
805 985_stk1	186804.988	881985.004	143.792	CHEM
053013 BASE1	186799.697	881999.916	144.254	OCCUPIED
053013 BASE2	186799.665	881999.91	144.255	OCCUPIED
D14 AS-DUG1	186789.539	881978.457	145.551	FEATURELINE
D14 AS-DUG2	186789.538	881978.455	145.545	FEATURELINE
D14 AS-DUG3	186788.9	881978.306	145.659	FEATURELINE
D14 AS-DUG4	186787.581	881978.787	145.864	FEATURELINE
D14 AS-DUG5	186787.338	881979.904	145.803	FEATURELINE
D14 AS-DUG6	186788.302	881980.161	145.576	FEATURELINE
E792N976	186792	881976	0	IDEAL
E799N978	186799	881978	0	IDEAL
E795N986	186795	881986	0	IDEAL
E795N987	186795	881986	0	
E795N987_stk	186795.007	881985.993	143.976	CHEM
E795N988	186795	881988	0	
E795N988_stk	186794.993	881987.996	143.824	CHEM
E795N989	186797	881986	0	
E795N989_stk	186796.997	881985.998	144.154	CHEM
E795N990	186792	881976	0	
E795N990_stk	186792	881975.998	145.784	CHEM
E795N991	186799	881978	0	
E795N991_stk	186798.998	881978.001	144.731	CHEM
E795N992	186799	881980	0	
E795N992_stk	186798.994	881980.003	144.573	CHEM
E795N993	186801	881978	0	
E795N993_stk	186800.989	881978.004	144.593	CHEM
E795N994	186801	881980	0	
E795N994_stk	186801.005	881979.998	144.344	CHEM

Table A-1 cont. Total station points.

RSGRID_CORNR1	186803.993	881975.095	144.698	FEATURELINE
RSGRID_CORNR2	186803.946	881977.062	144.581	FEATURELINE
RSGRID_CORNR3	186804.952	881977.083	144.48	FEATURELINE
RSGRID_CORNR4	186804.99	881994.011	142.853	FEATURELINE
RSGRID_CORNR5	186790.002	881994.103	144.15	FEATURELINE
RSGRID_CORNR6	186789.982	881975.003	146.439	FEATURELINE
RSGRID_CORNR7	186804	881975.098	145.191	FEATURELINE
053013 BASE3	186802.708	881986.39	145.175	OCCUPIED
E795N995	186792	881978	0	
E795N995_stk	186791.997	881977.997	145.482	CHEM
E795N996	186794	881976	0	
E795N996_stk	186793.995	881976.006	145.425	CHEM
E795N997	186794	881978	0	
E795N997_stk	186793.999	881978.001	145.243	CHEM
ELEVREDO1	186794.997	881985.991	144.284	EX_UNIT
ELEVREDO2	186794.993	881987.989	144.121	EX_UNIT
XUUXUU	186786.263	882035.259	143.478	OCCUPIED
UnitZ1	186782	882027	0	EX_UNIT
UnitZ2	186782	882027	0	
UnitZ2_stk	186781.998	882027.007	142.645	CHEM
UnitZ3	186782	882029	0	
UnitZ3_stk	186782.005	882029	142.501	CHEM
6613_OCC_1	186784.457	881999.314	145.77	XTRA-REF
Unit 781-001	186781	882001	0	IDEAL
Unit 781-001_stk	186781.003	882001.001	144.258	CHEM
Unit 781-003	186781.003	882003.001	144.258	
Unit 781-003_stk	186781.011	882002.997	144.152	CHEM
Unit 781-004	186783	882001	0	
Unit 781-004_stk	186782.993	882001.002	144.1	CHEM
Unit 777-990	186777	881990	0	IDEAL
Unit 777-990_stk	186776.996	881990.005	145.699	CHEM
Unit 777-991	186779	881990	0	
Unit 777-991_stk	186778.996	881990.004	145.675	CHEM
Unit 777-992	186777	881992	0	
Unit 777-992_stk	186777	881991.997	145.496	CHEM
Unit 804-995	186804	881995	0	IDEAL
Unit 804-995_stk	186803.996	881994.988	142.741	CHEM
Unit 804-996	186804	881997	0	
Unit 804-996_stk	186803.999	881996.995	142.605	CHEM
Unit 804-997	186806	881995	0	
Unit 804-997_stk	186806	881995	142.725	CHEM
N978E988	186790.046	882033.575	141.696	EX_UNIT

Table A-1 cont. Total station points.

