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ORIGINAL ARTICLE

Hybrid Methods for Locating and Excavating Early Historical Conflict-Related Domestic Sites

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Abstract Since 2012, the Mashantucket Pequot Museum and Research Center in Mashantucket, Connecticut, in collaboration with the University of Connecticut, has carried out a research program to survey and document the battlefields of the Pequot War (1636–1637). The unique nature of the project has required the refinement of the long-standing field methods of battlefield archaeology. In this article, we argue that these techniques, while originally developed to explore sites of conflict, can be operationalized to locate 17th-century indigenous domestic sites. We describe this modified method and provide a site-specific case study to present its efficacy.

Resumen Desde 2012, el Museo y Centro de Investigación Mashantucket Pequot en Mashantucket, Connecticut, en colaboración con la Universidad de Connecticut, ha llevado a cabo un programa de investigación para estudiar y documentar los campos de batalla de la Guerra Pequot (1636–1637). La naturaleza única del proyecto ha requerido el refinamiento de los métodos de campo de larga data de la arqueología de los campos de batalla. En este artículo, argumentamos que estas técnicas, aunque originalmente se desarrollaron para explorar sitios de conflicto, pueden adaptarse para localizar sitios domésticos indígenas del siglo XVII. Describimos este método modificado y proporcionamos un estudio de caso específico del sitio para mostrar su eficacia.

Résumé Depuis 2012, le Musée et Centre de recherche Mashantucket Pequot à Mashantucket dans le Connecticut, en collaboration avec l'Université du Connecticut, a mené un programme de recherche pour étudier et documenter les champs de bataille de la guerre de Pequot (1636–1637). La nature unique du projet a imposé le perfectionnement des méthodes de terrain établies de longue date en matière d'archéologie du champ de bataille. Nous postulons dans cet article que ces techniques, si elles ont été développées à l'origine pour explorer les sites de conflit, peuvent être rendues opérationnelles pour localiser les sites domestiques indigènes du 17ème siècle. Nous décrivons cette méthode modifiée et proposons une étude de cas d'un site spécifique pour illustrer son efficacité.

Keywords battlefield · conflict · method · contact · colonial

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Introduction

Since 2012, the Mashantucket Pequot Museum and Research Center (MPMRC), with the aid of multiple grants awarded by the National Park Service American Battlefield Protection Program, has undertaken a long-

term project to achieve a better understanding of the Pequot War (1636–1637) (McBride and Naumec 2009; McBride, Naumec, Bissonnette, Fellman et al. 2012; McBride, Naumec, Bissonnette, Currie et al. 2014; McBride, Naumec, Bissonnette, and Fellman 2016, 2017). To date, the sites of four battles have been documented through historical research and battlefield-archaeology surveys: the Siege of Saybrook Fort (September 1636–March 1637), the Massacre at Mistick Fort (26 May 1637), the Battle of the English Withdrawal (26 May 1637), and the Battle of Munnacommock Swamp (13–14 July 1637).

After more than 370 years, the Pequot War (1636–1638) remains one of the most controversial and significant events in the colonial and native history of North America. The war has been debated, discussed, and analyzed for centuries in hundreds of articles, books, narratives, and films. The most significant event in the war was the surprise attack on the Pequot fortified village at Mystic on the morning of 26 May 1637. By the end of the 2 hr. battle, over 400 Pequot men, women, and children were dead, half of them burned to death. Past research on the Pequot War has included thorough historical analyses (Shepard 1913; Cave 1996; Perrotta and Clemmons 2005; McBride and Bissonnette 2016), ethical debates about whether the war included aspects of genocide (M. Freeman 1995; Katz 1995), and discussions of the primary causes of the war and its legacy (Vaughan 1964; Hauptman 1990; McBride 1990, 1994, 2013; Starna 1990; Grandjean 2011).

Few studies have relied primarily on archaeological data, however, owing mostly to a paucity of known sites. Archaeological studies of this period have enormous potential to add to the understanding of the Pequot War as a conflict, as well as the lived experience of those who were affected by it. With funding from the National Park Service Battlefield Protection Program, the MPMRC and University of Connecticut initiated a long-term project to document the battlefields of this conflict using archaeology surveys and historical research, with the goal of better understanding the broader cultural and historical implications of the war and its significance to descendant communities of English and native people in the region.

In this article, we seek to accomplish two goals. First, we will detail the methodologies of the Battlefields of the Pequot War Project, including an approach combining metal-detecting surveys with traditional archaeological techniques that has proven useful in locating 17th-century indigenous domestic sites. Second, we will describe the site of Calluna Hill (CT 59-73) in Mystic, Connecticut, a 1637 Pequot domestic site burned by the English during their retreat following the Battle of Mystic Fort. As both a site destroyed during the battle and a place where Pequots lived during the conflict, Calluna Hill offers a rare opportunity to explore multiple facets of the Pequot War in a single location (Fig. 1).

Historical Context: The Pequot War

To understand the site of Calluna Hill and the methods used to find it, it is important to contextually frame the Pequot War. The arrival of Dutch and English explorers to southern New England in the first quarter of the 17th century was an extraordinarily damaging process for most of the region's indigenous inhabitants due to the destabilization of long-standing political relationships and rampant disease and displacement. Upon establishing trade relationships with the Dutch in 1611 or 1612, the Pequot experienced an initial gain in influence. This was achieved by a combination of political ingenuity, diplomacy, coercion, and warfare by which the Pequot leadership gained control of desirable resources and dominated smaller tribal polities (McBride [2021]).

By the mid-1620s the Pequots controlled a complex sociopolitical network of tributary tribes throughout southern New England that paid the Pequot tribute for their support and protection. The Pequot further influenced these groups by dictating their trade practices with each other and Europeans. In his account of the Pequot War, John Mason, the English captain who led the attack on the Mystic Fort, illustrated the nature of these tributary relationships when he described the native people he believed responsible for the murder of Captain John Stone and his eight crewmembers. Stone was an English trader whose death initiated a series of events that led to the Pequot War. Mason wrote that

> these Indians were not Pequots [Western Niantics], but had frequent recourse unto them, to whom they tendered some of those Goods, which were accepted by the Chief Sachem of the Pequots: Other of the said Goods were tendered to Nynigrett Sachem of [Eastern Niantics], who also received them. (Orr 1897:17)

Intertribal violence certainly predated the arrival of Europeans to New England, although in the early 17th

