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EDITOR'S NOTES

I hope you enjoy the 2022 issue of the *Bulletin of the Massachusetts Archaeological Society*!

This issue is jam packed with five articles, ranging from Ryan Collins' piece on the archaeology of the Mansion House site at Phillips Academy, to Drew Stanzeski and colleagues' site report and zooarchaeology analysis of the Nashaquitsa site on Martha's Vineyard.

I also have to share the news that this is my last issue as editor of the *Bulletin*. I want to thank past MAS President Suanna Crowley, and current MAS President Vic Mastone for inviting me to serve as editor. It was a great opportunity to update the look and feel of our society's venerable journal that originated with my predecessor here at the Robert S. Peabody Institute of Archaeology, Douglas Byers (in 1939!). I'm happy to report that John Andrew Campbell will assume the editorship in 2023. John is Project Archaeologist at Heritage Consultants, LLC and PhD Candidate/Researcher at Memorial University of Newfoundland, as well as a current MAS board member. John can be contacted at jacampbell8992@gmail.com. Welcome John!

Since the start of the COVID-19 pandemic in mid-March 2020, the MAS Board has made all back issues of the *Bulletin* available online in partnership with Bridgewater State University's library: https://vc.bridgew.edu/bmas/. Many libraries have remained closed or with limited access, and by making the issues available electronically, scholars and students are able to use all of this marvelous research.

Many thanks to the authors, contributors, and reviewers who helped complete this issue—I trust you will find much here of great interest!

Ryan J. Wheeler

FORGOTTEN FOUNDATIONS: REMOTE SENSING AND EXCAVATIONS OF THE MANSION HOUSE AT PHILLIPS ACADEMY

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Abstract

The Mansion House at Phillips Academy in Andover, Massachusetts is a site of significant historical importance in the local community. Begun during the Revolutionary War in 1781, the building then known as Judge Phillips House was home to Phillips Academy's founder, Judge Samuel Phillips Jr., and his family until 1812. During this time, Judge Phillips, his wife Phoebe Phillips, and their family were known to cultivate a warm and inviting atmosphere for the academy students while also hosting notable political figures like President George Washington. With its destruction by fire in 1887, the Mansion House slowly faded into memory and its precise location became lost. With excavations and remote sensing surveys conducted in 2018 and 2019, the Mansion House's location was slowly revealed again. However, the unearthing of the Mansion House's southern foundation wall raises new questions on the building's history and modification over time. This paper will explore the methodologies used to locate the Mansion House (including data from Ryan Wheeler's excavations in 2013 and 2016, historical images, maps, Google Earth Imagery, and ground-penetrating radar), and detail the work which remains to be undertaken.

Since its founding in 1778, Phillips Academy in Andover, Massachusetts has grown to become one of the most widely recognized preparatory schools in the United States. Judge Phillips House, home to the Phillips family, was constructed from 1781-85 and remained in their possession until 1812. The building was acquired by the Trustees of Phillips Academy in 1812, who converted it into an inn, known as the Mansion House. The destruction of the building by fire in late November of 1887 has been described as "the greatest loss to School and community" (Allis 1979:81). After the Mansion House's destruction, the West Quad of Phillips Academy was developed around the site. These significant changes resulted in the memory loss as to where the Mansion House precisely stood.

In this paper, I present data arguing that the remains of the Mansion House are located underneath the West Quad's front lawn at Phillips Academy. By using a mix of data from excavations directed by Ryan Wheeler in 2013 and 2016, historical images, maps, Google Earth Imagery, and ground-penetrating radar (GPR), my investigations in 2018 and 2019 were able to confirm the southern foundation of the Mansion House for the first time since its loss in 1887. Even though the southern foundation walls of the Mansion House were located, investigations have raised new questions on the history of the building and the architectural remains of the nearby buildings remotely sensed throughout the West Quad's grounds. Before exploring how the Mansion House was found, it is necessary to understand the significant history of this once monumental building.

History of the Mansion House

The Judge Phillips House, which was altered and expanded upon becoming the Mansion House, is a site of significant historical importance in the local community. Judge Samuel Phillips Jr. acquired the 9-acre site from the Phillips Academy Trustees in May of 1781, and the building's cellar hole was likely dug in the fall of that same year, beginning construction (David Chase, personal communication,2021).[1] In addition to founding Phillips Academy, Samuel Phillips Jr. was a major player in local business, actively involved in civic affairs and prominent in politics from the war era on. Samuel Phillips Jr. and his family moved into their home, then known as Judge Phillips House, in December of 1782 though the building remained incomplete until 1785 (Allis 1979:81; Fuess 1917:32; Taylor 1856:115). The building remained in possession of the Phillips family until 1812 (Chase 2000:36; Fuess 1917:32; Robbins 1908:23; Taylor 1856:114). Today the site of the Judge Phillips House is remembered by a modest stone monument, resting near where the building once stood (Figure 1). However, from its inception through its eventual destruction, the Mansion House was a beloved monument serving as a community nexus at Phillips Academy and for the town of Andover.

As recollected by Reverend John L. Taylor in his 1856 memoir, he states that the Judge Phillips House was "planned on a scale beyond anything then known in the town [of Andover]" (Taylor 1856:115). So large was the spectacle that local stores and schools closed for the frame raising in 1782, gathering community members as participants and spectators (Domingue 1990). According to Reverend Taylor (1856:115), a spectator present at the raising claimed that "The whole town was present". Furthermore, a Reverend Mr. French "offered a solemn prayer" during the raising – words that remained in the community's

Figure 1. Mansion House Monument at Phillips Academy in Andover, Mass. Photograph by Ryan Wheeler.

collective memory through the building's eventual destruction.

The Mansion House was an example of an early Federalist home, a predominant style of architecture in the post-revolutionary United States between 1780 and 1820 (Elliot 2010:39). Federalist architecture is characterized by rigid symmetry and the use of classical elements including pillars, arches, and Palladian motifs (Elliot 2010:39). Many of the early buildings on Phillips Academy's campus shared the federalist style, including the Phelps House, the Kittredge House, and the Peas House, which remains on campus to this day and offers the clearest look into what the Mansion House would have looked like.

The Mansion House had sixty-two windows, at least six chimneys with large open rooms, fine paneling, heavy doors with wrought iron hinges, and a central front door whose lock and accompanying iron key drew comparisons to those of a bastille (Allis 1979:81; Fuess 1917:33). Artist and architect Addison B. LeBoutillier (1917:3) described the Mansion House as "the finest house on the Hill."

Samuel and Phoebe Phillips cultivated a warm and inviting atmosphere for the academy's students (Fuess 1917:37; Taylor 1856:226). They also hosted notable political figures like President George Washington on November 5, 1789 (Allis 1979:93; Fuess 1917:106; Robbins 1908:23-26; Taylor 1856:175).

The building served as the home for Judge Samuel Phillips until his death on February 10, 1802, and to Phoebe Phillips, his widow, until she moved to the nearby Farrar House in 1812, where she lived until her death (Fuess 1917:43; Taylor 1856:390). That January, Phoebe Phillips made known her willingness to sell a portion of her real estate to the Phillips Academy Trustees.[2] This transaction occurred when Phoebe was in deteriorating health and her son, Col. John Phillips, had filed for bankruptcy and had major outstanding debts to Phillips Academy. Thus, the sale of the Mansion served as debt relief for John Phillips (Bentley 1911:470-71; Fuess 1917:43; David Chase, personal communication, 2019). The sale to the Trustees of Phillips Academy from Phoebe Phillips was finalized by July of 1812.

Between 1812 and 1818, it is clear from records that the building underwent great changes. According to the Trustees of Phillips Academy meeting records, on August 18, 1812, the intention was to lease the building "as a genteel boarding house."[3] In November and December of 1812, Russian Stoves (masonry stoves for cooking and heating) were installed, conforming to the building's new function.[4] In 1813, the renovated building was rented to Andrew Seaton as an inn (Carpenter 1903:69).[5] In June of 1817, the Committee of Exigencies at Phillips Academy authorized Eliphalet Pearson to form a committee "to digest a plan for applying the Mansion House to board students of the Academy" – adding a secondary use for the building as a dormitory.[6] As of November 10, 1817, plans were to move forward with the Mansion House as a student dormitory, in addition to it serving as an inn. It remained a hostelry until it burned down in 1887 (Fuess 1917:187).

As an inn, the Mansion House became a central meeting place for students and faculty of the academy and Andover residents. Over the years, as a waystop on the Essex Turnpike on the way to Boston (Fuess 1917:187), the Mansion House hosted notable guests including Emerson, Webster, President Andrew Jackson, President Franklin Peirce, and Mark Twain, among many others (Fuess 1917:362). During its time as an inn, the Mansion House would undergo several modifications that likely impacted the archaeological record. On September 27, 1820, the Trustees of Phillips Academy voted to build an addition to the Mansion House.[7] In December of 1833, more modifications to the Mansion House were planned, citing the intent to create a "convenient dining room."8 After this period, it is less clear how extensive modifications to the Mansion House were.

In its 105th year, in the early morning around 2:00 am, on November 29, 1887, the Mansion House burned down by an incendiary origin, which remains unresolved (Fuess 1917:362; LeBoutillier 1917:3). Thick smoke coming from a fire in the rear basement of the house near a pile of woodchips awoke the building's tenants. A second fire was discovered shortly after in a third-floor room at the house's front (*Andover Townsman*, December 2, 1887:4). With the fires discovery, the Mansion House's proprietor, Charles L. Carter, sought firefighters and students to assist in stopping the blaze (Fuess 1917:362-3). When it was apparent that the fire would consume the Mansion House, students and community members salvaged objects and furniture from the burning building. Notably, Headmaster Cecil Bancroft went so far as to remove the Mansion House's front door to save the colossal lock and key (*Andover Townsman*, December 2, 1887:4; Fuess 1917:363).

Much like the spectacle surrounding the raising of the frame in 1782, its destruction was a significant moment for Phillips Academy and the Andover community. An eloquent and somber description of the scene was captured in the December 2 issue of the 1887 *Andover Townsman*:

The scene of the fire was unique and strangely impressive. The moon was nearly at its full, brightly shining in the west. There was scarcely a breath of wind. The street and grounds were full of spectators – professors, teachers, school-boys, people from the town, women and children – all watching with sad interest the slow progress of destruction. There was no shouting, no running, scarcely any loud talking – it was about as still as when good Parson French offered the solemn prayer at the memorable raising of the house in 1782. Even the burning building itself seemed to be in sympathy with the general feeling; its massive oak timbers, braced and pinned after the strong and honest fashion of its time and its builder, did not fall, but slowly, almost silently, melted away [*Andover Townsman* December 2, Vol. 1, No. 8, page 4]

Figure 2. Photo of the ruined Mansion House in the aftermath of the December 28 Fire. Courtesy of the Andover Society for Culture and History. 1992.1634.1 Ruins of the Mansion House following the 1887 Fire.

By sunrise, nearly nothing remained of the historical and affectionately described "ancient" structure except for chimney stacks (Figure 2). Fuess (1917:362-3) described the ruined remains as "looming up like gaunt apparitions among charred beams and debris." With the Mansion House's destruction, there was broad agreement that the loss of place and associated memories would forever alter Andover Hill's experience (Fuess 1917:362-3). The decision to refrain from reconstructing the Mansion House came shortly after its destruction. Instead, the ruins were covered over and seeded as an open lawn. In time, the neighboring Printing Office (which also functioned as a bookstore and later as a dormitory) would also meet destruction by fire. Main Street, too, would undergo several changes, with its dirt and cobblestones paved over with asphalt, as well as undergoing expansion and retraction with the 1891 construction of the main street trolly (Balboni 2011) and its eventual mid-twentieth century removal. These collective modifications to the area once occupied by the Mansion House led to an eventual loss of precise memory as to where the building's foundations were. As a result, locating the Mansion House's ruined foundations has become the focus of archaeological field school investigations at Phillips Academy.

Initial Excavations 2013-2016

One of the challenging issues in excavating the Mansion House was estimating where the structure precisely stood. Modifications to Main Street and walking paths in the West Quad had significantly altered the landscape since 1887. Notable buildings like the Printing Office, next to the Mansion House, had also burned down. However, historic early nineteenth century buildings like Moses Stuart House to the south, and Pease House and Phelps House to the north occupy their original locations. As such, overlaying historical maps showing the Mansion House with current campus maps helped establish the best fit for the building's location and initial excavations. The maps Wheeler used to determine the areas were the 1836 and 1837 campus maps created by Frederick Barton, a mentor of Frederick Law Olmsted (Figure 3). David Chase, the former Director of Stewardship and Campus Historian of Phillips Academy, believes that the topography, roads, pathways, building forms and locations, and many of the Barton maps' tree locations remain accurate (personal communication, 2019).