STAKE 13_5	186791.936	882040.616	141.415	EX_UNIT
STAKE 13_6	186786.568	882013.468	143.049	EX_UNIT
6613_OCC	186793.414	882029.471	143.021	OCCUPIED
Unit 772-023	186772	882023	0	
Unit 772-023_stk	186772	882023.006	143.774	CHEM
Unit 804-038	186804	882038	0	EX_UNIT
Unit 804-038_stk	186804.001	882037.993	139.511	CHEM
Unit 804-039	186804	882040	0	
Unit 804-039_stk	186803.993	882039.992	139.366	CHEM
Unit 804-040	186806	882038	0	
Unit 804-040_stk	186806.001	882038.002	139.149	CHEM
Unit 818-019	186818	882019	0	EX_UNIT
Unit 818-019_stk	186817.996	882018.988	139.661	CHEM
Unit 820-019	186820	882019	0	
Unit 820-019_stk	186820.007	882019.006	139.451	CHEM
Unit 818-020	186818	882021	0	
Unit 818-020_stk	186817.999	882020.998	139.308	CHEM
6613_OCC3	186777.957	882033.359	144.074	EX_UNIT
Unit 818-021	186772	882025	0	
Unit 818-021_stk	186772.005	882024.995	143.641	CHEM
Unit 818-022	186774	882023	0	
Unit 818-022_stk	186774.002	882022.991	143.404	CHEM
061913 BASE1	186791.928	881990.33	145.714	OCCUPIED
E792N976ELEVDATUM	186791.737	881975.846	145.953	EX_UNIT
E799N978ELEVDATUM	186798.644	881977.898	145.004	EX_UNIT
E795N986ELEVDATUM	186794.891	881985.621	144.382	EX_UNIT
Unit 818-023	186767	881990	0	
Unit 818-023_stk	186767.004	881990.006	147.607	CHEM
Unit 818-024	186765	881990	0	
Unit 818-024_stk	186765.001	881990.005	147.955	CHEM
062013 BASE2	186789.719	882022.79	143.882	OCCUPIED
CELLAR_NW_CRNR	186792.645	882017.711	140.682	FEATURE
CELLAR_ELL_E_CRNR	186793.624	882016.187	140.694	FEATURE
CELLAR_ELL_W_CRNR	186792.032	882014.731	140.669	FEATURE
CELLAR_NE_CRNR	186795.584	882019.748	141.032	FEATURE
CELLAR_SE_OUT_CRNR	186798.354	882016.38	141.458	FEATURE
CELLAR_SW_CRNR	186792.905	882013.503	141.374	FEATURE
CHK_NAIL	186796.914	882020.793	141.882	XTRA-REF
TREEELEVDATUM	186791.635	882015.817	142.574	EX_UNIT
PLASTICELEVDATUM	186798.241	882014.249	142.217	EX_UNIT
C2C3ELEVDATUM	186786.018	882024.285	142.477	EX_UNIT
NAIL RECHECK1	186784.066	882024.147	142.535	GRIDNAIL

Table A-1 cont. Total station points.

NAIL RECHECK2	186787.551	882026.803	142.324	GRIDNAIL
NAIL RECHECK3	186799.262	882019.263	141.829	GRIDNAIL

Table A-2. Phosphate data.