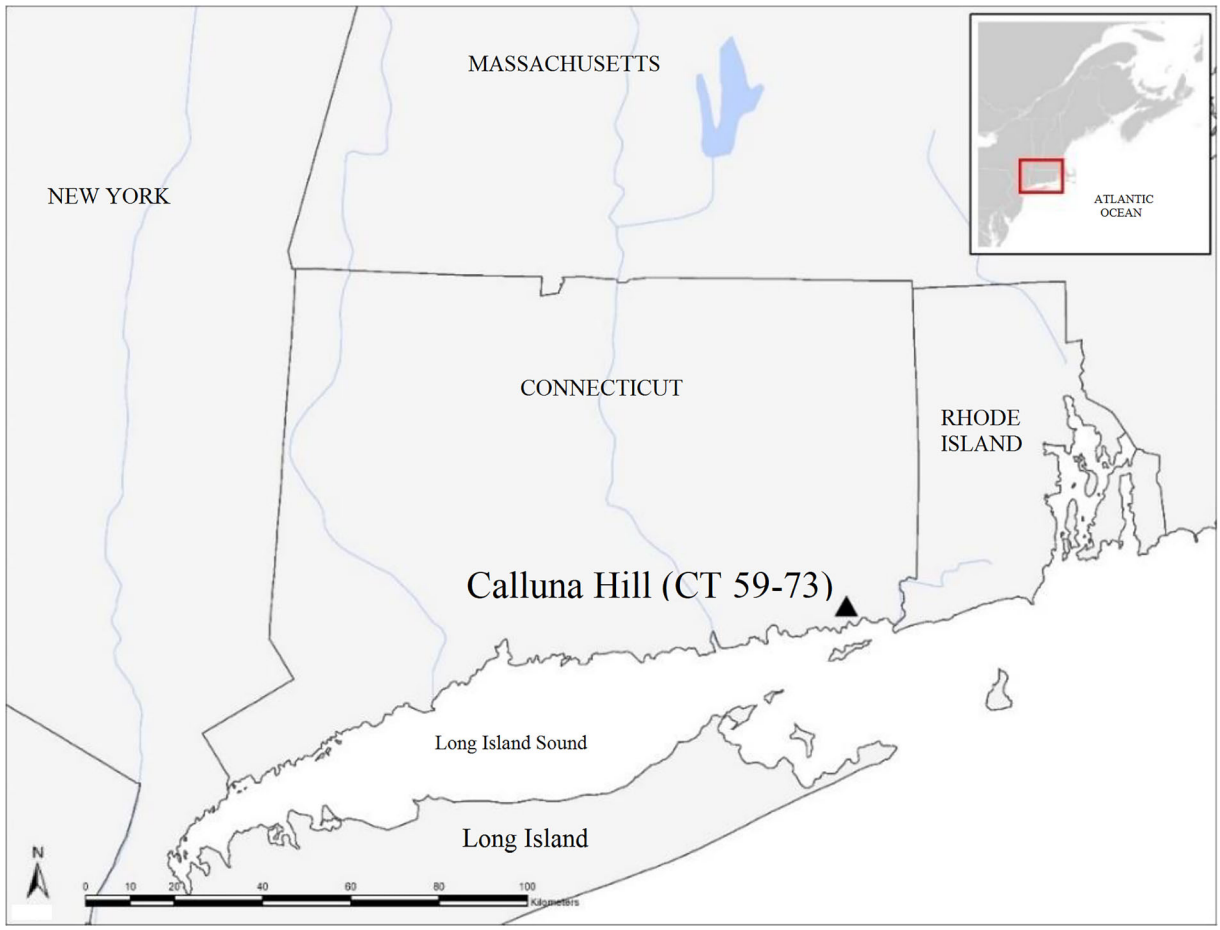

Fig. 1 Map of Connecticut (present-day political boundaries) with the site of Calluna Hill (CT 59-73) denoted. (Map by William A. Farley and Noah Fellman, Mashantucket Pequot Museum and Research Center [MPMRC], 2017.)

century the Pequots increased the level of regional conflict in an effort to control as much of the fur and wampum trade as possible (McBride and Bissonnette 2016).

By that time, Dutch traders had discovered the economic and social significance of wampum, a marine-shell bead made from quahog and whelk. Wampum was highly valued by fur-rich Iroquois and Algonquian tribes from more northern and interior areas. The demand for the beads was bolstered by its function as a medium for many social and political exchanges among native people (Cave 1996:53). Wampum was also an insignia of status, and the attainment of wampum and its subsequent use as personal adornment represented individual social mobility (Cave 1996:53). Due to its high desirability among these groups and its significant socially determined value, wampum played a role in nearly every 17th-century interaction between and within native groups. Pequots controlled the shorelines and waters of eastern Long Island Sound, which are ecological zones rich in wampum's raw material. Pequot power grew correspondingly, as they subjugated smaller bands and tribes who would, in exchange for protection, pay annual tributes in wampum. By the early 1630s, the Pequot had control over much of the Connecticut River valley as well as 2,500 sq. mi. along Long Island Sound (McBride [2021]).

By the late 1620s, Dutch traders and their investors earned large profits related to their burgeoning participation in the wampum trade. By 1630, the United Provinces imported 10,000 beaver pelts a year from New Amsterdam (Cave 1996:50). One estimate put the annual worth of furs obtained from inland native groups in 1633 at £20,000, or, in Dutch guilders, roughly *ƒ*200,000. That same year, Dutch settlers exchanged rough fabrics called "duffel," metal implements, and

other items worth ƒ31,000 for ƒ143,125 worth of beaver pelts (Ceci 1990:58–59). In 1626, Isaac de Rasieres, secretary of New Netherland, estimated that approximately 350,000 wampum beads would "be necessary for Dutch traders to have any success in acquiring furs from their northern trading partners" (McBride [2021]).

English Puritans from the Massachusetts Bay Colony began to colonize Connecticut in the early 1630s. The fur trade was vitally important to the economic survival of the English colonies, but without access to wampum the Puritan English had had little success in sustaining trade partnerships with inland groups. In 1627 the English joined the wampum economy by buying 50 fathoms of wampum from De Rasieres. Within a few years, wampum would become the Puritans' primary trade commodity in their New England colonies. The durable and easy-to-transport wampum beads were quickly adopted as a replacement for scarce coinage among the Dutch and English. This use, in turn, made the English increasingly reliant upon wampum and linked the English with the Pequots as partners in a rapidly expanding Atlantic fur trade (Ceci 1990:58–61; Cave 1996:50–54).

Dutch trading outposts, like the "House of Hope" (present-day Hartford, Connecticut), were "an effective means to facilitate the collection of furs from trading partners in interior areas" (McBride 2013:6), but were never as well supplied or designed for permanency as were their English counterparts. As such, they were slowly forced out of the southern Connecticut wampum trade by the 1640s. Pequot power also showed signs of faltering. A series of events occurring in 1634 helped incite the Pequot War. These included the capture and murder by the Dutch of the Pequot grand sachem, Tatobam, which outraged the Pequots and led to a brief war with the Dutch (McBride 2013). Not long after Tatobam's death, English trader John Stone and eight of his crew were killed by native people of disputed association (Hauptman 1990; Starna 1990; Cave 1996; Grandjean 2011). The war began when the English started raiding Pequot territories in August of 1636, with both sides winning military victories over the course of the following months.

The pivotal day of the war was 26 May 1637. A seasoned and well-equipped force of 77 English soldiers, assisted by over 200 Narragansett, Mohegan, and Wangunk warriors, attacked the Pequot fortified village in present-day Mystic, Connecticut. The English surrounded Mystic Fort in the early morning, planning to "destroy them by the sword and save the plunder" (Mason 1736:8). Following an initial volley through the palisade, the English entered the fort by forcing their way through its narrow and heavily guarded entrances and engaged the Pequot in hand-to-hand combat. Mason, realizing that the English were taking heavy casualties and losing the battle, ordered the fort to be burned. At least 200 Pequot died during the burning of the fort. After the battle, the English retreated 6.5 mi. to their ships waiting on the Thames River, fighting off furious counterattacks from the Pequot along 4.5 mi. of the route of retreat. By the end of the day the Pequot had lost approximately 500 fighting men, which represented around half of their total fighting force (McBride and Bissonnette 2016).

Unable to continue to fight against the English and their native allies, the Pequot decided to leave the region to seek refuge and assistance with other tribes. For the next three months remnant bands of Pequot were systematically pursued by the English, who killed Pequot men and sachems, and enslaved women and children. Women and children of high social standing were sold into slavery in the Caribbean, while the rest were enslaved in the colonies or given to the Mohegan and Narragansett as tribute for their wartime alliance (Cremer 2008). The Treaty of Hartford, signed by the Connecticut Colony, the Mohegan, and Narragansett in September of 1638, stipulated that

> the Peaquots shall be divided [between the Mohegan and Narragansett] as beforesaid, shall no more be called Peaquots but Narragansetts and Mohegans ... and shall not suffer them for to live in their country that was formerly theirs but is now the Englishes by right of conquest. (Vaughan 1975:341)

The surviving Pequot were also to pay an annual tribute in wampum, and former tributaries of the Pequot now paid their wampum tributes directly to the English.