The first investigations of the Mansion House set out with the initial goal of locating the building's foundations. Directed by Dr. Ryan Wheeler of the Robert S. Peabody Institute of Archaeology at Phillips Academy, field schools involving high school students conducted excavations between 2013 and 2016. Wheeler's field school tested the lawn fronting the West Quad of Phillips Academy through scattered sampling surveys of the area where they anticipated the Mansion House's foundations. Their investigation involved two 15 inch by 15-inch test pits in June of 2013, one 15-inch by 15-inch test pit, with nine 3-inch bucket auger tests in October 2013, three 15-inch by 15-inch test pits in April 2016, and three final 15-inch by 15-inch test pits in July 2016. In total, Wheeler's field school investigated nine 15-inch by 15-inch units and nine auger tests. Most excavated units reached a depth between 15 and 25 inches.

Wheeler's field school investigations shed significant light on the Mansion House's location. The first critical recognition was that the stone monument's placement memorializing the Mansion House did not mark the building's ruins. Most significantly, in April 2016, excavators exposed a portion of a brick wall with rubble core flanking the exterior – clearly a feature of the Mansion House (Figure 4).

Despite the knowledge gained from the test pitting carried out by Wheeler's investigations, several variables remained unknown. The brick foundation exposed by Wheeler's investigations only revealed a small portion of a feature in a 15-inch by 15-inch square. As such, it was impossible

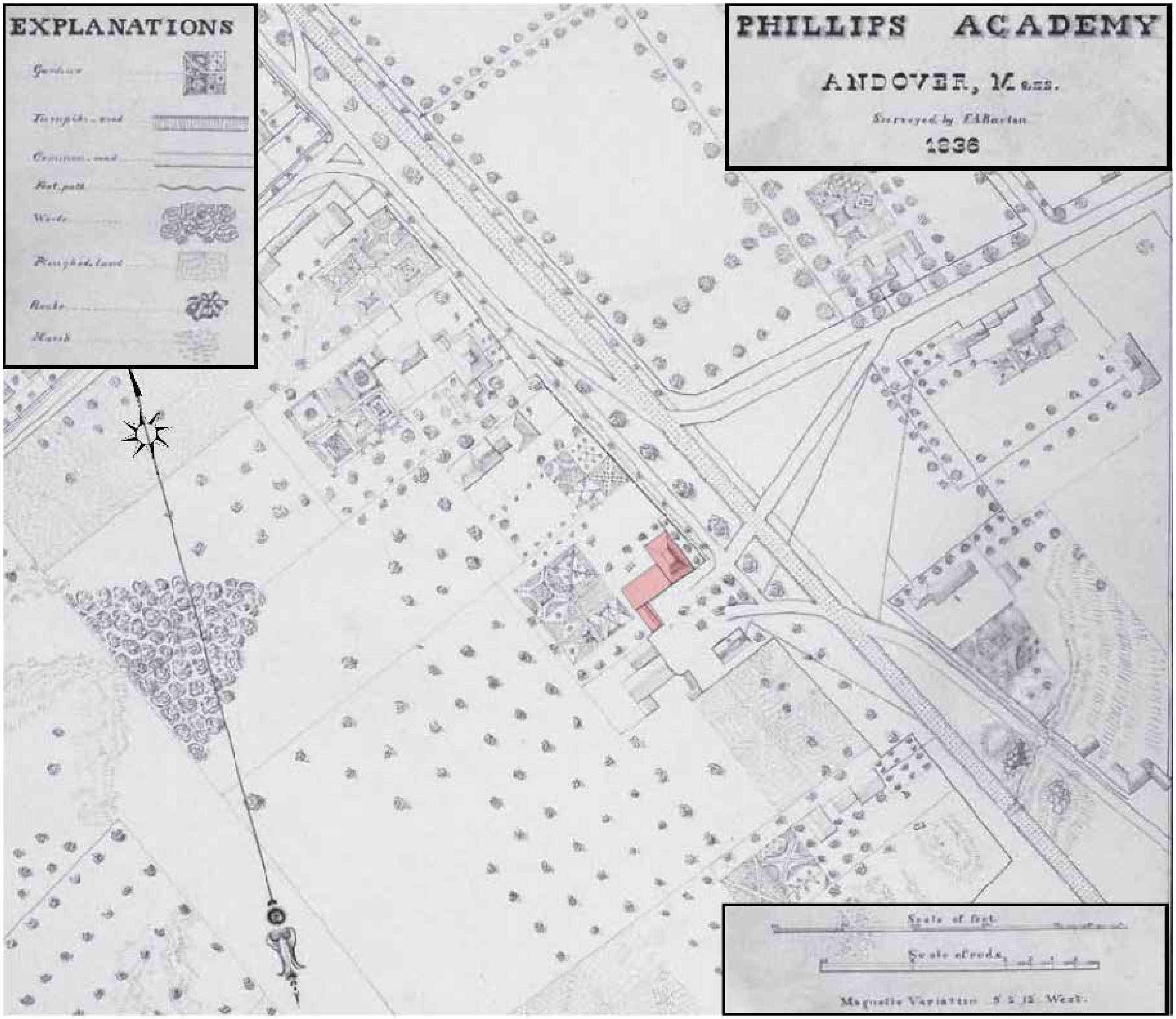

Figure 3. Modified detail of "Plan of the Real Estate of Phillips Academy" highlighting the Mansion House in red. Frederick Barton, 1836 [Phillips Academy Archives].

Figure 4. Photograph of brick feature exposed by Ryan Wheeler's excavations of the West Quad in search of the Mansion House. Photo courtesy of Ryan Wheeler.

to know if this feature was a foundational brick wall or a portion of one of the six chimney stacks of the Mansion House. Moreover, in their samplings, the field schools only detected a Mansion House feature in one unit – leaving much room for further inquiry. Nonetheless, Wheeler's field school investigations laid out an excellent groundwork with features and stratigraphic information for the 2018 investigations by the Phillips Academy Summer Session field school, called *Dig This*! *Archaeology in Action*, to build on.

Figure 5. Drone photograph of the 2018 *Dig This* excavation units showing the investigation area—photo by author.

Dig This! Archaeology Excavations: 2018

In 2018, *Dig This*! *Archaeology in Action* included 21 middle school students, divided into classroom lessons and field school investigations, co-taught and directed by Ryan H. Collins and Jason Larson. Excavations took place five mornings a week over four weeks in July. Units were arranged using a survey methodology informed by Wheeler's excavations and the Barton maps. However, students also selected units on the appearance of perceived surface anomalies hinting at subterranean features in the West Quad and surface artifacts. Students were divided into four groups and tasked with investigating seven 1-meter by 1-meter units (Figure 5). All units, except for one, were excavated to a layer of sterile soil.

Each unit in the West Quad encountered a layer of ash and burnt debris, evidencing localized fire. Due to the scattered survey, it was initially unclear which units were encountering remains from the fire that destroyed the Mansion House or the Printing Office. Several architectural features were exposed in the West Quad excavations, including portions of cobblestone paths, possibly a road. However, in one unit (Unit 2), positioned to expand upon the foundational wall exposed by Wheeler's class, our class encountered the anticipated brick feature. Unlike the feature revealed by Wheeler's investigations, *Dig This* encountered no neat wall organization or abutting rubble (Figure 6). Instead, the brick encountered here was largely in disarray, with the organization only hinted at. In this context was an incredible amount of ash, melted metal objects, including nails and hinges, and burnt wood. However, most revealing was the recovery of an iron plate, reading "No. 3 Made by Norton Furnace Co., Norton, MA" (Figure 7). As a result, we interpreted this feature to have been the remains of one of the six chimneys of the Mansion House. Excavations of Unit 2 never reached sterile soil. The matrix in the context of Unit 2 clearly gave way to collapsed walls inside the foundation of the Mansion House – as there were many open pockets of loose materials in dense ash, including metal, ceramic, glass, and wood.

With the confirmation of one of the chimneys, *Dig This* had exposed the first fully discernible feature

Figure 6. Photograph of chimney feature in Unit 2, showing brick and heavy ash in an artifact laden context. Photo by author.

Figure 7. Photo of furnace plate recovered in Unit 2, reading: "No. 3 Norton Furnace Co. Norton, Mass." Photo by author.

of the Mansion House since its destruction 132 years earlier (Collins 2019). However, as there were six chimneys, it remained unclear which one we had detected. Thus, the precise location and orientation of the Mansion House remained a mystery. As a result, ahead of the 2019 *Dig This* investigations, remote sensing methodologies were used to bring in more clarity.

Remote Sensing

Approaching the Mansion House site in the West Quad of Phillips Academy through remote sensing involved using historical images, maps, satellite imagery, and the subsequent use of ground-penetrating radar (GPR). The most accurate maps, as previously described, were produced by Frederick Barton in 1836 and 1837, or half a century into the Mansion House's life. In that time, the West Quad landscape would undergo several transformations, as is apparent from comparisons with drawings and photography.

Major additions were constructed to the rear of the Mansion House in the early nineteenth century, providing space for the inn and dormitory (Figure 8). This observation is significant because it could suggest two distinct styles of foundation construction. Furthermore, a long building to the rear (just southwest) of the Mansion House is worth noting as it appears to be present on both the 1836 and 1837 Barton maps. However, the building is not present in any later photograph of the Mansion House. The Printing Office, also known as the Bookstore, is present on the Barton maps, although without its rear ell. The ell of the Printing Office is well documented in later photography. In photographs that show both the Mansion House and the Printing Office circa 1880, the rear building present on the Barton maps is absent (Figure 9).

By the 1930s, all the buildings mentioned above were absent from the West Quad. Since then, no new structures have been added to the West Quad. However, the lawn of the West Quad has

Figure 8. Photograph of the Mansion House, c. 1875 showing inn and dormitory additions in the rear. Courtesy of the Andover Center for History and Culture. 1985.044.1 Mansion House.

Figure 9. Photograph of the Stuart House (left), Printing Office, or Bookstore (center), and Mansion House (right). From Sarah Stuart Robbins' Old Andover Days (1908:38).

been modified by the addition and removal of asphalt walkways, utility lines, and a possible cistern. Together, these modifications have impacted the landscape, changing the historic buildings' visible and detectable signatures. Any remote sensing project must understand the complex layering of architecture and foundations in the area that spans roughly 240 years.

Google Earth satellite imagery of the West Quad was incredibly helpful in prospecting potential features on the landscape. Since its introduction in 2006, Google Earth has been a promising remote sensing tool for archaeology – particularly when prospecting new sites or visualizing less apparent features on the ground (Myers 2010:455; Ur 2006:35). Google Earth imagery of Phillips Academy dates to 1995 and extends through the present, revealed interesting data on how the lawn of the West Quad has changed as well as promising features present on the landscape during times of low rainfall. The Google Earth imagery of the West Quad lawn available from August 2013, June 2015, and January 2021 provide the most visible data on below-ground remains. In the June 2015 and January 2021 Google Earth imagery, there are clear quadrilinear and rectilinear forms on the West Quad landscape (Figure 10). On the northern portion of the images (left), there are quadrilinear forms that contain the features exposed both by Wheeler and Collins' investigations. This data alone was quite suggestive.

The quadrilinear forms exposed in the June 2015 and January 2021 images also coincide with the estimated position of buildings labeled on Barton's Map, including what is presumably the Mansion House and the Printing Office (Figure 11). Several other features appear on the West Quad landscape, including a smaller rectilinear form that may have served as privy (an exciting prospect for future investigations). It must be stated that the data revealed from Google Earth imagery are suggestive but not necessarily accurate or reflective of the features we are expecting. Whether a visible form represents a ruined foundation, a later utility line, or a coincidence of landscaping can be difficult if not impossible to discern from satellite imagery alone. Likewise, there is always the risk that perceived lines and forms reside in the eye of the beholder. As such, the potential presence of features observed through satellite imagery must be confirmed through testing.