		Eidt				Mehlich II		
Transect	**Sample**	**Length**	**Time**	**Percent**	**Value**	**P**	**ABS**	**%T**
Houselot	3001	0	2	0	1	2.75 Limit	1.449	3.55
Houselot	3002	5	1	75	4	2.75 Limit	1.35	4.46
Houselot	3003	0	0:00	0	1	2.75 Limit	1.524	2.99
Houselot	3004	3	2	10	2	2.75 Limit	1.592	2.56
Houselot	3005	0	2	0	1	2.75 Limit	1.291	5.12
Houselot	3006	0	2	0	1	2.75 Limit	1.685	2.06
Houselot	3007	4	0:00	50	3	2.75 Limit	1.445	3.59
Houselot	3008	5	0:00	10	3	2.75 Limit	1.158	6.95
Houselot	3009	1	0:00	75	2	2.75 Limit	1.426	3.75
Houselot	3010	5	0:00	80	4.5	2.75 Limit	1.655	2.21
Houselot	3011	6	1	50	4.5	2.75 Limit	1.371	4.26
Houselot	3012	0	0:00	3	2	2.75 Limit	1.644	2.27
Houselot	3013	0	0:00	3	2	2.75 Limit	1.417	3.83
Houselot	3014	0	2	0	1	2.75 Limit	1.82	1.51
Houselot	3015	4	1	30	3	2.75 Limit	1.735	1.84
Houselot	3016	0	2	0	1	2.75 Limit	1.664	2.17
Houselot	3017	0	2	0	1	2.75 Limit	1.156	6.98
Houselot	3019	0	2	0	1	2.75 Limit	1.466	3.42
Houselot	3020	0	2	0	1	2.75 Limit	1.287	5.16
Houselot	3021	0	2	0	1	2.75 Limit	1.165	6.84
Houselot	3022	0	2	0	1	2.75 Limit	1.194	6.39
Houselot	3023	8	1	20	4	2.75 Limit	1.352	4.45
Houselot	3024	0	2	0	1	2.75 Limit	1.474	3.35
Houselot	3025	5	2	75	4	2.75 Limit	1.432	3.7
Houselot	3026	6	1	50	3.5	2.75 Limit	1.302	4.99
Houselot	3027	6	0.5	40	4	2.75 Limit	1.56	2.75
Houselot	3028	6	1.5	50	3	2.75 Limit	1.517	3.04
Houselot	3029	0	2	0	0	2.75 Limit	1.397	4.01
Houselot	3030	10	:30	75	5	2.75 Limit	1.369	4.28
Houselot	3031	4	1	50	3	2.75 Limit	1.469	3.4
Houselot	3032	3.5	2	40	3	2.75 Limit	1.107	7.82
Houselot	3033	4	1	50	4	2.75 Limit	1.128	7.45
Houselot	3035	1	1:30	10	2	2.75 Limit	1.056	8.8
Houselot	3036	4	1:30	25	3	2.21	0.637	23.09
Houselot	3037	3	:30	3	4	2.75 Limit	0.917	12.1
Houselot	3038	2	2	50	3	2.75 Limit	1.132	7.39
Houselot	3039	3	1:30	18	3	2.75 Limit	0.849	14.17
Houselot	3040	2	2	variable	2	2.75 Limit	1.575	2.66
Houselot	3041	4	1	50	4	2.75 Limit	1.316	4.83
Houselot	3042	1	2	variable	2	2.75 Limit	1.414	3.86

Table A-2 cont. Phosphate data.