The events of 26 May 1637 have been explored through the "Battle of Mistick Fort Documentation Plan" and the "Battle of Mistick Fort: English Withdrawal and Pequot Counterattacks" battlefield-survey projects, funded by a series of National Park Service American Battlefield Protection grants (GA-2255-09-017, GA-2255-11-011, and GA-2287-13-014) and by an ongoing collaboration among the MPMRC, the University of Connecticut, the Mashantucket Pequot Tribal

Nation, and a variety of nonnative stakeholders in the Mystic, Connecticut, region. In this article we focus on the 2.5 mi., 34.2 ha (84.6 ac.) portion of the 4.5 mi. running battle in Connecticut that has been surveyed and that extends from Pequot Hill in Mystic to Poquonnock in Groton (McBride, Naumec, Bissonnette, Currie et al. 2014:6–7). The battlefield-archaeology surveys of this engagement have produced hundreds of battle-related objects along the withdrawal route.

In Captain John Mason's account of the withdrawal he mentioned: "There was at the Foot of the Hill [Pequot Hill where Mistick Fort was located] a small Brook, where we rested and refreshed our selves. ... We then Marched on towards Pequot Harbour; and falling upon several Wigwams, burnt them" (Mason 1736:11). In 2013, archaeologists and volunteer avocational metal detectorists located a site containing two distinct domestic middens in context with a number of battlefield objects. Between 2013 and 2018, archaeologists working for the MPMRC and the University of Connecticut returned to this site with the intention of delineating any domestic features associated with the middens. Architectural features interpreted to be a native wigwam, indigenous-made ceramics typical of the early 17th century, English-made pipes, faunal and floral remains, and reprocessed brass and iron objects and scrap were found. Along with the domestic artifacts, the wigwam feature was delineated by burnt post molds, suggesting the house had been burned, as described in Mason's narrative. These artifactual indicators, along with the site's locational congruence with Mason's narrative, indicated that this site was likely the small Pequot village burned during the Battle of the English Withdrawal.

Methods: The Withdrawal

When conducting battlefield surveys associated with the Battle of Mistick Fort: English Withdrawal and Pequot Counterattacks Project, archaeologists from the University of Connecticut and the MPMRC relied on the methods and techniques developed by previous conflict archaeologists surveying 18th- and 19th-century battlefields; see, e.g., Cimprich and Mainfort (1989), Fox and Scott (1991), Connor and Scott (1998), Scott (2003), and Scott and McFeaters (2011). As discussed by Scott and McFeaters (2011), conflict archaeology is a rapidly developing subfield of archaeology dedicated to studying both battlefield and non-battlefield sites associated with conflicts. Conflict studies first emerged from within the discipline of historical archaeology, likely owing to the long-standing interest of historians and anthropologists in the historical and cultural effects of conflict. The best-known examples of published battlefield and conflict-archaeology studies have focused on sites from the last two centuries. These include studies of the Battle of Little Bighorn, battles from the American Civil War (Cimprich and Mainfort 1989; Fox and Scott 1991; Fox 1997), and Revolutionary War fortifications (Hanson and Hsu 1975; P. Freeman 2001). More recently, archaeologists have studied conflict in the prehistoric era (Rice and LeBlanc 2001; Allen and Arkush 2008). The Pequot War Battlefield Project presents new challenges because the conflict occurred during the transition between these two periods, necessitating methodological and theoretical considerations from both prehistoric and historical conflict archaeology.

The Pequot War Battlefield Project has thus required the development of specific methodological practices to achieve its research goals. The Mashantucket Pequot Tribal Nation (MPTN) has employed an active archaeological research team since the 1980s. Since then, archaeologists and historians from the MPMRC have developed a useful protocol for the excavation of a variety of traditional archaeological contexts. Battlefield archaeology is unique and requires different goals and correspondingly distinct methodological approaches to achieve those goals (Scott and McFeaters 2011). Identifying and delineating battlefield sites is extremely difficult using traditional archaeological techniques, such as shovel test pits or block excavations. Instead, battlefield archaeologists rely heavily on metal-detector surveys. The archaeological exploration of battlefield sites is generally aimed toward discerning human activity across large areas. Further, the target components of battlefield sites have a restricted range of material culture and were often only active for relatively short periods of time. In the case of the Battle of the English Withdrawal, that timeframe was roughly 10 hr. (McBride, Naumec, Bissonnette, Currie et al. 2014:7).

In order to situate and locate the English route of withdrawal and the dimensions of the battle that took place within such a short timeframe, researchers first assessed the historical accounts documenting the event. There exist several written records of the war. Military historians and battlefield archaeologists have analyzed these and other documents to discern locations of

Pequot War battles and the tactics employed by both the English and native combatants. These documents also include information about weaponry, armor, and the material goods carried and used by the combatants, which, in turn, informed the field team's metal-detector surveys. This information helped in the construction of a battlefield timeline with anticipated archaeological signatures (McBride, Naumec, Bissonnette, and Fellman 2017).

The combination of historical resources and battlefield objects recovered by archaeological metal-detector surveys allowed researchers from the MPMRC and the University of Connecticut to adapt Fox and Scott's (1991) method of "dynamic pattern analysis," which "seeks to identify and isolate discrete battle 'events' associated with aggregates of individuals based on their archaeological signatures and integrate them into a spatial and temporal framework to identify movement across the battlefield" (McBride, Naumec, Bissonnette, Currie et al. 2014:71). Fox and Scott 1991:94) analyzed recovered pieces of firearms and projectiles at the Battle of the Little Bighorn in order to allow "resolution of individual positions and movements, or trajectories, across a battlefield. Individual patterns are integrated to form unit patterns; together these patterns develop the flow or progress of a battle." We used a similar technique, based on firearm parts, armor pieces, indigenous-made armaments and personal adornment, and musket balls, to recreate the temporal and spatial pattern of the retreat and to identify discrete battlefield events. Prior to Fox and Scott's groundbreaking study of the Battle of the Little Bighorn, battlefields were interpreted as single, static events bounded by the extent of artifact finds. While useful in determining the location and extent of a battle, these approaches provided no temporal dimension and little nuance of battle actions or unit behaviors. By using Fox and Scott's method, MPMRC archaeologists identified group actions across the miles-long route of withdrawal, revealing and mapping specific engagements and events along the way.

Methods: The Village

Locating the burned village mentioned by Mason's account was one of the major goals of the project. Historical research and dynamic-pattern analysis suggested the site was most likely to be within a short distance of a particular stream (Eccelston Brook) at the bottom of Pequot Hill. In 2013, archaeologists located two metal-laden domestic shell middens (designated Site 59-73) along the route of the English Withdrawal Battlefield, approximately 400 m from the brook. The initial metal-detector surveys identified high densities of what appeared to be scrap iron and brass within and adjacent to the two discrete midden features. The holes dug by metal detectorists at the location of a "hit," generally measuring less than 20 cm^2, were used to extract the metallic objects. They also revealed relatively high densities of shell and bone, interpreted as discrete domestic-refuse areas. The features were noted, mapped, and left for later exploration.