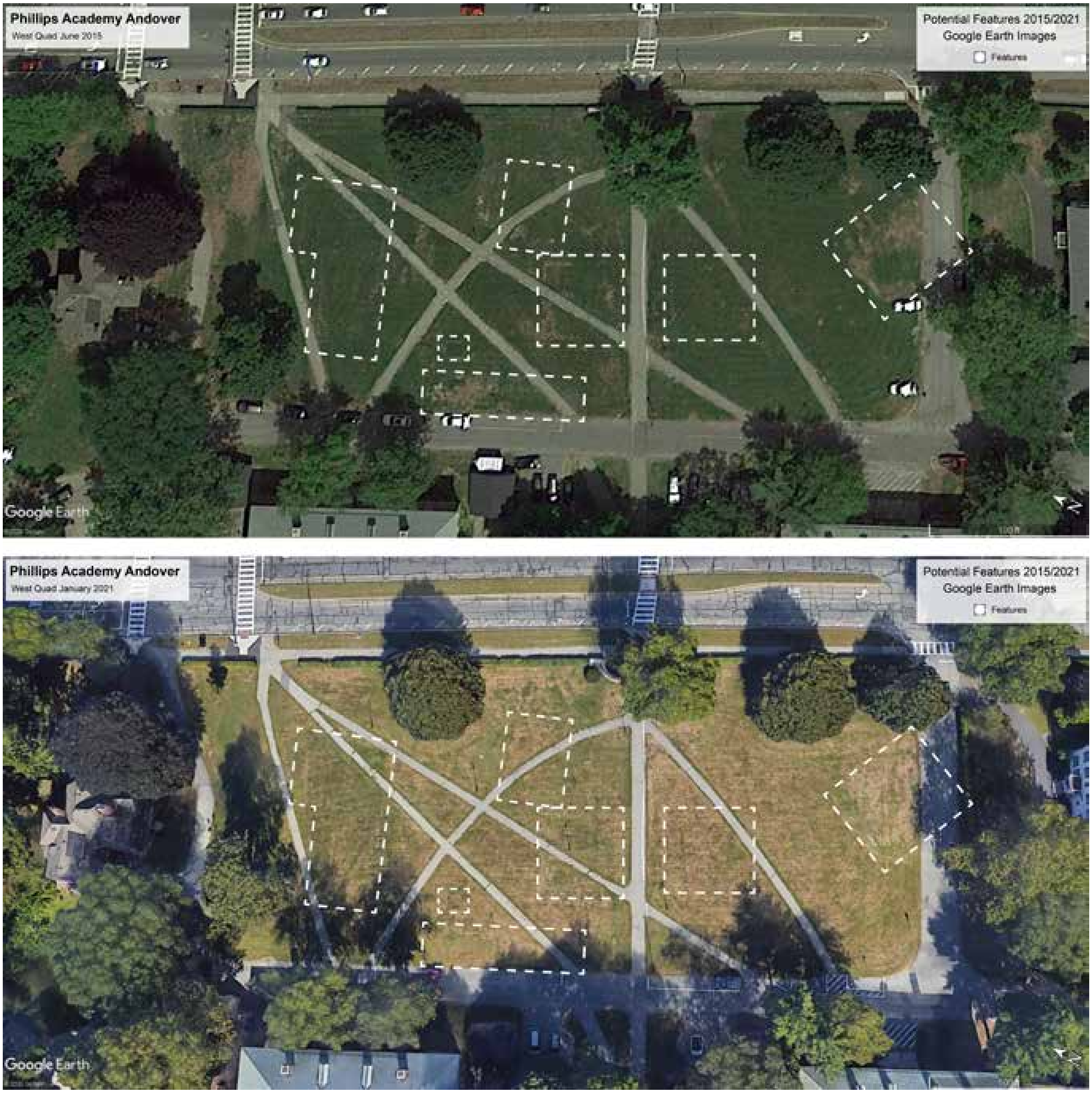

Figure 10. (Above) June 2015 and (below) January 2021 Google Earth Imagery, with visible features present in the West Quad of Phillips Academy, outlined in white dotted lines. Figure by the author.

With the data from excavations and Google Earth imagery, Peter Leach, a GSSI technician, was consulted to conduct a ground-penetrating radar survey of the prospective Mansion House area. Leach and I developed a GPR survey plan to remotely image and map subsurface features that might shed light on the Mansion House. Using a GSSI Utility Scan GPR system with an antenna frequency of350 MHz, Leach and I immediately discerned several features on the West Quad grounds. In processing the GPR data from the utility scan survey, clear rectilinear forms with substantial depth were present. The features, presumably foundation walls, also coincided with features present on the Google Earth imagery and buildings found on the Barton Maps (Figure 12). Also, the presence of the chimney feature

Figure 11. January 2021 Google Earth Imagery overlain with the 1837 Frederick Barton map of the West Quad buildings and nearby roads at Phillips Academy. Figure by the author.

was distinct in our survey from other features surrounding it.

While the GPR survey was revealing, it was not exhaustive. More study of the West Quad is warranted and scheduled to occur with the Summer 2021 *Dig This* investigations. Of note was the northernmost of two circular features, detailed in yellow and tentatively labeled as shafts. These shaft features, however, are unlikely to be historical. The southernmost shaft feature, as discussed below, is likely a 2018 excavation unit. Nonetheless, further research is warranted to confirm the remotely sensed features' presence to determine what they represent.

According to Peter Leach's estimates using the 1836 Barton map, the Printing Office was outside of the initial GPR survey's bounds. However, there is reason to doubt this conclusion. Adding to the matter's complexity is that, while the Printing Office is present on both the 1836 and 1837 Barton maps, it is shown in slightly different positions. The 1836 map has the building slightly more to the south with a Main Street facing front in perfect alignment with the Mansion House. However, the 1837 map positions the Printing Office slightly more to the north and slightly closer to Main Street than the Mansion House.

Features revealed in the Google Earth imagery also appear to conform to the 1837 Barton map placement of the Printing Office – which was slightly within the GPR survey's bounds. This same area conforming to the 1837 Barton map and the Google Earth imagery was investigated through 2018 excavations in Unit 3. Unlike other nearby excavations units, Unit 3 encountered a high degree of ash, burnt material, and fused papers in a several-inches-deep layer. As a result of excavations and remote sensing, it now seems likely that excavations encountered the Printing Office's interior in Unit 3. While this prospect is intriguing, it is curious that the Printing Office's footprint would not appear in the GPR survey unless the building's foundations were potentially shallow and lacking a basement in the surveyed area. The continued investigation will explore the Printing Office and clarify its location.

There was far more conformity when comparing the 1837 Barton map to the GPR survey's potential

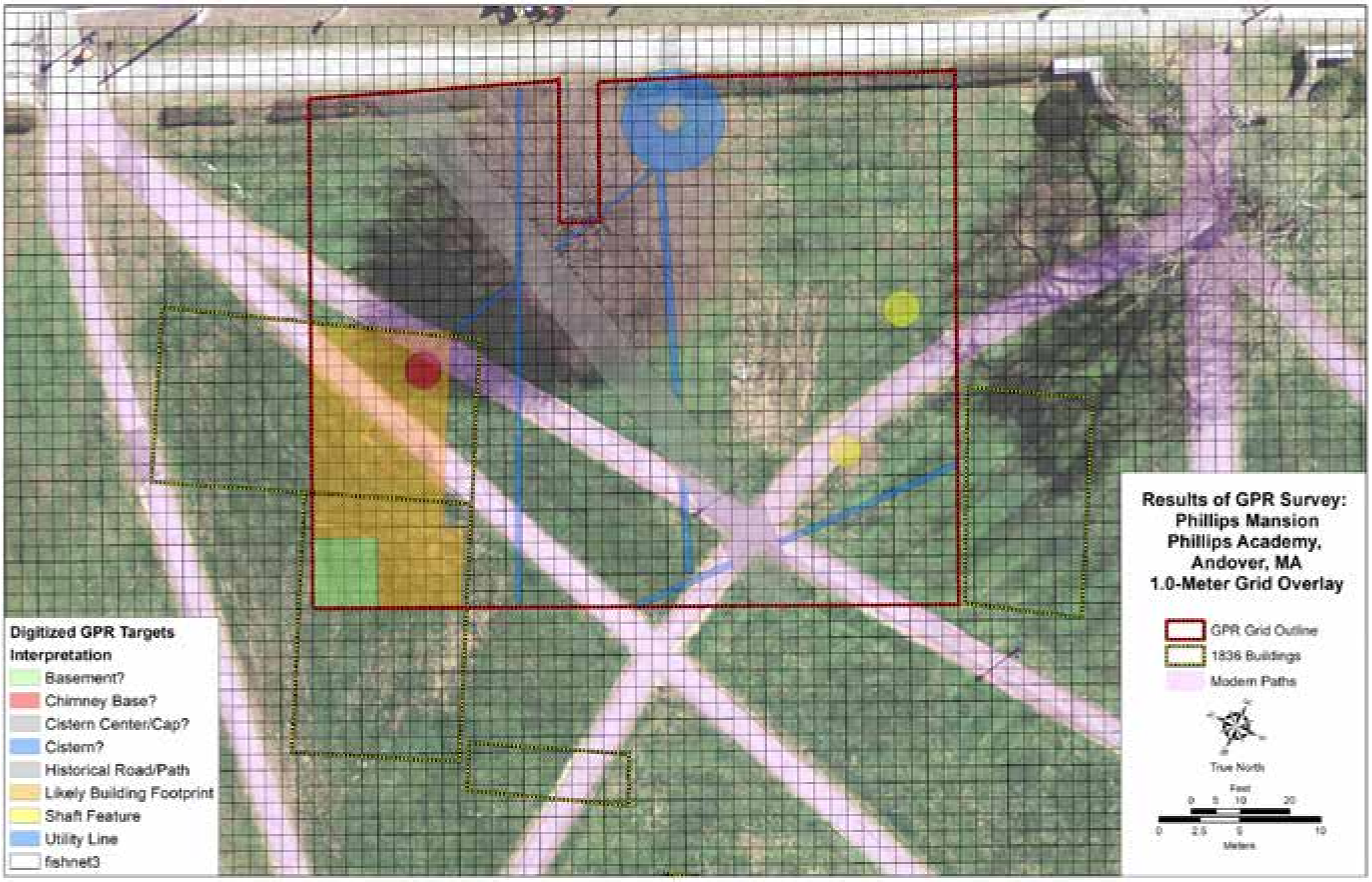

Figure 12. Map of the ground-penetrating radar survey conducted by Peter Leach in 2019, showing the remotely sensed features and their relation to the 1836 Frederick Barton map. Image courtesy of Peter Leach.

features. Unfortunately, only a portion of the Mansion House appeared within the bounds of the GPR survey, as we now know. Additional extensive and further comprehensive modeling will reveal far more of the eighteenth and nineteenth century structures that once stood in the West Quad. In particular, with the Mansion House, the building's footprint was evident by a delineation of features that presumably represented the southern foundational walls. The context north of the walls was distinct, breaking with the West Quad's stratigraphic data – suggesting the building's interior and presumed basement.

Interestingly, an area detailed in green had a deeper context, suggesting a possible secondary basement – certainly an area worth exploring in future investigations. While the GPR survey and remote sensing data on the Mansion House site were revealing, all prospective features need to be confirmed or 'truthed' through excavation. That is precisely what the 2019 *Dig This* excavation set out to test.

Dig This! Excavations in 2019 and New Questions

In July of 2019, a new *Dig This* class (co-taught by Ryan Collins and Stephanie Nicolard) began excavations on the West Quad's grounds. A total of seven 1-meter by 1-meter units were excavated along an axis believed to contain features sensed through GPR and Google Earth imagery. Units were spaced along an east-west axis conforming to a feature believed to be the southern foundation wall of the Mansion House. To our surprise, in the westernmost units, large masonry stones were exposed less than 10 centimeters underneath the topsoil in the West Quad (Figure 13).

Continued excavation revealed that the large masonry stones were, in fact, stacked upon lower

Figure 13. Masonry stones of the Mansion House's southern foundation wall, exposed by *Dig This* in July 2019. Photo by author.

courses of stones (Figure 14). The feature continues further underground to a depth yet to be determined. As opposed to a brick foundation, the presence of stone masonry was somewhat unexpected – given the results of previous investigations where brick features were predominant. Nonetheless, the presence of stone masonry extending over 7-meters would seem to confirm our hypothesis of where the Mansion House's southern foundation wall remains.

While the 2019 investigations were incredibly revealing, there are still several unknowns. Like the summer 2018 excavations, the 2019 *Dig This* investigations took place over four weeks. However, intense heat and heavy rains resulted in a loss of nearly one week of data collection. Furthermore, being in the footprint of the Mansion House resulted in a heightened presence of artifacts. As a result, more time was required for data processing.