Houselot	3043	5	1	75	4	2.75 Limit	1.385	4.12
Houselot	3044	5	1	30	4	2.75 Limit	1.702	1.98
Houselot	3045	1	2	variable	2	2.75 Limit	1.117	7.64
Houselot	3046	4	2	5	2	2.75 Limit	1.322	4.77
Houselot	3047	3	2	30	3	2.75 Limit	1.51	3.09
Houselot	3048	2	1	5	2	2.75 Limit	1.411	3.88
Houselot	3049	3	1:30	40	3	2.75 Limit	1.064	8.63
Houselot	3050	0	2	0	1	2.75 Limit	1.546	2.85
Houselot	3051	3	2	20	2	2.75 Limit	1.53	2.95
Houselot	3052	0	2	0	1	2.75 Limit	1.559	2.76
Houselot	3053	4	1.5	50	3	2.75 Limit	1.349	4.48
Houselot	3054	0	2	0	1	2.75 Limit	1.04	9.12
Houselot	3056	6	1	75	4.5	2.75 Limit	1.586	2.59
Houselot	3056B	1	1:30	15	2	2.75 Limit	1.358	4.38
Houselot	3057.1	2	2	10	2	2.75 Limit	1.658	2.2
Houselot	3057.2	5	1	60	3	2.75 Limit	1.36	4.37
Houselot	3058	4	1	50	3	2.75 Limit	0.89	12.88
Houselot	3059	3	1:30	40	3	2.75 Limit	1.151	7.06
Houselot	3060	8	:30	80	5	2.75 Limit	1.408	3.91
Houselot	3061.1	4	0:00	50	4	2.75 Limit	1.122	7.56
Houselot	3061.2	1.5	2	35	3	2.75 Limit	0.825	14.96
Houselot	3062	5	1	40	3	2.75 Limit	1.14	7.24
Houselot	3063	5	1:20	10	3	2.54	0.733	18.51
Houselot	3064	0	2	0	1	2.44	0.703	19.81
Houselot	3065	6	1:40	30	3	2.75 Limit	1.36	4.37
Houselot	3066	0	2	50	2	2.75 Limit	1.334	4.64
Houselot	3067	0	0:00	0	1	2.46	0.709	19.56
Houselot	3068	6	1	100	5	2.75 Limit	0.958	11.01
Houselot	3069	3	2	30	3	2.75 Limit	1.034	9.25
Houselot	3070	4	1	50	3	2.75 Limit	1.424	3.77
Houselot	3071	9	:30	75	5	2.75 Limit	1.114	7.7
Houselot	3072	8	:30	75	5	2.3	0.663	21.74
Houselot	3073	6	:50	30	4	2.75 Limit	1.137	7.3
Houselot	3074	4	1	50	3	1.49	0.429	37.27
Houselot	3075	3	1.5	30	3	2.6	0.751	17.73
Pasture	2	5	2	30	2	1.06	0.307	49.37
Pasture	3	4	0:00	50	4	0.8	0.231	58.78
Pasture	4	4	1:30	50	3	0.86	0.247	56.66
Pasture	5	0	0:00	0	1	2.74	0.79	16.22
Pasture	6	6	0:00	50	4	1.05	0.304	49.71
Pasture	7	5	1:03	55	3	0.88	0.254	55.67
Pasture	8	6	:30	70	4.5	1.55	0.448	35.68

Table A-2 cont. Phosphate data.

Pasture	10	4	1:30	30	3	1.5	0.432	36.97
Pasture	11	2	1:30	75	3	0.2	0.059	87.3
Pasture	12	2	0:00	15	2	2.02	0.582	26.19
Pasture	13	2.5	0:00	50	3	0.95	0.274	53.26
Pasture	14	5	:50	25	3	2.32	0.669	21.43
Pasture	15	5	2	variable	3	1.05	0.302	49.88
Pasture	16	4	1:30	25	3	0.35	0.1	79.4
Pasture	17A	2	0:00	20	3	0.72	0.209	61.79
Pasture	17B	3	1:30	10	2	0.12	0.034	92.55
Pasture	18	2.5	:30	variable	3	0.84	0.241	57.4
Pasture	19A	2	2	10	2	1.5	0.434	36.83
Pasture	19B	3	0:00	5	2	2.17	0.627	23.58
Pasture	20	2	1	5	2	2.75 Limit	0.844	14.33
Pasture	21	3	:40	25	3	1.73	0.499	31.69
Pasture	22	3	0:00	5	2	2.75 Limit	0.997	10.07
Pasture	3100	4	:30	50	3			
Pasture	3101	6	1:45	90	3.5			
Pasture	3102	0		0	0			
Pasture	3103	10	1:00	100	4			
Pasture	3104	7	:30	25	3.5			
Pasture	3105	5	1:30	30	3			
Pasture	3106	6	:45	50	3			
Pasture	3107	5	1:30	50	3			
Pasture	3108	8	:30	50	5			
Pasture	3109	4.5	:30	45	3.5			
Pasture	3110	5	:30	100	3			
Pasture	3111	5	:30	75	4.5			
Pasture	3112	5	4:00	10	0			
Pasture	3113	8	:15	25	1			
Pasture	3114	9	:15	50	5			
Pasture	3115	5	1:30	75	2			
Pasture	3116	4	1:30		2.5			
Pasture	3118	4.5	1:00	75	3			
Swago	1	6	1.5	50	3	1.13	0.325	47.29
Swago	2	5	2	10	3	1.28	0.371	42.59
Swago	3	7	1	40	4	2.6	0.749	17.81
Swago	4	7.5	1	85	5	2.75 Limit	0.821	15.1
Swago	5	5	2	10	2	2.75 Limit	0.852	14.06
Swago	6	3	1:30	50	3	2.33	0.673	21.21
Swago	7	5	2	40	3	2.75 Limit	0.911	12.27
Swago	8	0	2	0	1	2.12	0.612	24.42
Swago	9	6	2	50	3	1.23	0.356	44.03