After the 2013 field season was completed, we began analyzing the nature and distribution of objects recovered from Site 59-73 (what would later be called "Calluna Hill") to see whether any other domestic sites could be detected along the route of withdrawal. By using a Web-based geographic information system (GIS), breaking down metal-detector finds by type, and eliminating obvious battle-related artifact classes (i.e., musket balls, English weapons and armor, brass arrow points), we created a list of artifacts we believed represented a "domestic signature" (Vandkilde 2015) (Table 1). A complete absence of battlefield objects was not necessary to denote a domestic site, as we believe the Pequot settlements were directly intersected by combatants, thus creating a complex palimpsest of domestic and conflict-related objects. Rather, we looked for areas with significantly higher levels of domestic-signature artifacts that were evident over the background "noise" of battlefield objects. When analyzing the entire withdrawal route using this signature, spatially discrete patterns emerged in several locations. The artifact classes included in that signature are described in Table 1. Note that not all of these artifacts would be

Table 1 "Domestic signature" artifact classes

Ceramic smoking pipe	Metal rod
Escutcheon	Metal scrap
European-made ceramic	Metal sheet
Folding knife	Metal smoking pipe
Glass bead	Metal spoon
Hinge	Metal strap
Indigenous-made ceramic	Nail
Kettle fragment	Pin
Metal bead	Scissors
Metal ring	Slag

interpreted as "domestic" in a typical archaeological sense. However, this list was developed by ground truthing suspected domestic sites through excavation. The most important goal was not necessarily to find domestic artifacts with metal detecting, but to find the artifacts that appear frequently in domestic settings along the retreat route. Thus, our technique was honed by repeatedly mapping metal-detector finds and testing those finds with targeted excavations. It is the authors' belief that those hoping to use this technique would need to develop a unique "domestic signature" for their particular historical and domestic context.

In total, an additional five possible domestic sites were identified along the route. We believe the high degree of congruence between the battlefield and domestic sites is because the English and their native allies were following an existing Pequot path or trail. From an English perspective, the trail offered the path of least resistance by avoiding wetlands, rough terrain and high ground, and places of potential ambush, such as wetlands. In addition to being the path of least resistance, for Pequots the trail connected fortified places, seasonal camps, and special-purpose sites. Work on several of these sites is ongoing, but testing and excavation has yielded a range of non-metallic domestic objects and features, such as Pequot-made ceramics and stone and ceramic pipes, and features, such as hearths, refuse areas, and post molds (Willison 2016; McBride, Naumec, Bissonnette, and Fellman 2017) (Figs. 1, 2, 3).

In 2014, the University of Connecticut field school returned to the site of Calluna Hill, working under the hypothesis that there would be native domestic structures associated with the middens. Mason's brief description, along with prior studies, helped researchers theorize about the likely dimensions and archaeological signature of 17th-century indigenous domestic architecture (Sturtevant 1975; McBride 1993, 1994, 2007, 2008; Leveillee et al. 2006; Jordan 2008; Hrynick et al. 2012; Hrynick and Betts 2014; Farley et al. 2019).

The first field season at Calluna Hill demonstrated that delineating a short-term contact-period domestic occupation is far more difficult than anticipated, even when the location of the site is known. We approached the site with a traditional archaeological survey method and dug 58 shovel test pits at 5 m intervals. Despite some of these pits falling within a few meters of the known midden locations, this survey was inconclusive, and no period artifacts were recovered. In hindsight, we realized that lithics, usually the most ubiquitous and visible indicator of native occupations, were absent from this site. Because of this, we employed a more appropriate method based on systematic surveys using different types of metal detectors.

The metal-detector survey was conducted within 1 m wide transects oriented in different directions and using different types of metal detectors. As was later determined, certain types of detectors failed to identify any metallic objects due to the high mineral content of the soils; for more information on metal-detector physics and the value of integrating different types, see Connor and Scott (1998).

We combined the information obtained from the metal-detector survey with a chemical phosphate analysis to identify possible domestic structures or refuse areas. Areas that measure relatively high in phosphate indicate possible human activity, such as garbage disposal or living floors (Cook and Heizer 1965; Provan 1971; Shackley 1975:68; Sjöberg 1976; Eidt 1977; Craddock et al. 1985; Cavanagh et al. 1988; Bethell and Máté 1989; Terry et al. 2000:152; Holliday and Gartner 2007; Rypkema et al. 2007). At Calluna Hill, our phosphate-analysis method consisted of excavating half-liter soil samples at 5 m intervals across the site area from 5 and 10 cm levels below the surface using standard protocols to avoid cross contamination of samples. The analysis revealed areas of relatively high phosphate concentrations that matched our expectations of several burned native domestic structures extant at the time of the battle. Two of the burned areas were immediately adjacent to the two middens (Fig. 4). Integrating the phosphate maps and the data from metal detecting, we targeted two areas for exploration through block excavations.

Based on the results of the phosphate analysis, 1 m wide trenches radiating west and east from the center of the larger midden area were excavated (Feature 1). The trench technique was successful and identified a concentration of contact-period indigenous-made ceramics approximately 3 m west of the midden (Figs. 5, 6).

In 2015 and 2016, archaeologists returned to Calluna Hill in order to expand excavations in an effort to better delineate the concentration and extent of domestic objects. The indigenous-made ceramics were identified as the Hackney Pond variety, which are associated with final Woodland and early 17th-century sites (ca. 1450–1650) (McBride 1984; Lavin 1987). The trench was expanded into a block excavation radiating from the ceramic concentration. Excavating at 5 cm arbitrary levels and using 1/8 in. screens, we discerned several