The easternmost unit explored by *Dig This* in 2019 may have uncovered the Mansion House's southeast corner, though this remains unconfirmed. The depth of the masonry feature remains unconfirmed and may be the subject of continued investigations. As noted in the GPR survey, there remains an area, or anomaly, that extends deeper than the surrounding area of the Mansion House's remotely sensed footprint. This remotely sensed feature is tentatively listed as a basement. Though, what it may represent has yet to be determined. Likewise, it remains to be determined if the ell and the main building of the Mansion House share the same foundation wall. Finally, the West Quad contains the remains of several buildings present during the Mansion House's lifetime. Exploring these features will undoubtedly help us

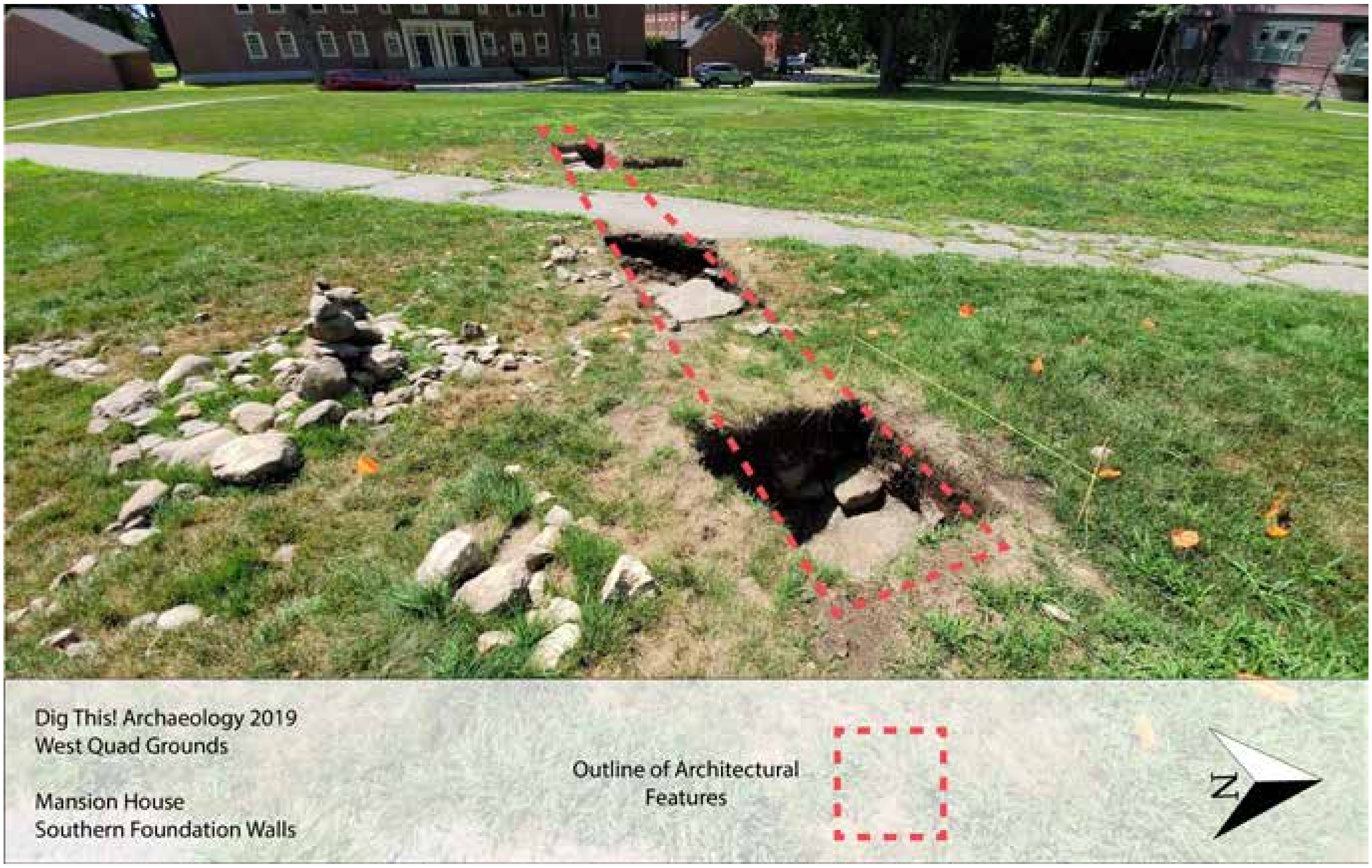

Figure 14. A complete view of the masonry stone southern foundation of the Mansion House was exposed by *Dig This* in August 2019. Photo by author.

understand daily life at Phillips Academy during the eighteenth and nineteenth centuries.

Conclusion

With the location of the Mansion House's southern foundation wall, a significant piece of heritage at Phillips Academy has once again been revealed. This finding not only establishes a more precise understanding of where Mansion House foundations are situated but allows us to explore the material remains that have sat untouched for 132 years. With luck, this year's investigations will allow us to understand even more about life in the Mansion House during its final days. While the mysteries around the long-ago fire are unlikely to be solved, more insight will undoubtedly be learned about the inn and the community it served.

Data Availability Statement

All of the Mansion House site artifacts and data are housed at the Robert S. Peabody Insitute of Archaeology, Phillips Academy, 180 Main Street, Andover, MA 01810.

Acknowledgments

The Course *Dig This! Archaeology in Action* was supported by Phillips Academy, the Lower School Institute, and Summer Session. Special thanks to the director of Summer Session, Beth Friedman, to support campus excavations and hands-on learning. Thank you to the Robert S. Peabody Institute of Archaeology, its director Ryan Wheeler, and curator Marla Taylor. The Peabody Institute provides *Dig This* classroom space, excavation materials, and houses the artifacts recovered. Thank you to the Andover Center for History and Culture, especially the Collections Manager Angela McBrien and Director of Programs & Social Media, Lauren Kosky-Stamm. They provided access to archival materials, photographs, and physical objects from the Mansion House, including the inn's original ledgers. Special thanks to David Chase, the former Director of Stewardship and Campus Historian of Phillips Academy, who shared archival materials and feedback during this paper's construction. Thank you to Peter Leach, GSSI technician, who conducted a ground-penetrating radar survey of the Mansion House and provided a map of the remotely sensed features present in the West Quad. Thank you to the 2018 and 2019 *Dig This* excavators, co-teachers Jason Larson and Stephanie Nicolard, and teaching assistants Joseph Lake and Teddy Wolfe. Finally, thank you to the William Neukom Foundation for Computational Science at Dartmouth College, which provided support for the completion of this project and manuscript.

Notes

1 Phillips purchased the original 9-acre site from the Phillips Academy Trustees, by exchange, in May (Philips Academy Archives, Trustee Meeting Records, v.1, 22 May 1781).

2 On January 3, 1812 – Madame [Phoebe] Phillips has made known her willingness to sell a portion of her real estate to the trustees. The Trustees of Phillips Academy voted to authorize board president Eliphalet Pearson to treat with her sale of Mansion House & outbuildings and 9 acres, also the house occupied by Amos Blanchard [on Salem Street] & 3 acres. The plan was to lease back the Mansion House to Madame Phillips or to John "Jr" the Blanchard House (Philips Academy Archives, Trustee Meeting Records, v.1). On June 10, 1812 – Trustees of Phillips Academy note the Mansion House. A committee votes to advertise the Mansion House for lease (Philips Academy Archives, Trustee Meeting Records, v.1). Payment for recording the deed to the Mansion House made on July 1, 1812 (Phillips Academy Archives, Cashbook, 1796-1837; courtesy of David Chase).

3 On August 18, 1812, Eliphalet Pearson reports the conclusion of the purchase of the Mansion House & Blanchard House from the Phillips family. The Trustees of Phillips Academy vote to lease the Mansion House "as a genteel boarding house"(Philips Academy Archives, Trustee Meeting Records, v.1; courtesy of David Chase).

4 By November 5, 1812, payment was given to William Roberts Russian Stoves at the Mansion House and payment was given to Reuben Frye in December for installing the Russian Stoves (Andover-Newton Archives, ms. softbound "Institution" account book, 1812-13; Carpenter 1903:69).

5 In July 1815, the Mansion House was being rented to Thomas Folsom as an inn (Andover-Newton Archives, bound Journal of the Theological Institution, 1808-31; courtesy of David Chase).

6 On June 4, 1817, the Committee of Exigencies authorize Eliphalet Pearson to form a committee "to digest a plan for applying the Mansion House to board students of the Academy and to converse with [the innkeeper] Mr. Locke upon the subject" (Philips Academy Archives, Trustee Meeting Records, v.1; courtesy of David Chase).

7 In September 1820, at their annual meeting, the Trustees of Phillips Academy vote to build an addition to the Mansion House according to the plan presented, so long as the cost will be less than $400. (Philips Academy Archives, Trustee Meeting Records, v.1; courtesy of David Chase).

8 On December 12, 1833, Treasurer Samuel Farrar and Mr. Armstrong appointed as a committee to add to and alter the Mansion House, to create a "convenient dining room" and to arrange an appropriate increase in rent to the lease holder (Philips Academy Archives, Trustee Meeting Records, v.1; courtesy of David Chase).

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500-YEAR-OLD LATE WOODLAND LITHIC WORKSHOP IN AN ESTUARINE ENVIRONMENT AT THE CUT RIVER IN MARSHFIELD, MASSACHUSETTS

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Abstract

This article focuses on a Phase II site examination of the Cut River Point site, near the Cut River and Duxbury Marsh in Marshfield, Massachusetts. The area surrounding the site is an estuarine environment composed of several tidal rivers and salt marshes. The site examination recovered artifacts from the plow zone to a depth of about 30 centimeters below the surface and revealed a site area estimated to be roughly 41,000 square meters in size. The site consists of one or more high-density lithic workshops. Over 5,000 pieces of ancient Native American lithic debitage were recovered during the Phase II study, including 46 tools and cores, one Late Archaic Atlantic-like point, and many Late Woodland Levanna points. A few sherds of Native American pottery were also found. Two features were identified, including one that yielded a radiocarbon date of 510 +/- 95 years BP. The large number of Large Triangular points recovered suggests that the site may have been an important Levanna culture quartz and felsite workshop. Many other ancient Native American sites are situated in similar estuarine environments in the region indicating the significance of these marine habitats.

Background

There are eleven ancient Native American sites within the general project vicinity. Four of these sites date to the Late Woodland Period, with Levanna points (see Ritchie 1961:31-32 for his original definition of this type). Most of the sites in the region are known from surface collections made by avocational archaeologists and therefore, little cultural or chronological data are available. Late Woodland sites occur in a wide variety of habitats including estuarine environments such as sites 19-PL-424 and -425 on Duxbury Marsh, 19-PL-426 at Green Harbor, and 19-PL-45 at Kingston Bay. The Cut River Point site on Duxbury Marsh falls into the typical pattern for similar multicomponent Late Woodland sites in the region. It is interesting to note that while several of the sites in the nearby vicinity contained shell middens, no shell deposits were identified at the Cut River Point site. Many Late Woodland sites also do not contain shell middens.

The initial archaeological study was conducted by Alan E. Strauss of Cultural Resource Specialists of New England (CRS) under contract with Clancy Construction for the Cut River Condominium Development in August of 1993. The Phase IC consisted of a surface inspection followed by the excavation of twenty-two 45 to 50-centimeter test pits (Strauss 1993). A total of 1,419 pieces of stone debitage were recovered from the subsurface investigations. Two Late Woodland Levanna point (Large Triangle) bases were also recovered as well as, two steep-edge scrapers, a quartz edge tool, eight quartz tool fragments, and four utilized flakes. The artifacts were primarily recovered from the plowed topsoil; a few remains were found in the subsoil. This article focuses on the results of the Phase II Site Examination.

Research Design

Because the Phase I suggested that the site may contain significant archaeological data and be eligible for listing on the National Register of Historic Places, a Phase II site examination was recommended. The Phase II was designed to obtain specific data about the site's boundaries, age, cultural affinities, and archaeological integrity. To meet the goals of the Phase II project, both 45 x 45 shovel test pits, two 50 by 100 cm tests, and seven one-meter units were excavated. The site examination was conducted under Massachusetts Historical Commission (MHC) permit number 1343 and in accordance with Commission guidelines and regulations. The project fieldwork was conducted in April 1994.

Methodology

The methods used at the site were designed to test a site with extensive cultural remains within a relatively small area (44,000 square feet). While the project includes a larger area, portions of that area have been previously disturbed by grading, bulldozing, and construction. Consequently, the MHC selected the undisturbed portions where the highest densities of cultural remains were found during the Phase I study in hopes of intercepting diagnostic artifacts, artifact clusters, and cultural features. Testing was also recommended to further define the boundaries of the site and to test in areas unexcavated during the first phase. The main goal of the site examination was to determine archaeological integrity and potential for National Register of Historic Places eligibility.

Field Methodology

The excavation of test pits was conducted by shovel within natural soil horizons. Meter units were excavated by flat shovel and trowel and were sifted through 1/4-inch mesh. An arbitrary 10-centimeter excavation increment was used within each natural level, including the plow zone, which was sifted separately, so that all artifacts could be sorted by depth and horizontal provenience. Each of the subsurface testing methods is briefly described below so the reader can understand how the site was excavated.

50 by 50- centimeter Shovel Test Pits. The test pits were not measured and were more often than not about 45 by 45 centimeters (two shovel blade widths). Test pits were used to obtain complete spatial coverage and to fill in any gaps left during the intensive survey. Some areas could not be tested during the intensive survey because of dense undergrowth; these were cleared prior to the Phase II project so they could be tested.

Excavation Units

Meter units were employed where high densities of artifactual materials were found. These units helped to locate features, diagnostic artifacts, and to discern vertical stratigraphy of cultural remains. Meter units allow a much greater level of vertical control when excavating than do shovel test pits.

Laboratory Methodology

The laboratory work and analysis of the artifactual remains included the following components: washing, cataloging, and lithic analysis. Carbon samples were collected in the field from all *in situ* features. Burned wood carbon was placed directly in aluminum foil packets and sent to Kruger Enterprises (Geochron) of Cambridge, Massachusetts for radiocarbon dating. Soils from ancient Native American features were fine-screened in order to locate micro-flakes, seeds, beads, bone, or other culturally associated materials.

Lithic Analysis

The lithic analysis included a determination of the types and proportions of raw materials used at the site (see Massachusetts Historical Commission 1984). In addition, tools and tool fragments, and associated stages of tool manufacture were recorded. Flaking debris was classified using the categories of *angular waste*, *flake*, *decortication flake*, and *retouch flake*. Each of these components is briefly defined for the reader below.