Table A-2 cont. Phosphate data.

Swago	10	4	1:30	33	3	1.25	0.361	43.56
Swago	11	4	2	20	2	1.19	0.342	45.47
Swago	12	3	1	50	3	0.79	0.228	59.17
Swago	13	3	1.5	25	3	1.04	0.299	50.23
Swago	14	4	2	10	2	1.59	0.46	34.71

Table A-3. Charred wood identifications by sample, part 1.

Sample #	Block	Grid	Level	Red Oak ct.	Red Oak wt.	White Oak ct.	White Oak wt.	Chestnut ct.	Chestnut wt.	Oak/ Chestnut ct.	Oak/ Chestnut wt.	
25	C	13	A					1	0.03			
29	C	13	C									
31	C	13	B									
32	C	13	B					1	0.09			
33	C	13	B					2	0.07			
35	C	13	B									
53	H	2	1					3	0.02			
54	H	2	1							3	0.03	
55	F	11										
56	E	1	B									
59	C	14	3							1	0.02	
61	C	14	5									
64	B	5	6									
65	C	25	4									
67	B	5	1					1	0.03	2	0.04	
400	B	5	3	1	0	1	0.01			3	0.03	
417	B	5	8			3	0.16			3	0.05	
423	B	5	10			1	0.07	4	0.84			
424	B	5	11					1	0	5	0.12	
426	B	5	12	1	0.27	1	0.03	9	0.4	1	0.02	
430	B	5	14	2	0.22	1	0.02	6	0.31	6	0.18	
445	B	5	16							2	0.02	
452	B	5	17					2	0.06	5	0.07	
455	B	5		1	0.01					1	0.01	
458	B	5	18			1	<0.01	4	0.05	6	0.07	
459	B	5	19							7	0.02	
460	B	5	20					7	0.29	10	0.15	
462	B	5	21					4	0.09	3	0.04	
473	B	5	24							4	0.03	
477	B	22	5							6	0.04	
480	B	5	27	1	0.08					9	0.29	
482	B	5	28					2	0.03	3	0	
495	B	10	8									
500	E	1	9							3	0.03	
502	B	10	11					1	0.03			
503	B	10	12									
506	B	10	13					2	0.02	1	<0.01	
521	B	10	17					4	0.04			
523	B	10	18					2	0.09			
527	B	10	18					3	0.04			

Ash ct.	Ash wt.	Hicko-ry ct.	Hickory wt.	Elm ct.	Elm wt.	Semi-ring porous ct.	Semi-ring porous wt.	Walnut ct.	Walnut wt.	Diffuse porous ct.	Diffuse porous wt.
		1	0.01								
		2	0.03							1	0.01
										2	0.03
		1	0.04								
11	0.05					11	0.02				
								1	0.03		
		1	0.05			2	0.04				
1	0.01							2	0.04	2	0.06
										1	0
								2	0.05		
								3	0.11		
								2	0.04		
		1	0.01			2	0.05				
								2	0.01		
		3	0.06					2	0.09		
						1	0.03				
		2	0.03								
								2	0.03		
						1	0	1	0	1	0.02
										2	0.02
										2	0.01
										1	<0.01
										1	0.02
						4	0.04				
										1	TRACE

Table A-3 cont. Charred wood identifications by sample, part 1.