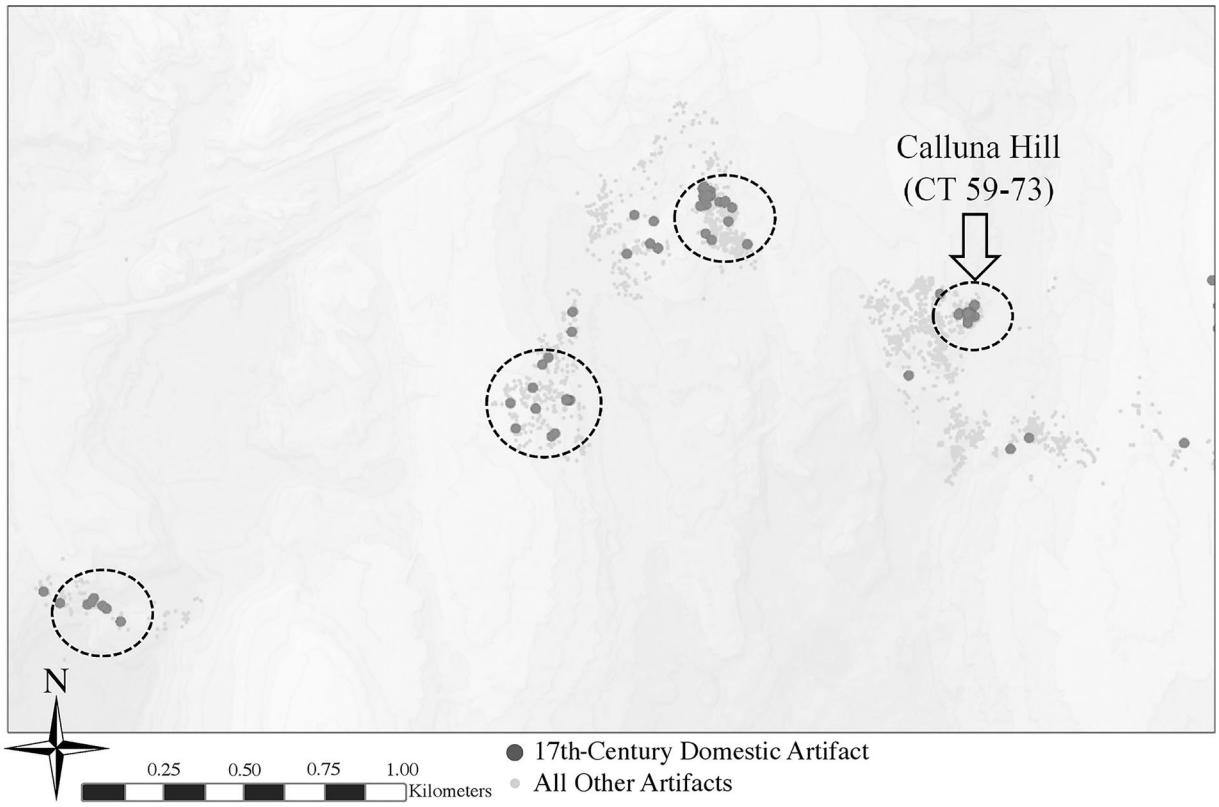

Fig. 2 Map of the English retreat route with 17th-century domestic artifacts highlighted. Areas of interest are circled and were used as candidates for ground truthing. Calluna Hill (CT 59-73) is noted. (Map by William A. Farley and Noah Fellman, MPMRC, 2017.)

subtle post-mold features. The orientation of the post molds, along with the associated artifacts, was strongly suggestive of indigenous domestic architecture (Fig. 7). This excavation yielded 256 sherds of indigenous-made ceramics and 10 fragments of 17th-century English-made smoking pipes (Fig. 8).

The discovery of Calluna Hill was an educational experience. We hoped to find domestic sites based on Mason's account of the English withdrawal from Mystic Fort, but did not have a surefire method for doing so. The description of how Calluna Hill was initially detected and eventually delineated became a guide that we used to identify a number of other 17th-century domestic sites associated with the earliest years of European colonial contact (ca. 1611–1637) (McBride [2021]).

Continuing Application of the Method

Since applying this formula, we have successfully located five other early contact, indigenous domestic sites along the route of the withdrawal. These sites represent the "largest assemblage of early 17th-century Indigenous sites associated with a single Native group ever identified in southern New England" (McBride, Naumec, Bissonnette, and Fellman 2016:20) and are dated to between approximately 1611, due to the presence of European-made trade goods at all the sites,[1] and 1637, the conclusion of the Pequot War (McBride, Naumec, Bissonnette, and Fellman 2016). The Pequot began to trade with the English around 1633, so later occupations could contain a mix of Dutch and English trade goods. We believe that none of the domestic sites was occupied after 1637 because both historical records and three decades of archaeological work strongly suggest that the postwar Pequots would have been unlikely to live on sites in these locations. The restrictions outlined in the 1638 Treaty of Hartford would have, in fact, outlawed it. Additionally, the Hackney Pond indigenous-made ceramics found at several of the sites, including

[1] The year 1611 is the first known instance of trading activity between the Pequot nation and the Dutch.

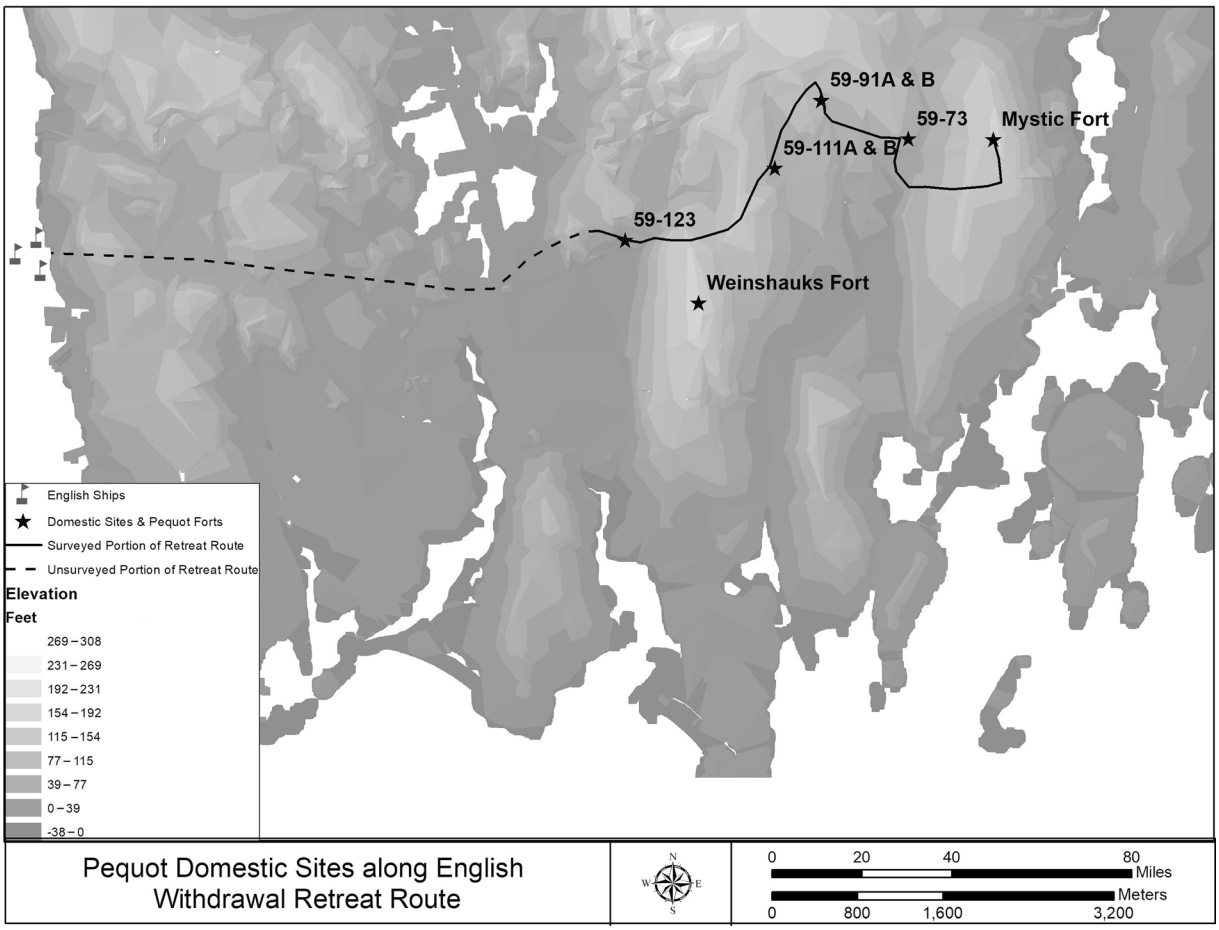

Fig. 3 Map of Pequot domestic sites along the English withdrawal route. Depicted are the fortified villages of Weinshauks and Mystic Fort, the known retreat route, and the location of the English ships on the day of the battle. (Map by Megan Willison, 2020.)

Calluna Hill, have only been recovered from pre-1637 sites. After the Pequot War, indigenous sites in Connecticut are usually associated with the collared and castellated Shantok style of indigenous-made ceramics (Lavin et al. 1993; Lavin 2013).

Excavations have been conducted at three of the five additional sites and have yielded numerous post-mold features, hearths, and sherds of indigenous-made pottery; faunal, lithic, botanical, glass, and metallic remains; and indigenous-made ceramic and steatite pipe fragments. No entire domestic structure has yet been positively identified, but excavations have yielded an abundant and diverse array "of English and Dutch trade items ... unprecedented in the archaeology of non-burial Contact Period sites" (McBride [2021]). General site locations, as determined from the metal-detecting surveys, are shown in Figure 2. Domestic sites found using this method and their relationship to the Battle of the English Withdrawal route are shown in Figure 3.