A *flake* refers to a flat, thin or curved piece of stone that exhibits a bulb of percussion, striking platform or both. *Angular waste* is used to describe thicker pieces of stone that do not exhibit any flake qualities but are cultural in nature. A *decortication flake* contains any amount of cortical surface such as a weathered cobble surface. *Cortical flakes* indicate that primary tool manufacture took place at the site and are indicative of the form of the parent material that was used. A *retouch flake* is a flake that is one centimeter or less in size and is complete, i.e. it has a platform and distal end. Flakes were also placed into the following measurement categories: 3 to 6 centimeters, 1 to 3 centimeters, and 1 centimeter to less than 1 centimeter.

Several classifications for tool technological stages are used in this article. They include a *core*, which is a roughly flaked piece of stone that exhibits flake scars on all sides. A *biface* is an intentionally worked stone that exhibits flake scars on both the ventral and dorsal surfaces and exhibits a recognizable shape. A *uniface* is a stone that has been flaked on only one side, such as a scraper. A *tool fragment* refers to a worked piece of material that is either the tip, base, tang, or side of a tool but is too small to categorize specifically. A *worked stone* is a large blocky piece of rock that has flake scars removed but its intended function or production sequence is unclear. A *projectile point preform* refers to a nearly finished artifact that represents the final stage of manufacture prior to retouching and or sharpening to finish it as probably a hafted arrowhead.

Lithic identifications in this article are generalized macroscopic classifications. Macroscopic analysis was conducted and the common terms such as *felsite*, *quartz*, *quartzite*, and *argillite* are used; the latter referring to an indurated mudstone or siltstone that has little luster and weak flaking properties. *Argillite* at the site was either green or brown (see Strauss 1989 for more on green argillite). The term *felsite* is used in this paper to refer to volcanic material that either has phenocrysts or is aporphyritic (without phenocrysts or inclusions). In addition to the typical raw materials found at ancient Native American sites, the site contained a suite of very fine-grained siliceous materials. These materials could not be characterized as volcanics, cherts, or quartzites because of their extremely fine-grained nature, similar to chalcedony. These siliceous rocks are therefore classified as unidentified siliceous materials or *USM*. Funds were not available for thin sections, petrographic analysis, or X-ray fluorescence of the chipping debris at the site.

Site Description and Topography

Environmental Setting

The Cut River Point site is situated about one half mile from Green Harbor at the end of Assumption Road in Marshfield and is adjacent to the Cut River (Figures 1 and 2). The area consists of dry vegetated land with staghorn sumac and white cedar and is slightly higher in elevation than the surrounding Duxbury Marsh. The site is located in an estuarine environment and is surrounded by marine resources from the Bass Creek, Green River, Wharf Creek, Little Wood Island River, Pine Point River, and tidal flats. Soils in the tested area consist primarily of the Scituate series, which are moderately well drained and which formed in compact glacial till (Upham 1969:88). These soils have a very dark gray-brown plow zone underlain by a yellow-brown sandy loam. Rocks within the proposed construction area include granite, graywacke, arkose, and conglomerates (Chute 1965; Shaw and Petersen 1967).

The topography of the site area is generally characterized as nearly level ground, although it is slightly higher than the surrounding marsh. It

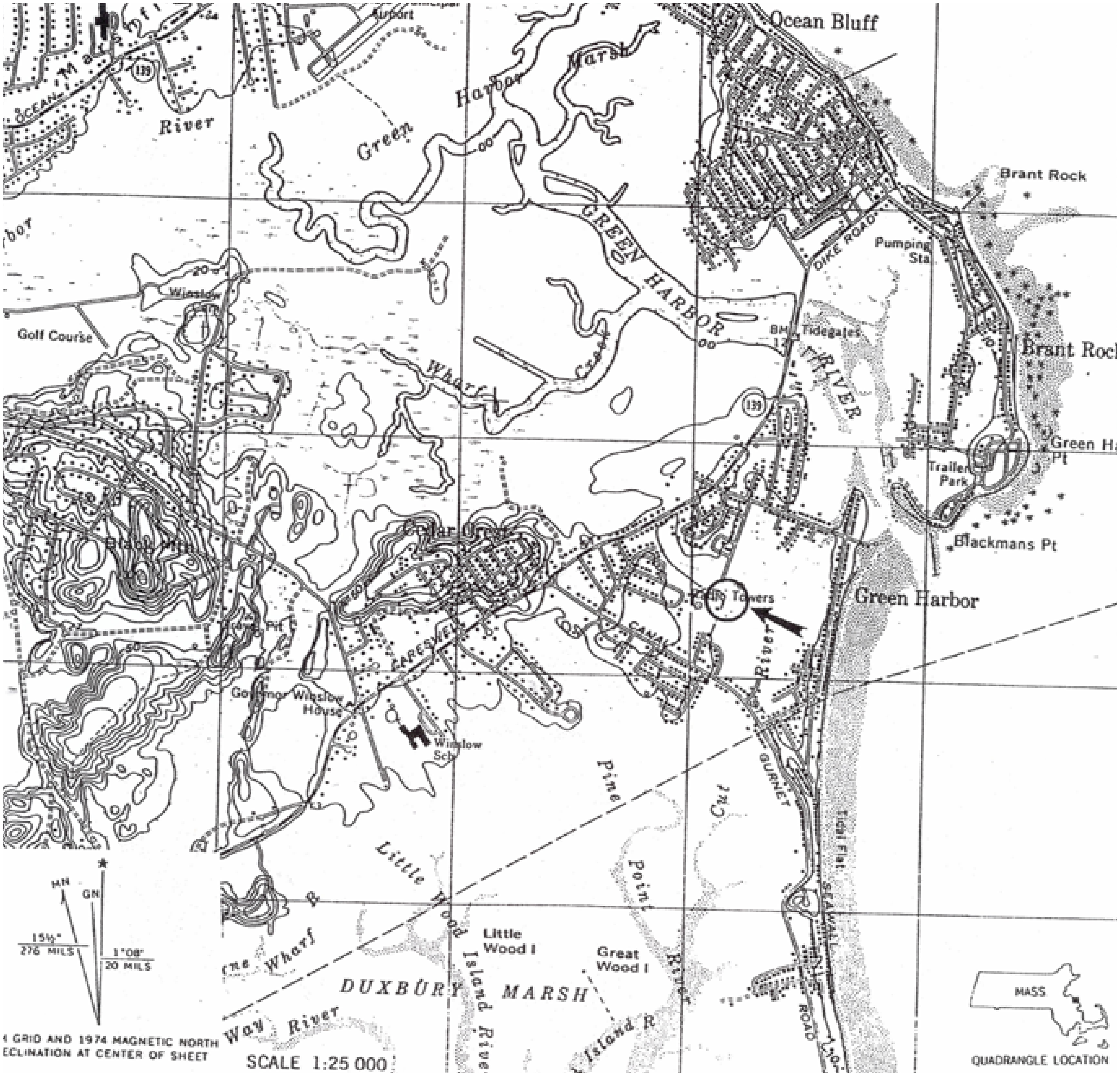

Figure 1. USGS topographical map showing approximate site location.

Figure 2. View of Cut River looking east from site area.

does become flooded during storms, heavy rains and at times of very high tides (Figure 3).

Soil Description and Stratigraphy

The soils within the site are formally classified as Scituate series. There are two basic horizons: the topsoil and the B horizon subsoil. Occasionally, the boundaries between horizons are sharp and easily defined, as in the case of agricultural plowing. In unplowed soils the boundaries between

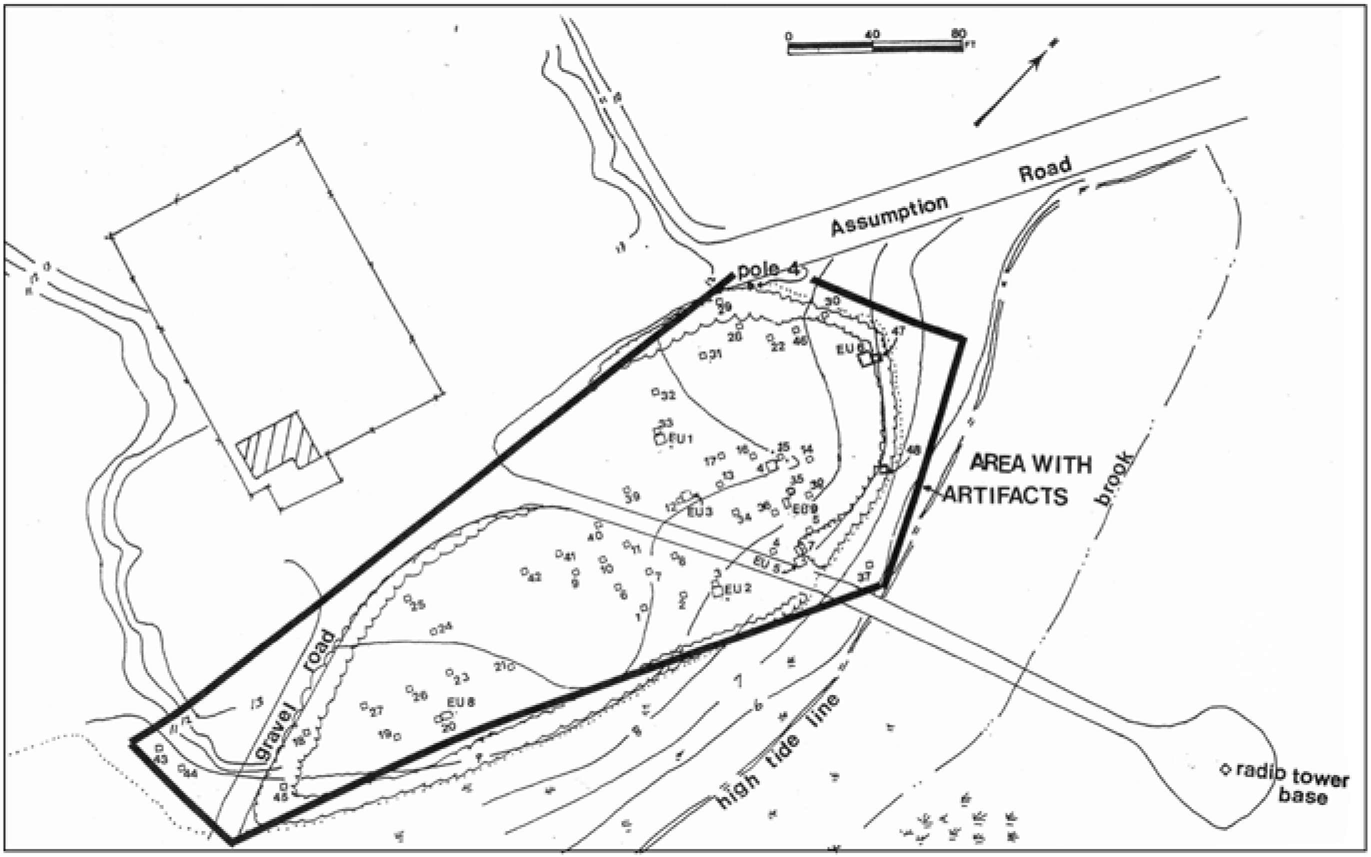

Figure 3. Plan of Phase II subsurface testing.

Test Pit 14		
Depth in cm	Color	Texture
0-26 26-46	10 YR 3/2 very dark yellow-brown 10 YR 6/8 brownish yellow	silty sand, hard packed silty sand fragipan
0-30	Excavation Unit 1 10 YR 2/2 very dark brown	silty sand
30-40	10 YR 4/6 dark brownish-yellow	silty sand and rocks

Figure 4. Representative soil from site: (1) root mat, (2) plow zone, (3) B horizon subsoil.

the topsoil and subsoil usually merge gradually over a vertical distance of a few inches, are hard to demarcate, and are usually indistinct, mottled, and irregular. Representative soil profiles from the site area are shown in Figures 4 and 5. The first level (1) is the organic root mat, often called the O horizon. It consists of decaying organic litter derived from plants, leaves, and weeds. The root mat at the site is only about three centimeters in thickness. The second stratum (2) is the topsoil (A horizon) which is the uppermost layer of mineral soil and contains large amounts of organic material; it is therefore dark in color (see Figure 4). Rainwater penetrates into the topsoil and often removes or leaches some of the soluble bases that may be present. Consequently, the topsoil (plow zone in this case) is often very acidic (low pH) and may result in poor preservation of organic remains such as bone or wood. The average depth of the plow zone was about 26 centimeters below the surface.

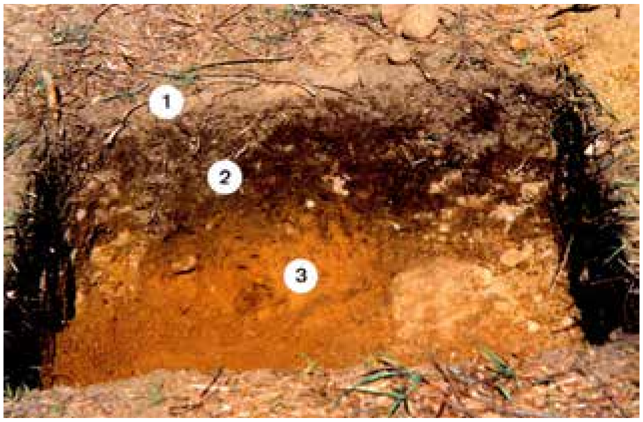

Figure 5. Soil Profile from Test Pit 14 and Excavation Unit 1.