Sample #	Block	Grid	Level	Red Oak ct.	Red Oak wt.	White Oak ct.	White Oak wt.	Chestnut ct.	Chestnut wt.	Oak/ Chestnut ct.	Oak/ Chestnut wt.
528	B	10	19								
529	B	5	Clean-up					10	0.13	5	0.05
532	B	10	20					6	0.57		
537	B	10	21								
539	B	10	21								
540	B	10	23					2	0.08		
543	B	10	22								
545	E	1	17					3	0.06		
548	B	10	23					3	0.02	2	0.01
552	E	1	20					4	0.04		
556	B	10	8								
557	B	10	9					1	0.01		
558	B	10	10								
559	B	10	11								
560	B	10	12							1	0.01
561	B	10	13					1	0	1	0.02
563	B	10	16			1	0.01	2	0.11	10	0.09
567	E	10	20					1	0.02		

Table A-4. Charred wood identifications by sample, part 2.

Sample #	Block	Grid	Level	Beech ct.	Beech wt.	Maple ct.	Maple wt.	Cherry ct.	Cherry wt.	Birch ct.	Birch wt.	Aspen/ Cottonwood ct.
25	C	13	A									
29	C	13	C									
31	C	13	B									
32	C	13	B									
33	C	13	B									
35	C	13	B									
53	H	2	1									
54	H	2	1									
55	F	11										
56	E	1	B									
59	C	14	3									
61	C	14	5									
64	B	5	6									
65	C	25	4									
67	B	5	1			1	0.03			2	0.03	
400	B	5	3									
417	B	5	8							3	0.03	1

Ash ct.	Ash wt.	Hickory ct.	Hickory wt.	Elm ct.	Elm wt.	Semi-ring porous ct.	Semi-ring porous wt.	Walnut ct.	Walnut wt.	Diffuse porous ct.	Diffuse porous wt.
		1	1								
1	0.02					1	0.01				
										2	0.31
										3	0.01
										1	0.02
				1	0.01						
								1	<0.01	1	0.01

Aspen/ Cottonwood wt.	cf Apple ct.	cf Apple wt.	Pine ct.	Pine wt.	Softwood ct.	Softwood wt.	Grape-vine ct	Grape-vine wt.	Unidentified ct.	Unidentified wt.
									19	0.03
									4	0.02
									6	0.02
									2	0.01
									7	0.02
							2	0.04		
									15	0.15
									1	<0.01
									3	0.02
									24	0.16
									25	0.05
	1	0.02								
					1	0.02				
<0.01										

Table A-4 cont. Charred wood identifications by sample, part 2.

Sample #	Block	Grid	Level	Beech ct.	Beech wt.	Maple ct.	Maple wt.	Cherry ct.	Cherry wt.	Birch ct.	Birch wt.	Aspen/ Cottonwood ct.	
423	B	5	10										
424	B	5	11							1	0		
426	B	5	12							1	0.07		
430	B	5	14										
445	B	5	16			1	0.01						
452	B	5	17			1	0.05						
455	B	5				3	0.03			2	0.03		
458	B	5	18			2	0.01			4	0.05		
459	B	5	19			2	0.04						
460	B	5	20							1	0.01		
462	B	5	21			2	0.12			1	0.01		
473	B	5	24			1	0						
477	B	22	5										
480	B	5	27			2	0.06			1	0.01		
482	B	5	28			3	0.03			1	0.16		
495	B	10	8										
500	E	1	9										
502	B	10	11										
503	B	10	12										
506	B	10	13	1	<0.01								
521	B	10	17										
523	B	10	18			1	0.01						
527	B	10	18							2	0.04		
528	B	10	19			2	0.1						
529	B	5	Clean-up										
532	B	10	20			1	0.01						
537	B	10	21										
539	B	10	21										
540	B	10	23										
543	B	10	22										
545	E	1	17			4	0.11						
548	B	10	23			1	0.01						
552	E	1	20										
556	B	10	8										
557	B	10	9										
558	B	10	10										
559	B	10	11										
560	B	10	12			1	0.01			1	0.01		
561	B	10	13			1	0.02						
563	B	10	16			3	0.02	1	<0.01	1	0.01		
567	E	10	20			5	0.11						