Although excavations and analyses are still ongoing, initial testing suggests that all five additional sites were seasonally occupied, unfortified villages containing wigwam structures. The sites do show significant diversity in size, likely season of occupation, and the number of possible domestic structures. With two exceptions, we do not believe that these sites were directly involved in the Battle of the English Withdrawal or extant at the time of the Pequot War. Unlike Calluna Hill, most are not mentioned in any historical narrative and do not show signs of burning or destruction. The artifacts found at these sites place them within the tight timeframe of 1611–1637, but without a direct historical reference or some other absolute-dating technique we cannot reliably date them any more precisely.

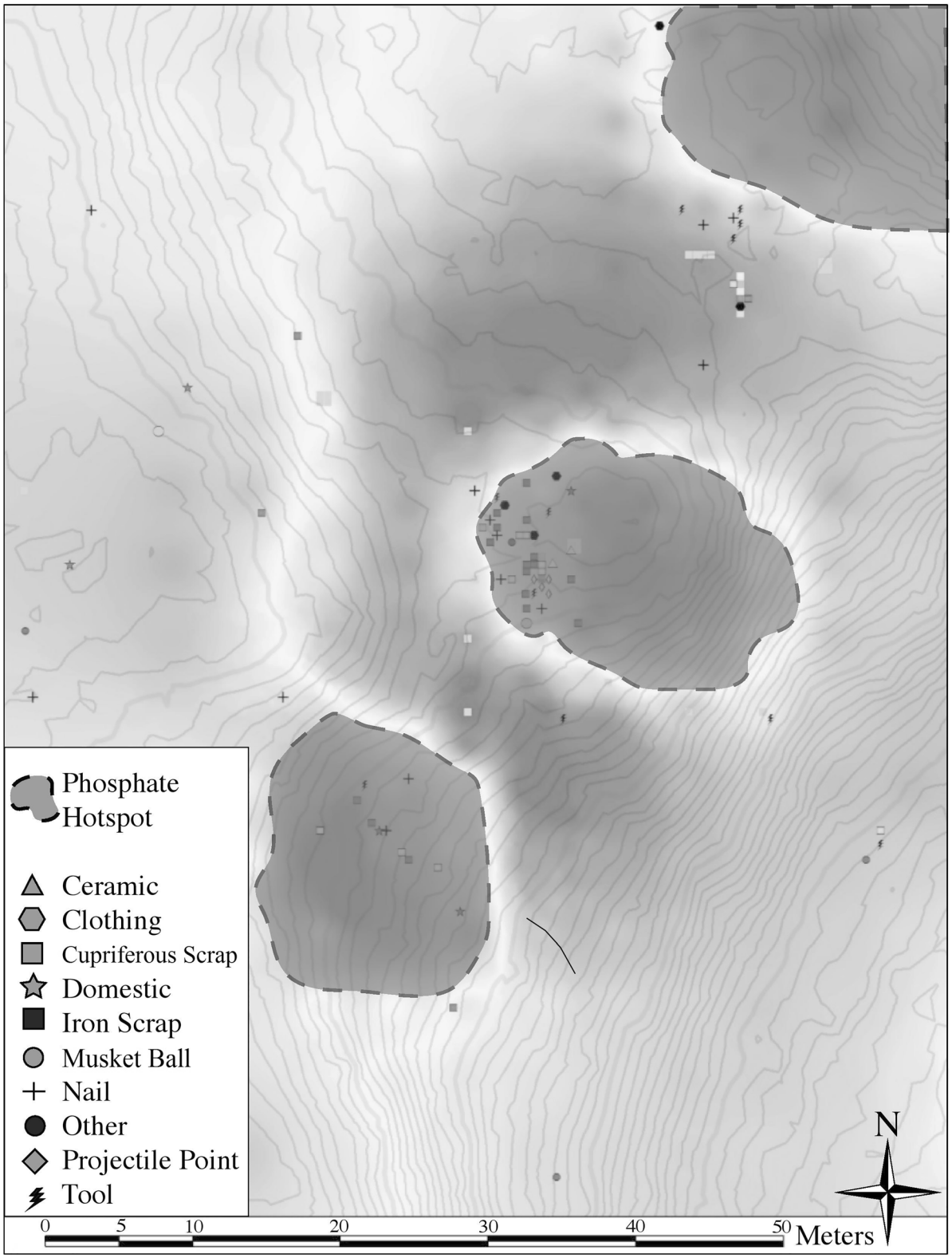

Fig. 4 Map revealing high areas of phosphate density at Calluna Hill (CT 59-73). Areas with high phosphate concentrations ("Phosphate Hotspot") were interpreted to be likely locations of native domestic architecture. (Map courtesy of the MPMRC, 2013.)

Fig. 5 Sample of altered metal objects recovered from Calluna Hill (CT 59-73). The central midden (Feature 1) included mostly brass objects (*left*). The northern midden (Feature 2) included mostly iron objects (*right*). (Photos courtesy of the MPMRC, 2012–2014.)

These sites would not have been found without the combined use of metal-detector surveys and traditional archaeological techniques. We also believe that this methodology can be employed in other temporal and global contexts wherein two cultural groups are exchanging metallic objects and distinctive signatures can be discovered through the integrative use of metal detecting, GIS, and archaeological survey.

To summarize, the methodology we propose for isolating early contact, indigenous domestic sites is as follows:

(1) Conduct broad, but systematic, metal-detecting surveys;
(2) map the finds of the surveys in step 1 using an interactive GIS interface;

Fig. 6 Hackney Pond ceramics recovered from Locus 1 at Calluna Hill. (Photos courtesy of the MPMRC, 2012–2013.)