The third stratum (3) is the B horizon or subsoil. In well-drained soils, this horizon is often yellow-brown to reddish-brown in color. The subsoil (B) is often divided into zone (B1, B2, and B3) which reflect the top, middle, and the bottom of the horizon with regard to color and texture. At the site, the second substratum of the B-horizon was identified as slightly lighter in color but it was usually obscured by numerous rocks and boulders.

Site Integrity and Land Use

Very few artifacts from more recent times were found during the Phase II testing. These artifacts consist primarily of redware sherds within the first few centimeters of the plowed topsoil. It is likely that the site area remained wooded throughout the recent past and may have been used in part for Anglo-American farm related activities. No buildings or structures are recorded for the property except for the recent New England Telephone building and the radio tower bases. There is also a 25-foot sewer easement, 12-inch existing force main, and a gravel road. Parts of the site have been destroyed as a result of earth moving activities near the area that was tested. In recent times, the edges of the site have been used for dumping; these portions of the site contain debris piles of logs, boulders, and cement blocks and could not be tested.

Phase II Site Examination

Shovel Test Pits

Thirty shovel test pits were excavated as part of the site examination (TPs 23-52) (Figure 3). Test pits were situated to obtain complete coverage of the impact area and to fill in any gaps left during the first phase of work. Test pits were excavated at eight meter intervals in systematic transects, with some test judgmentally placed. Test Pits 23 to 25 were excavated in a transect in the southwest end of the project area in order to determine if the site extended to the western end of the project area. A low density of ancient Native American debitage was recovered from Test Pits 23 and 24, however TP 25 contained no remains and it exhibited disturbed soil horizons. Test Pits 26 and 27 were excavated in a short transect in the southern corner of the proposed construction area to determine the site's boundary; both pits contained a small amount of chipping debris.

Test Pits 28 and 29 were excavated in the northwest corner of the impact area to determine the extent of the site. Both test pits contained a moderate amount of debitage including 47 quartz flakes, three felsite flakes, one quartzite flake, and one quartz biface fragment in TP 28 (Figure 6A). In order to fill in areas that were not tested, Test Pits 30, 31, 32, and 33 were excavated in the north-central portion of the impact area; each test pit contained a moderate amount of debitage except for Test Pit 33, which contained over 50 stone flakes and several lithic tools. The following stone tools were recovered from Test Pit 33 in the plow zone between 0 to 30 centimeters below the surface: a gray-brown felsite projectile point tip (Figure 6C); a dark gray felsite projectile point tip-midsection (Figure 6B); a felsite biface (Figure 6D); a quartz biface (Figure 6E); and a quartz biface basal fragment (Figure 6F).

Test Pits 34, 35, and 36 were excavated in the eastern site area in order to define the site's horizontal extent. Numerous quartz and felsite flakes were recovered from each of these test pits. Test

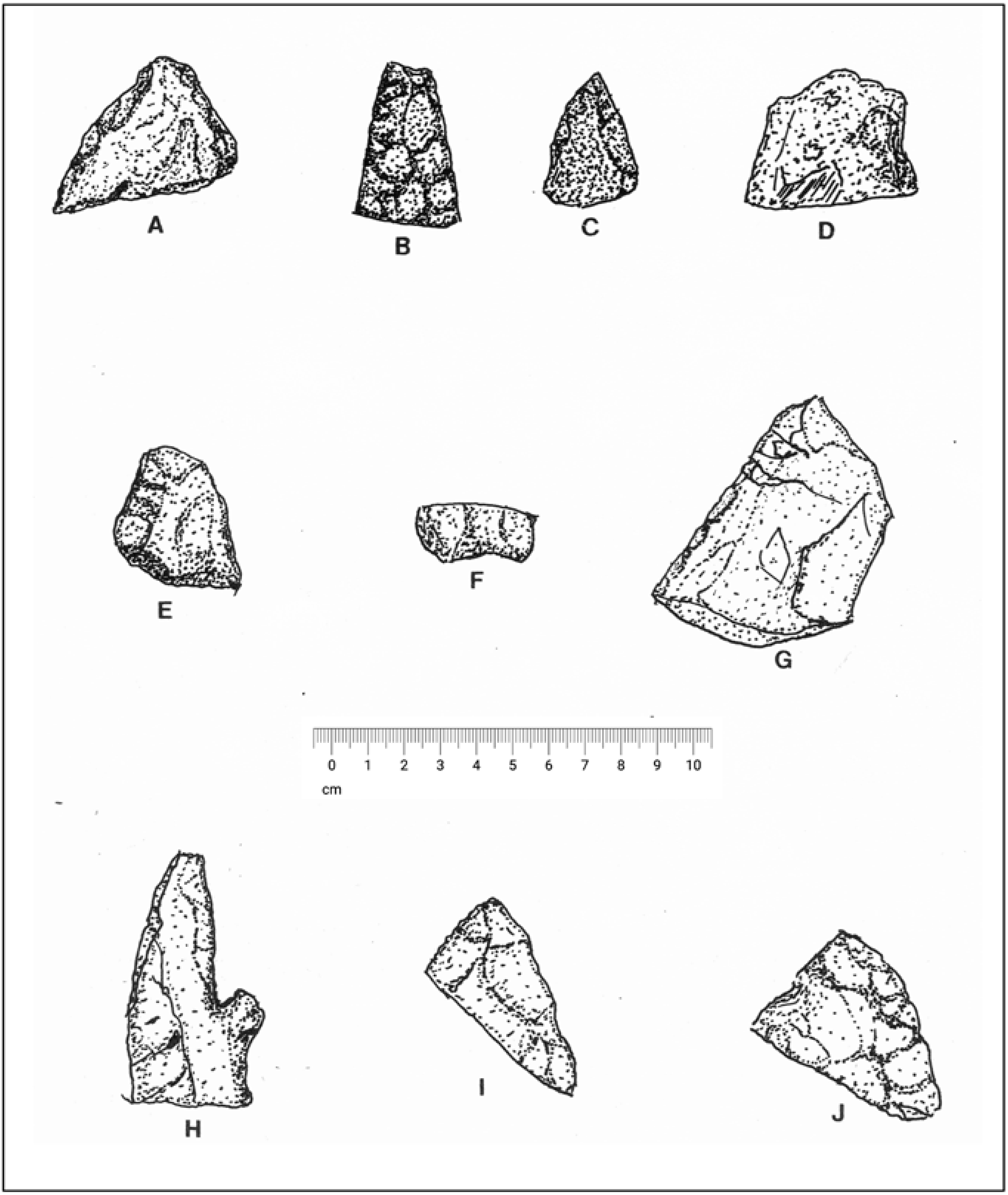

Figure 6. Stone tools from Cut River: (A) Biface fragment, quartzite TP 28; (B) Projectile point tip-midsection, felsite TP 33; (C) Projectile point tip, felsite TP 33; (D) Biface, felsite TP 33; (E) Biface, quartz, TP 33; (F) Biface basal fragment, quartz, TP 33; (G) Levanna point preform, quartz, TP 36; (H) Tool fragment, quartz, TP 36; (I) Levanna point tip, TP 51; (J) Levanna point tip, quartz, TP 52.

Pit 36 contained a quartz Levanna point preform (Figure 6G) and a quartz tool fragment (Figure 6H). It should be noted here that a Levanna point is synonymous with a Large Triangle point (see Massachusetts Historical Commission 1984:130-131). Test Pit 37 was also excavated in the eastern end of the impact area to determine if the site extended to within ten meters of the saltmarsh. Ten quartz and two felsite flakes were recovered from Test Pit 37. Test Pit 38 was a judgmental pit that was excavated in an area believed to have high artifact densities. Over fifty flakes were found in the plow zone and four flakes were found in the subsoil of this pit.

Test Pits 39 to 42 were excavated in a linear transect to further define site boundaries. All of these test pits contained cultural remains, however, artifact densities decreased to the south. The far southern corner of the area was tested with Test Pits 43, 44, and 45. Land disturbance and fill were identified in TPs 43, 44, and 45. A small number of flakes was found in Test Pits 44 and 45.

Test Pits 46, 47, and 48 were excavated in the northeast edge of the impact area near the saltmarsh. These pits all contained low densities of chipping debris (maximum of 15 flakes in Test Pit 47).

A possible steatite pipe fragment was recovered during the initial project and therefore four units (TP 49-15 west; 50-15 south; 51-11 east; and 52-15 north) were excavated at a 2.5 meter interval around Test Pit 15 in order to locate additional portions of this artifact (see Strauss 2021:3-34 for more on the use of steatite). While no additional steatite pipe fragments were found, two sherds of ancient Native American pottery were found in Test Pit 49 and one sherd was found in Test Pit 52. Two quartz Levanna point (Large Triangle) tips were recovered from the plow zone of Test Pits 51 (see Figure 6I) and 52 (See Figure 6J). Chipping debris was also found in these units.

To summarize, a total of 655 pieces of debitage was recovered from thirty shovel test pits that were excavated during the site examination. The majority of chipping debris consisted of quartz (349) and felsite (264). The remaining materials consisted of 15 quartzite flakes, 20 unidentified siliceous material (USM), and 7 argillaceous flakes. In addition to debitage, ten broken tools were recovered. At least three of these date to the Late Woodland period, however the narrow projectile point tips from TP 33 suggest a possible Late Archaic or Early Woodland (ca. 5,000-3,000 BP) component. It is clear from the shovel testing that the site extends to the full extent of the proposed construction zone in all directions and to within 10 meters of the saltmarsh (see Figure 3). The highest density portions of the site are in the north central area; artifact densities decreased in the southern half of the site.

One-by-One Meter Units

A total of seven one-by-one meter units (EUs 1 to 7) and two units 50 by 100 centimeters (EUs 8 and 9) was excavated during the site examination (see Figure 3). The meter units were excavated in areas of high artifact density, in activity areas, and in locations that were believed to possibly contain subsurface features. Excavation was done in arbitrary ten-centimeter levels within each natural soil horizon. Soils were sifted through 1/4-inch mesh as was the case with the shovel test pits. The results of the meter unit excavations are provided below.

Excavation Unit 1 was located adjacent to Test Pit 33, which contained numerous tools and debitage. In addition to containing a large amount of chipping debris, EU 1 contained eight stone tools. A point tip made of gray-brown USM was found in the 10 to 20 centimeter level (Figure 7A); two quartz Levanna point bases (Figures 7B and C) were also found in this 10-centimeter level. An Atlantic-like felsite point (ca. 4,100-3,600 BP) was found in the next level (20-30) (Figure 7D) as was a felsite base (possibly from an Atlantic point) (Figure 7E). Also recovered in the 20 to 30 level were a quartz biface (Figure 7F), a felsite Levanna point tang (Figure 7G), and a quartz point tip (Figure