	Aspen/ Cottonwood wt.	cf Apple ct.	cf Apple wt.	Pine ct.	Pine wt.	Softwood ct.	Softwood wt.	Grape-vine ct	Grape-vine wt.	Unidentified ct.	Unidentified wt.
										5	0.07
										2	0.1
		1	0.1								
										4	0.01
		1	0.1							1	0.01
						1	0.02			2	0.02
		2	0.02	2	0.02					1	0.27
				2	0.13						
		1	0							2	0.01
										1	0.02
						1	0.03				
				1	0	1	0				
										6	0.01
										5	0.01
										6	0.01
										25	0.38
						1	<0.01			6	0.06
										4	0.01
										4	0.04
				2	.O5					5	0.07
				1	0.02						
										1	0.01
				2	0.18					23	0.69
										21	0.1
										23	0.1
										4	0.12
						1	0.01			2	0.02
										2	0.01
										2	0.01
										2	0.01
										1	0
						1	0.01			1	<0.01

Appendix B: Example Forms

Fiske Center, University of Massachusetts Boston

UNIT/STRAT RECORD

Project ______________________ **Site Name** ______________________

Block ________ **Unit No.** __________ **Unit Coordinates** ______________________

Unit Size ________ **Excavator Initials** ________________ **Date(s)** ______________________

Associated strata above: ____________ **and below:** ____________

Associated features: ______________________

STRATA

Designation	Munsell Color	Soil Texture	Top depth NW	Top depth NE	Top depth SW	Top depth SE	Description (soil inclusions, cultural material, etc) Note rationale for strat designation

LEVELS

Level	Context #	# Bags	Top Depth nw	Top Depth ne	Top Depth sw	Top Depth se	Bot. Depth nw	Bot. Depth ne	Bot. Depth sw	Bot. Depth se	Flot sample	Bug Sample	Geochem sample	Cultural Material

Excavation method (circle): Trowel Shovel 1/4" screen 1/8" screen Wet screen Other __________

Add'l samples taken from each context: Note type, volume, and sample numbers

Photos: **B&W Roll/frame #(s):** **COLOR Roll/frame #(s):** **DIGITAL**

Attachments: Plan map Profile N S W E Other ______________

NOTES ON REVERSE

Figure B-1. Sample unit strata form.

Fiske Center, University of Massachusetts Boston

FEATURE RECORD

Project ______________________ Site Name ______________________

Block ________ Unit No. ____________ Strata ____________ Level ____________

Feature # ________ Feature Type ______________________ Assoc. features ____________

Size: N-S ________ E-W ______ Elevation Top: ________ Bottom: ________

Munsell color: ____________ Soil texture: ________________

Stratigraphic Relationships:

Excavator(s) initials: ________ Date(s): ____________ to ____________

LEVELS (if excavated by levels)

Level	Context #	# Bags	Top depth	Bottom depth	Sample types and numbers	Cultural Material

Excavation method (circle): Trowel Shovel 1/4" Screen 1/8" Screen Wet Screen Other ____________

Samples taken from each context:
Note type, volume, and sample numbers

Photos: B&W Roll/frame #(s): Color Roll/frame #(s): Digital

Attachments: Plan map Profile N S W E Other ________________

Complete description of feature:

Figure B-2. Sample feature form.

Inventory Catalog Form

Fiske Center for Archaeological Research

Project: ______________________________

Unit Number: ______________ Context Number: ______________

(If Applicable) Level: ______________ Lot: ______________ Feature: __________

Excavated Date: ______________ Excavator(s) Initials: __________

Samples (note sample numbers and types): ______________________________

Materials removed for conservation? ☐ yes ☐ no

Include removed/conserved materials in the counts below, and record conservation details on the back of this form.