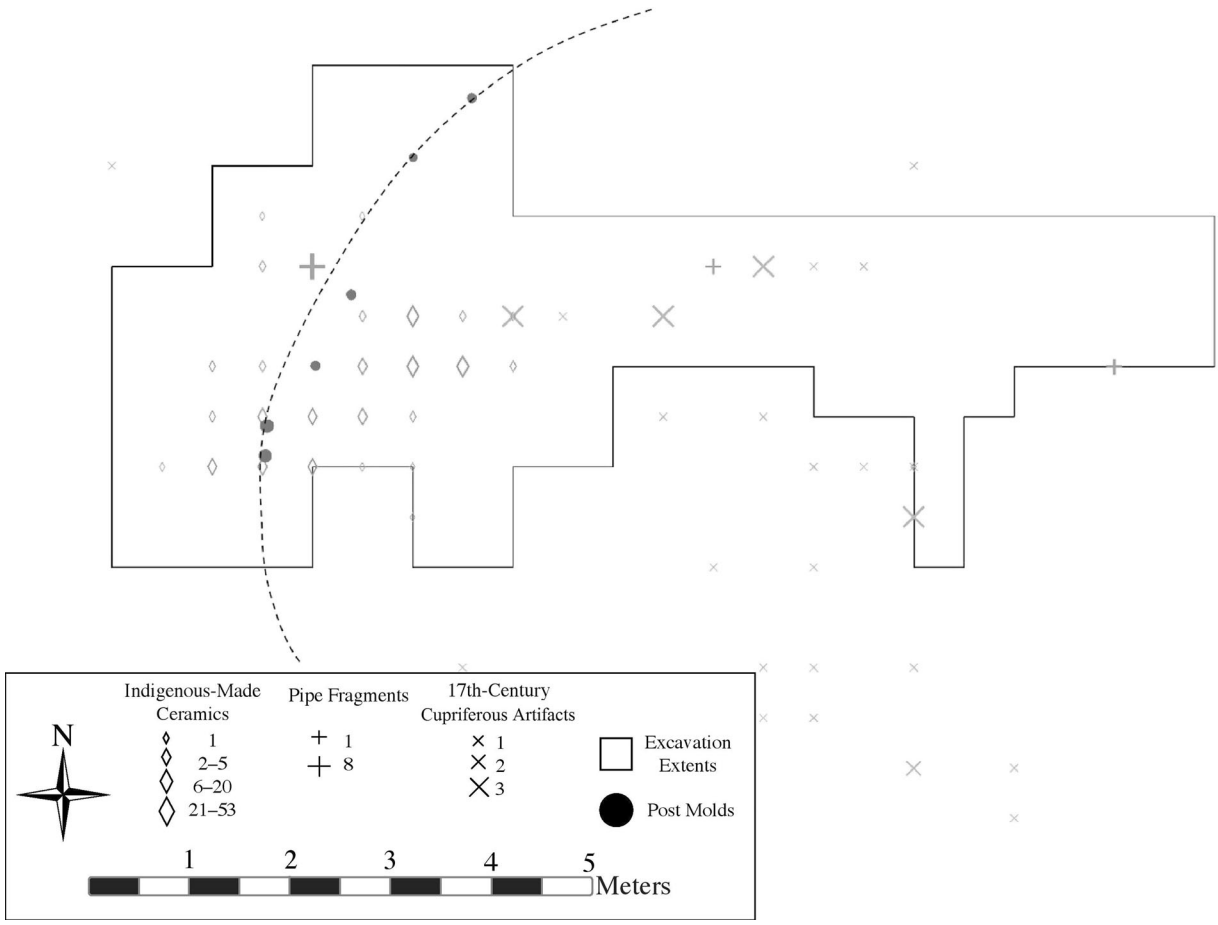

Fig. 7 Map of the Feature 1 wigwam at Calluna Hill (CT 59-73). The dashed line represents the authors' interpretation of the western wall of the wigwam based on post-mold locations. (Map by William A. Farley and Noah Fellman, 2014.)

(3) isolate metallic domestic artifacts within your GIS;
(4) return to those locations and conduct tighter metal-detecting surveys;
(5) if possible, conduct other noninvasive techniques guided by the metal detecting (i.e., GPR, magnetometry, phosphate analysis) (Silliman et al. 2000; Kvamme 2003; Kvamme et al. 2006);
(6) conduct slow, fine-grained trench excavations across areas of interest; and
(7) expand block excavations at the same level of fine-grained analysis where artifact densities or features are found.

Collaborations

The success of the Pequot War Battlefield Project was based on a number of important collaborations. The first and foremost of these relationships is the one between archaeologists and local descendant native communities, including the Pequot, Narragansett, and Mohegan. Archaeologists have worked collaboratively with tribal members from the MPTN for more than a quarter century. The tribe's museum, the base of operations for all the archaeological and historical research done on the battlefield and dozens of other projects, was funded and built by the tribe for the purposes of creating an indigenous-focused research and education center. We continue to work toward this ultimate goal: the

Fig. 8 Early to mid-17th-century English-made smoking-pipe fragments recovered from Locus 1 at Calluna Hill. (Photos courtesy of the MPMRC, 2012–2013.)

creation of a native-centric research program that informs both tribal members and members of the nonnative public about the region's indigenous history (Silliman 2008; Angelbeck and Grier 2014; Gould et al. 2020).

The museum and tribe have also developed a long-standing relationship with the University of Connecticut Department of Anthropology. This type of collaboration is more typical, with similar programs found in universities around the country. The tribe supports research at and around the reservation both financially and logistically, and the university supports the tribe by providing the labor and technical expertise to carry out that research. The university and its students benefit further from field-school opportunities, independent studies in laboratory techniques, and opportunities for undergraduate and graduate students to conduct original research. Hundreds of students have completed University of Connecticut field schools supported by the MPMRC and MPTN, and dozens of master's and doctoral candidates have completed theses and dissertations that have benefited the tribe and its public education program.

Another important collaboration was recently described in a *New York Times* article as an "unconventional alliance" (Kelley 2017). Successful archaeological metal-detecting surveys require a technical expertise that few archaeologists possess. Following the methodologies of Scott and McFeaters (2011) and Connor and Scott (1998), we invested in a series of metal detectors that, at first, provided underwhelming results. Upon employing them in the field we quickly realized that we lacked the experience to understand either the science or art of the technology. Ultimately, the solution to this problem came from a fruitful collaboration with avocational metal detectorists.

Unlike elsewhere in the world (Thomas and Stone 2008; Lewis 2016), archaeologists and metal detectorists in the United States are traditional adversaries, with differing views on how best to investigate and preserve cultural resources. However, we found the metal detectorists with whom we worked willing to learn archaeological techniques and open to accepting the importance of provenance. From the detectorists, we archaeologists learned how to use our new tools effectively and a great deal about how to envision an historical landscape. After several years of using metal detectors under the guidance of our experienced partners, the large majority of 17th-century objects are still found by the "amateurs." For example, out of the 839 17th-century artifacts recovered from four battlefield

sites (CT 59-40, 59-73, 59-91, and 59-111), 75.6% were found by just two of our avocational volunteers. It will likely be years more before any of the professional archaeologists gain the skill and sensitivity necessary to do the job by themselves. Collaborating with avocational metal detectorists has been a boon both to the archaeological community and, we believe, to the detectorists themselves. This collaboration has helped us develop a more effective archaeological method.

Calluna Hill (CT 59-73) as a Site of Conflict

The role of Calluna Hill within the larger context of the Pequot War is still being analyzed. The site represents a rare opportunity to study Pequot lifeways during the 17th century at a short-term domestic occupation, as well as a chance to think about such sites through the lens of conflict archaeology. Relying on the terminology laid out by Scott and McFeaters (2011:104), Calluna Hill could be described as an ancillary site, "camp," or, perhaps, a "support area"; however, it is also an active part of the battlefield itself, since it lies within the line of retreat, and the houses within it were burned as a direct action of the English combatants. Exchanges of fire occurred here, as impacted musket balls and brass projectile points were found in close proximity to the domestic features (Malone 1991). As a site directly and indirectly associated with conflict, it offers an opportunity to study cultural behaviors "that mirror ... the greater society's cultural ideas, constraints, and orientation," and thus reveals much about what it meant to be a Pequot in the 1630s (Scott and McFeaters 2011:105).

Calluna Hill can act as a test for the historical record. This is a popular use of conflict sites because battles are often described in great detail by eyewitnesses and historians, perhaps owing to their being dramatic sites of violence (Hanson and Hsu 1975; Cimprich and Mainfort 1989; Fox and Scott 1991; Scott 2003). There are several contemporary historical descriptions of the Pequot War and dozens of histories written about the conflict. Of all these, only one sentence from one account refers to the village at Calluna Hill. As mentioned earlier, that account is by John Mason, and it describes succinctly the finding and burning of several wigwams (Mason 1736:11).

The interpretation of this passage, which was important during the planning stages of excavations at Calluna Hill, presented significant challenges. What would Mason have recognized as a wigwam? Would that include a variety of indigenous architectural structures or one very specific type? How do we interpret the term "several" through Mason's worldview? It is not clear whether the modern definition of "three or more" would be relevant in the latter 17th century when Mason wrote his reflections on the battle. The word seems to have been used idiosyncratically during the period. The archaeological investigations of Calluna Hill gave us the opportunity to test these questions about the historical record in the same way that the history recursively informed our excavation strategies. Excavations at the site have revealed only one domestic structure, but features and artifact densities suggest several more were present. Despite lingering questions about what precisely Mason meant in his short description of Calluna Hill, the archaeology has so far confirmed his account of the presence, size, and season of occupation of a Pequot domestic site from the early 17th century.