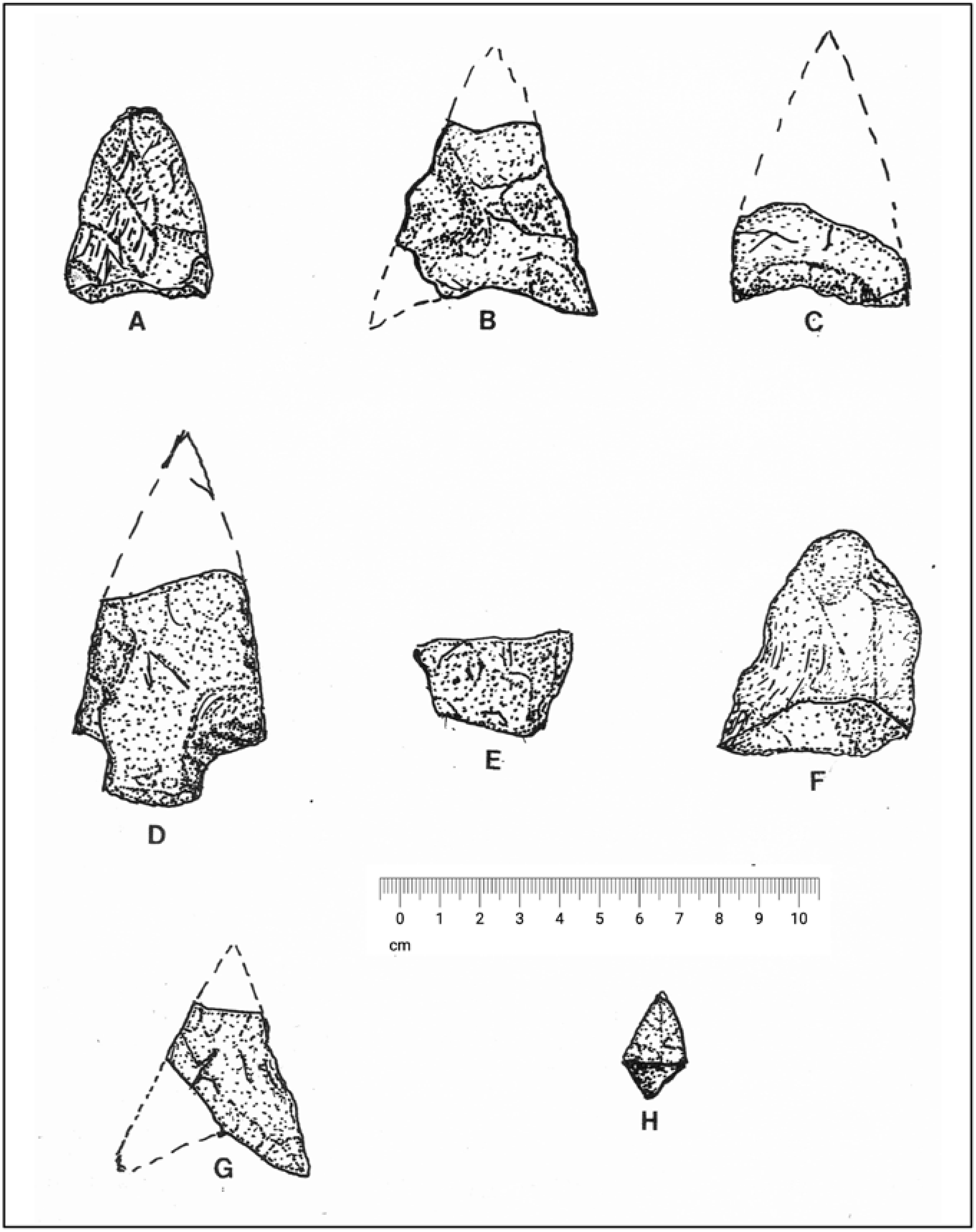

Figure 7. Tools from Excavation Unit 1: (A) Point tip, brown USM; (B) Levanna point, quartz; (C) Levanna point fragment; (D) Atlantic-like point, felsite; (E) Point basal section, felsite; (F) Biface, quartz; (G) Levanna point tang, felsite; (H) Point tip, quartz.

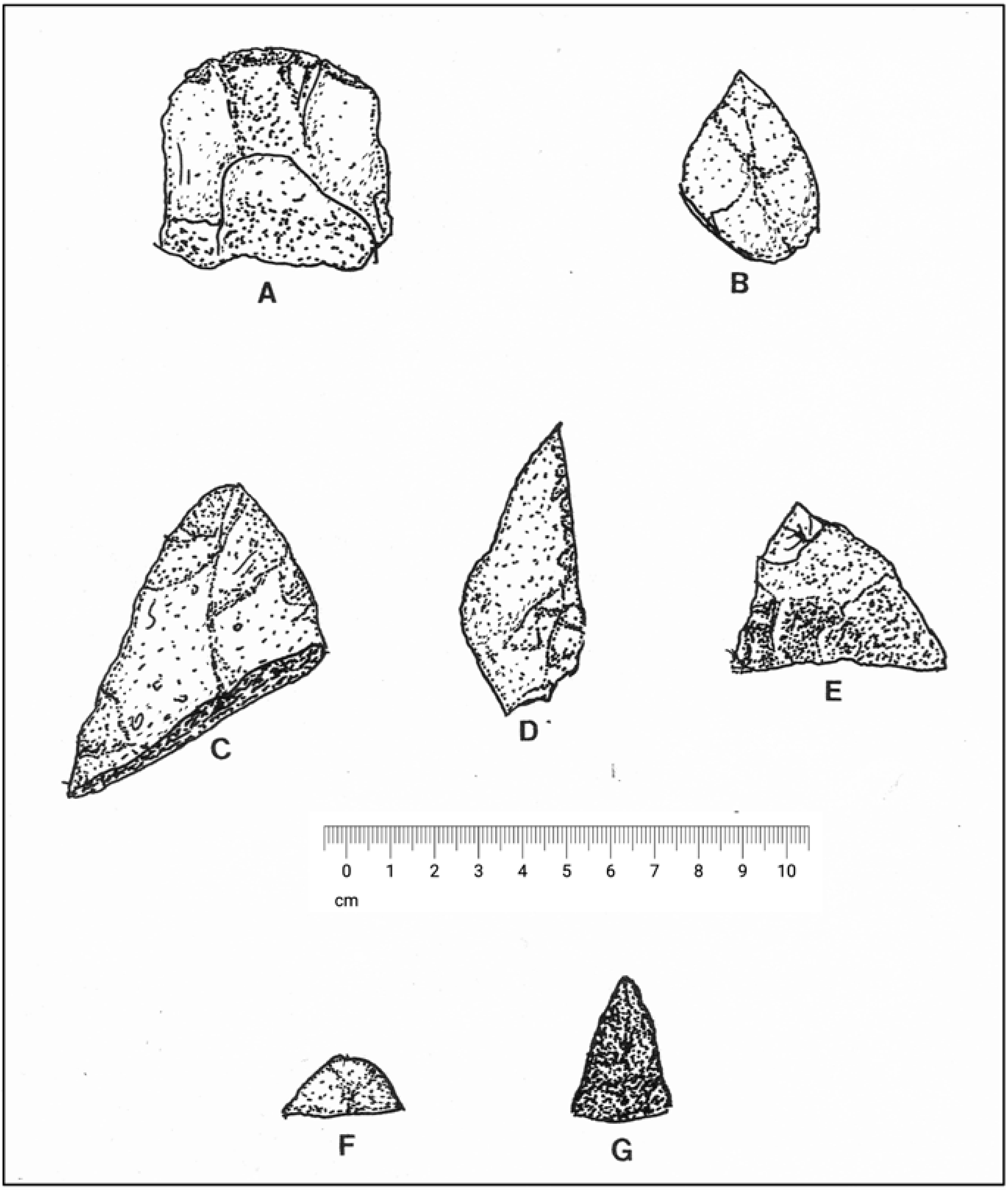

Figure 8. Tools from Excavation Unit 2: (A) End scraper, quartz; (B) Point tip, quartz; (C) Levanna point preform, felsite; (D) Tool fragment, argillite; (E) Levanna point base, quartz; (F) Biface tip. Quartz; (G) Point tip, felsite.

7H). One sherd of fine-tempered Native American pottery was also recovered from EU 1. Most of the artifacts were recovered from the plow zone; a few flakes were found in the very rocky transition between the plow zone and subsoil.

Excavation Unit 2 was located adjacent to Test Pit 3 of Phase I, which produced a high density of artifactual material. In addition to a high density of chipping debris, EU 2 contained seven stone tools, which are described below. The 10 to 20 centimeter level contained a quartz end scraper recovered from 0 to 10 centimeters (Figure 8A). The 10 to 20 level contained a quartz projectile point tip (Figure 8B). The next level (20-30) contained a broken dark gray felsite point tip (Figure 8C), a green-gray argillite tool fragment (Figure 8D), a quartz Levanna point base (Figure 8E), and a quartz biface fragment (Figure 8F). A dark gray felsite point tip (very narrow blade) was found in the lowest level of 30 to 40 in the plow zone/B horizon interface (Figure 8G). All of the artifacts were found in the plow zone or interface; no flakes were found in the rocky and compact subsoil.

Excavation Unit 3 was excavated adjacent to Test Pit 12, which contained a high density of Native American artifacts during the initial survey. No finished stone tools were recovered from EU 3, however, a large amount of quartz, felsite, and quartzite chipping debris was found. Two large bifacial blanks, one of quartz and the other of USM were recovered in the 10 to 20 level. A dark soil stain approximately 28 centimeters in diameter was identified in the B horizon at a depth of 32 centimeters below the surface. The feature had an irregular, mottled base that ended at 42 centimeters in depth. The feature (Feature 1) was quartered in order to provide a cross-section view (Figure 9). There was no burned bone, ash, or fire-cracked rock in the feature, however 17 flakes and a few fragments of charcoal were recovered. Soil samples from the feature were fine-screened; no artifacts, seeds, bone, or other cultural remains were identified. The stain possibly represents the base of an ancient Native American feature that was truncated by the plow zone. The small amount of charcoal collected from the stain was insufficient for radiocarbon dating.

Figure 9. View of Feature 1 (soil stain) from Excavation Unit 3.

Excavation Unit 4 was placed in the vicinity of the bracket units of Test Pit 15 which contained ancient Native American pottery. In addition to chipping waste, four stone tools were recovered from EU 4. All of the tools were found from 10 to 20 centimeters below the surface in the plow zone and included three quartz point tips (Figure 10A through C) and a tool fragment (Figure 10E). Four sherds of undecorated Native American pottery were recovered from the 10 to 20 centimeter level. A dark stain, 20 cm in diameter, was identified in this unit at the base of the plow zone. Excavation of this stain did not produce artifacts, but revealed what are likely rodent burrows.

Excavation Unit 5 was located near Test Pit 4, which during the initial survey produced chipping debris as well as fire-cracked rocks. This unit was excavated in the hopes of locating a subsurface feature or additional diagnostic materials (Figure 11). Two quartz projectile point tips were recovered between 20 to 30 centimeters in depth (see Figure 10D and G). A quartz biface tip was recovered from the 30 to 40 centimeter level in EU 5 (see Figure 10H). Chipping debris was also recovered, as was ancient Native American pottery. One sherd of pottery was recovered from 10 to 20 cm and four pieces of ceramics (two with cord marked decoration) were found in level 3 (20 to

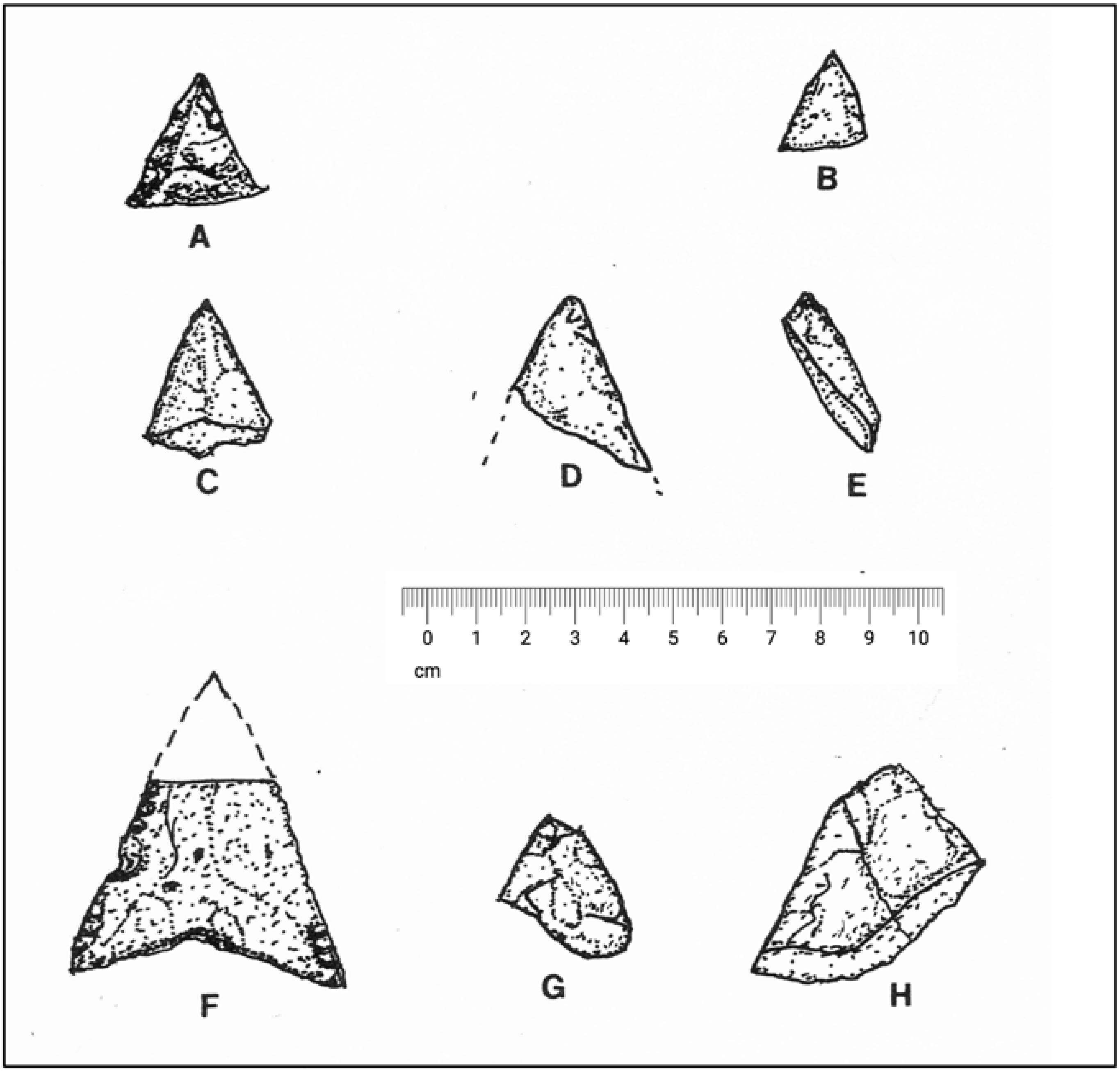

Figure 10. Tools from EU 4, 5, and 6: (A) Point tip, quartz, EU 4; (B) Point tip, quartz, EU 4; (C) Point tip, quartz, EU 4; (D) Point tip, quartz, EU 5; (E) Tool fragment, quartz, EU 4; (F) Levanna point, felsite, EU 6; (G) Point tip, quartz, EU 5; (H) Biface tip, quartz, EU 5.