Ceramics				
Redware	Refined Earthenware	Coarse Earthenware	Stoneware	Porcelain
Glass		**Faunal**		
Curved	Flat	Bone	Shell	Loose Teeth
Pipes		**Lithics**		
Stem	Bowl	Flakes	Slate	Other Lithics
Metals				
Nails	Ferrous Object	Ferrous Other	Non-Ferrous Object	Non-Ferrous Other
Small Finds				
Buttons	Other Adornment	Needlework/Sewing	Toys and Games	Other
Architectural			**Synthetic**	**Other (explain)**
Brick	Plaster/Mortar	Slag		
Organic				
Wood	Charcoal	Coal/Coal Ash	Leather	

Notes: (sherds >25% of a vessel, high density of one type of artifact, maker's marks, obvious dated artifacts or TPQs, important small finds, etc.)

Inventory Completed: Initials ______________ Date ______________

Date Entry Completed: Initials ______________ Date ______________

Last revised 8/20/14

Figure B-3. Sample inventory form.

SITE __________ CONTEXT __________ Unit / Feature __________ Level __________ Excavators / Date: _______________

CERAMICS **Fiske Center for Archaeological Research**

Count	Ware Coarse or Refined	Ware Type	Style / Decoration	Paint / Print & Color RW only: Int & Ext glaze	Vessel Type	Portion	Comments Motif, Date, Maker's Mark, etc.	Rec. #

GLASS

Count	Object	Portion	Color	Mfr. Method	Style & Finish write all that apply	Comments Decoration, Mfr. Date, Physical State, etc.	Rec. #

Inventory Completed: Initials _______ Date ________ Data Entry: Initials _______ Date _______

Figure B-4. Sample catalog form.

SITE __________ CONTEXT __________ Unit / Feature __________ Level __________ Excavators / Date: _______________

OTHER MATERIALS **Fiske Center for Archaeological Research**

Count	**Class**	**Subclass**	**General Material** See Codes Below *	**Object** Item, Material	**Comments** Dimensions, Decoration, Mfr. Method, Date, etc.	**Rec. #**

* *General Material Codes:* **C** = Ceramic • **G** = Glass • **L** = Lithic • **I** = Other Inorganic • **F** = Ferrous Metal • **N** = Non-Ferrous Metal • **O** = Organic • **P** = Composite

Inventory Completed: Initials ______ Date _______ Data Entry: Initials ______ Date ______

Figure B-5. Sample catalog form.

Appendix C: Sarah Burnee/Sarah Boston Field School Students

2006

Jane Chun,
Kristin Converse
Drew Bailey
Bryan Buckler
Slobodan Jokic
Nicole Levesque
Shannon Streets
Maris Patalano
Guido Pezzarossi*

2007

Joanna Curtis
Liam Lynch
Jane Pansky
Michael Slawson
Jessica Bowes
Katharine Johnson
Tess Ostrowsky
Fredrick Suthertand

2008

Mary Shia
Stephanie Bennett
Tonya Bushway-Flynn
Vicent Szeto
Jonathan Dench
Kelly Duff
Benjamin McNamee
Heather Capitanio
Trevor Johnson
Thomas Kutys

2009

Courtney Westfall
Amelie Allard
Johann Furbacher
Katie Kosack*
Martha Sulya
Michael Way

2010

Andrew Glyman
Allana Osinski
Aaron Warsaw
William Farley*
Ryan Hewey
Anne Lahey
Ciana Meyers
Jennifer Poulsen

2011

Renee Carbone
Richard Densmore
Eric Fahey
Mary Saliba
Maegan Aja
Joseph Bagley
Katelyn Coughlan*
Kyle Edwards

2012

Yasmeen Abdallah
Melissa Constanti
Paul Gliniewicz
Moira Magni
Scott McGaughey
Lauren Roach
Jeffery Burnett
Jonathan Green
Britini Hagopian
Jess Hughston
Teddy Maghrak
Kalia Herring
Martin Schmidheiny
Miles Shugar*
Joshua Stewart

2013

Vincent Barros
Yvonne Bley
Kelly Rogers
James Carter
Katharine Evans
Eric Fahey
Alex Flick
Casey Layne

*Also served as project Teaching Assistants