By returning to Scott and McFeater's (2011:105) notion that conflict sites are a "mirror" of a society's norms and values, Calluna Hill can be used as a reflection of changing Pequot cultural norms during the Pequot War. It is well documented that, during the early 17th century, the Pequot underwent significant cultural change in order to mitigate the challenges of their new colonial reality (Ceci 1990; McBride 1990, 1993, 1994, 2007, 2008; Bendremer 1999; Nassaney 2004; Silliman 2010; Farley et al. 2019). Even more scholars have approached this subject during later periods or among other native groups during the same period (Bragdon 1988; Lightfoot 1995; Voss 2002; Murray 2004; Den Ouden 2005; Witt 2007; Jordan 2008, 2009, 2014; Loren 2008; Ferris 2009; Mancini 2009; Silliman 2009; Dietler 2010; Hayden 2012; Beaudoin 2013; Beaudry 2013; Farley 2014; Hunter et al. 2014). None of these studies have had the opportunity to archaeologically test the nature of change and continuity among indigenous peoples soon after the arrival of Europeans to the region.

Several artifact classes at Calluna Hill can help in understanding the complex ways that Pequots materially mitigated colonial encounters. The site contained an assortment of goods made from materials ranging from local sources to ones made from materials only accessible through newly emerging global capitalist markets. English-made pipes were found outside to the northwest of the domestic structure, and several similar pipe stems were found in the middens.

Ceramics found at Calluna Hill were almost exclusively of native manufacture. Nearly all the ceramic sherds found within and around the domestic structure were of the

Hackney Pond type, which is a relatively coarse indigenous-made ceramic with little-to-no visible temper (McBride 1984; Lavin 1987, 2013). Later indigenous sites in Connecticut tend to include either a mixture of European-made and indigenous-made ceramics or exclusively European styles (e.g., Monhantic Fort, see Benard [2005]). It should be noted that the origin of manufacture of an artifact does not discount its role as an indigenous object (Silliman 2010). It is clear that, at Calluna Hill, the Pequot were making complicated decisions about what novel materials to adopt and which to ignore in preference to long-available types. Certainly this suggests significant agency, but it also raises questions. Why use English-made pipes instead of stone ones? Why choose indigenous ceramics instead of European-made ones? These choices could be driven by economic market conditions, such as availability, price, and access. They could also be driven by functional considerations, such as the usefulness of

Table 2 Metals and related artifacts from retreat-route domestic sites

Artifacts		Sites		
		CT 59-73	CT 59-111	CT 59-91
Total 17th- and possible 17th-century metals	Musket balls	27	121	204
	All other metals	207	132	169
	Total	234	253	373
Scrap and sheet metal	Brass	49	25	26
	Iron	13	8	9
Projectile points	Brass	1	8	15
	Iron	4	0	0
Kettle fragments		0	18	6
Select metal tools	Hooks	4	2	3
	Axes	2	3	0
	Rods	2	0	3
	Adzes	1	1	1
	Hoes	1	1	2
	Knives	9	12	20
Nail fragments		47	3	31
Beads	Glass	5	7	0
	Cupriferous	2	1	1
Gun parts		3	4	1
Pipe fragments	Kaolin	17	0	9
	Steatite and/or aboriginal pottery	0	5	2
European flint		9	1	0
Select metal, personal	Buckles	3	4	0
	Decorative (comb, perforated decoration)	2	1	0
	Buttons	2	8	12
	Thimbles	0	1	1
	Jesuit rings	0	2	3
	Jaw harps	1	1	3
	Scissor fragments	2	1	1
Percentage manipulated[a]		27.45%	27.35%	26.63%

[a] The "Percentage manipulated" row refers to the percentage of iron and brass metals that have observable human alterations, presumably after they had been obtained by the Pequot inhabitants of these sites. This calculation excludes nonrelevant artifact classes in the table, such as glass beads, pipe fragments, and European flint.

Fig. 9 Brass projectile points found along the path of the English withdrawal and at the Mystic Fort site. (Photo courtesy of the MPMRC, 2012–2013.)

Fig. 10 Modified brass and iron objects found along the retreat route, at the Mystic Fort site, or at Calluna Hill. (Photo courtesy of the MPMRC, 2012–2013.)

certain ceramics for certain types of food preparation or the relative ease of producing sheet-brass projectile points vs. stone points. They could also represent more ideological considerations having to do with the connections between material type, color, cosmology, and relationship building.

The metal artifacts from Calluna Hill provide perhaps the best opportunity to address these questions. Willison (2016:42–70) analyzed the metals at both Calluna Hill and the broader English withdrawal (Table 2). She found that many of the brass and iron objects at Calluna Hill were reworked by the site's inhabitants. For instance, over 27% of the metal artifacts at the site were "manipulated in some way to produce new objects out of European trade items and technologies," with modifications including "perforation, scoring, cutting with shears and chisels, beveling edges, bending, and rolling" (Willison 2016:65). Willison argued that these alterations were made to make utilitarian or combat objects (primarily projectile points [Fig. 9]) and decorative objects (mostly charms and amulets [Fig. 10]).

There is some question about why native combatants so quickly adopted this new material type for their projectile points. Native people had an at least 10,000-year-old regional lithic tradition, with stone spear- and arrowheads being the norm throughout that entire period. Future functional analyses and a broader regional study of metal-point adoption could reveal reasons the Pequots replaced this technology so quickly. Experimental studies, for instance, could provide clues as to whether metal points have superior strength, durability, and/or malleability as measured beside lithic comparatives. Previous studies have suggested that traditional lithic-trade routes among indigenous people may have been interrupted or transformed by the arrival of Europeans with new materials, as well as the disease and disruption that they bought. Many early colonial Connecticut sites, for instance, show a sharp decline in "exotic" lithic material types that had previously been imported from regions to the west, north, and south (McBride 1984).

The other brass and iron objects being fashioned at Calluna Hill have a less obvious explanation as battlefield artifacts (Fig. 10). There is ethnohistorical evidence, however, that suggests these too may have had important battlefield implications. Historical accounts reveal that Pequots wore a great deal of ornamentation of various types into battle, including that made of metal, as a symbol of their material and social wealth, and as a reminder that they fought for their own prosperity and the prosperity of their families (Wood et al. 1764:67; Willison 2016:67). Bracelets and other adornments had perceived medical benefits if made from brass or copper and may have been used to increase the power of the individual or as a type of first aid in the field (Morton 1883:154; Willison 2016:67). Willison also asserted that native men may have chosen cupriferous adornments to wear into battle to bolster their expressions of masculinity and as a sort of reference back to much deeper, traditional understandings of the spiritual powers of the malleable and mutable metal (Willison 2016:68–69). It is likely that Pequot men (and perhaps women) chose to bring into battle metal objects fashioned at Calluna Hill and other domestic sites for some or all of these reasons. Each individual combatant may have expressed his or her agency in choosing what to wear and why.

Conclusion

Over the last half decade, the MPMRC has worked to advance the goals of conflict archaeology and has greatly expanded the understanding of early 17th-century native and European American cultures in southern New England. The site of Calluna Hill has provided us with the opportunity to explore new methods for finding and delineating the extents of traditionally difficult-to-find period domestic sites. It is also an excellent test case for understanding the role of domestic spaces in their broader wartime contexts. Going forward, our primary goals are to deepen our understanding of this understudied period and bring heightened awareness to the usefulness of our methods and of conflict archaeology more broadly.

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Declarations

Conflict of Interest Statement On behalf of all the authors, the corresponding author states that there is no conflict of interest.

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