Figure 11. View of excavation in progress, Unit 5.

30). The pottery was thin and sand-tempered, suggesting Middle to Late Woodland affinities. All of the cultural resources were recovered between 0 to 30 centimeters in the plow zone.

Excavation Unit 6 was placed near Test Pit 47 at the edge of the marsh in order to determine if there was also a high density of artifacts in this area. A felsite Levanna point was found at a depth of 26 centimeters in the plow zone of EU 6 (see

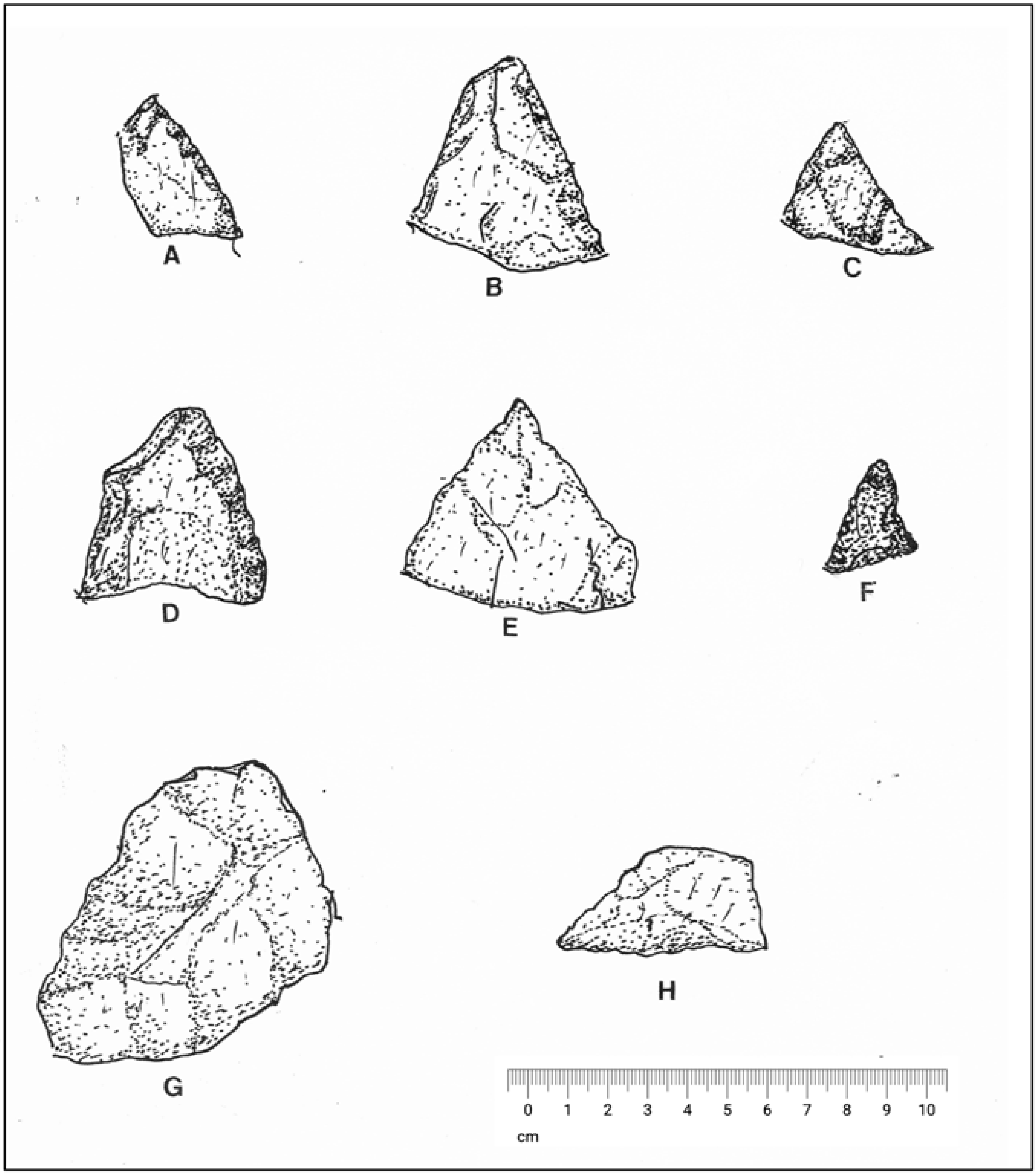

Figure 12. Tool from Unit 7: (A) Tool fragment, quartz; (B) Levanna point, broken, quartz; (C) Levanna point tip, quartz; (D) Levanna point base, quartz; (E) Levanna point preform, quartz; (F) Point tip, felsite; (G) Biface, quartz; (H) Levanna point fragment, quartz.

Figure 10F), as was a moderate to high amount of chipping debris. Soils in this unit were gritty, but also contained a high clay content and were very wet.

Excavation Unit 7 was excavated in the vicinity of EU 5 where numerous artifacts and pottery were recovered. In addition to chipping waste, eight stone tools were recovered from Unit 7.

A quartz tool fragment was recovered from 10 to 20 centimeters (Figure 12A) as was a broken quartz Levanna point (Figure 12B). Several tools were found from 20 to 30 cm including a quartz Levanna point tip (Figure 12C), a quartz Levanna point base (Figure 12D), a quartz Levanna point preform (Figure 12E), a felsite point tip (Figure 12F), a quartz biface (Figure 12G), and a quartz Levanna point fragment (Figure 12H). Five sherds of Native American pottery were recovered from this unit as well from the third plow zone level (20 to 30 centimeters).

The base of a possible cultural feature was found in Unit 7 in the east end of the excavation. A dark stain with charcoal and small fragments of burned bone were labelled Feature 2. The top of the feature, in the base of the plow zone, was found at 28 centimeters and the bottom extended to 39 cm below the surface. The dark stain which formed the feature was roughly circular (37 by 17 cm in size) and was situated between two large boulders (Figure 13). Quartz, maroon felsite, and a jasper-like flake were found in the feature; soil and charcoal samples were collected. The soil samples were fine-screened to recover organic remains and micro-flakes. The result was the recovery of three quartz flakes and one felsite flake and one possible charred seed. The charcoal sample, most of which was recovered from the bottom of the feature (30 to 39 centimeters) was sent to Geochron Laboratories for radiocarbon dating. The sample from the feature (GX-20132) was dated to 510 +/- 95 years before present (BP) (C-13 corrected). This feature therefore was probably a Late Woodland storage, refuse, or fire pit.

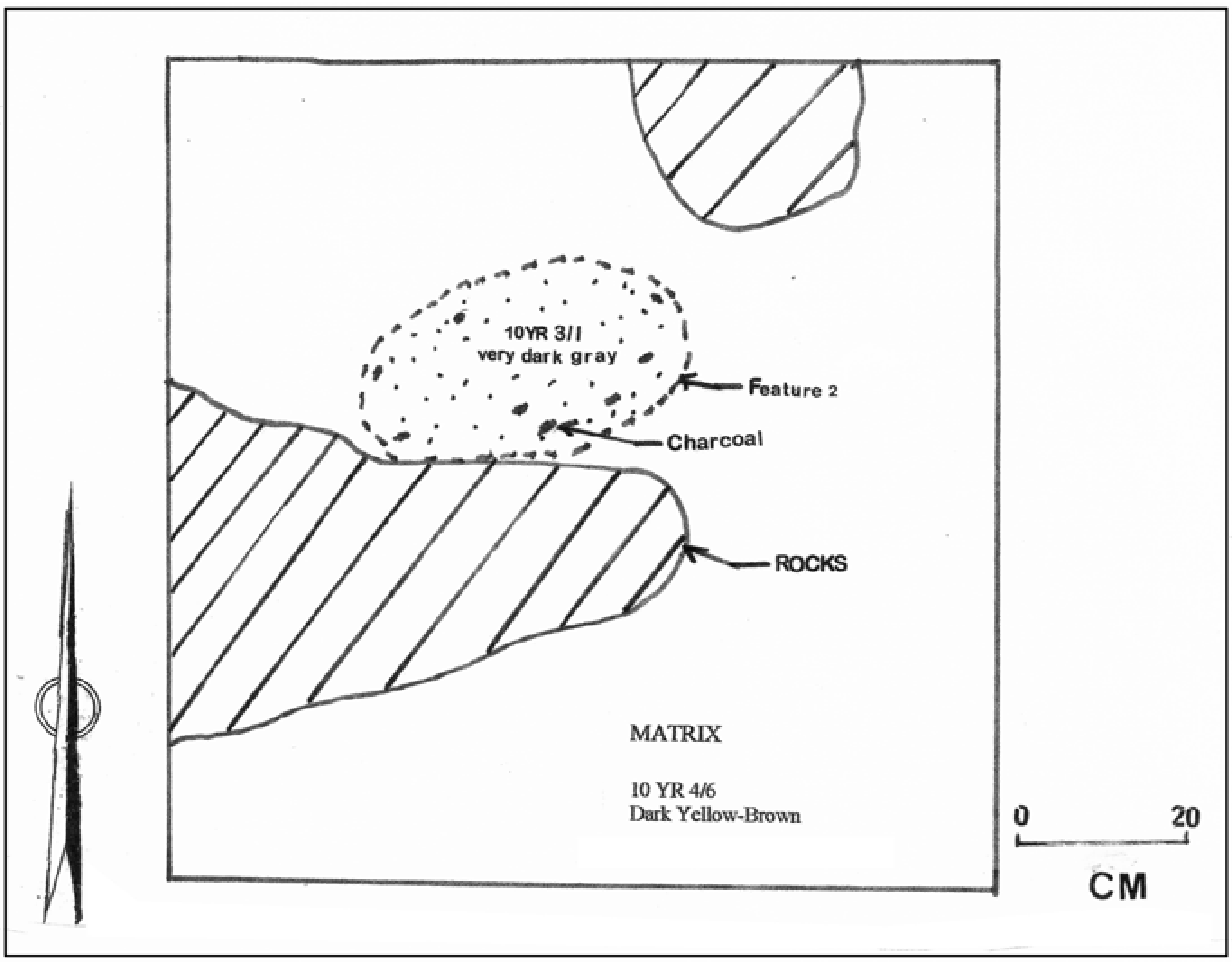

Figure 13. Plan view of Feature 2, Excavation Unit 7.

Excavation Unit 8 (50 by 100 cm) was located near Test Pit 20 in order to investigate the southern extent of the site. A small felsite point tip was recovered from level 2 (10 to 20 cm) below the surface. A low density of artifacts was found in this unit.

Excavation Unit 9 (50 by 100 cm) was dug in the vicinity of test pits 36 and 38 which contained high densities of artifacts. A fragment of the tip of a quartz biface was recovered from the 10 to 20 centimeter level in the plow zone. In addition, there was an abundant amount of quartz, felsite, and quartzite debitage recovered from the plow zone at 10 to 20 cm in depth. The base of the plow zone was very irregular, mottled, and rocky.

Cultural Materials Recovered

Diagnostic Stone Artifacts

Forty-six stone tools and cores were found during the site examination. The majority of these artifacts were quartz bifaces, tool fragments, or broken projectile points. Most of the diagnostic points from the site date to the Late Woodland Period (ca. 1,300 to 400 BP). In addition, one Late Archaic (4,100 to 3,600 BP) Atlantic-like point was found. The points suggest that the site is multicomponent. Table 1 provides an inventory of all of the stone tools recovered during the site examination.

Thirty-five (35) ancient Native American projectile points were recovered from the excavation units. The majority of tools (57%) were recovered from the plow zone in the 20 to 30 centimeter level. Table 2 provides a summary of the tools recovered from the meter units by level during the site examination.

The majority of the projectile points recovered from the site were quartz and felsite Levanna points, which have been dated to the Late Woodland period (1,300-400 BP). In addition, two quartz Large Triangle points (Levanna) were

Table 1. Stone Tools Recovered During the Phase II Site Investigation, Including Cores.

Tool Type	Material	Unit	Approx. Depth in Cm
Biface, broken	quartz	TP 28	0-29
Point tip	felsite	TP 33	30
Point tip	felsite	TP 33	32
Biface, broken	quartz	TP 33	30
Biface, fragment	felsite	TP 33	29
Tool, fragment	quartz	TP 36	20
Levanna, preform	quartz	TP 36	19
Biface, fragment	quartz	TP 51	30
Levanna, point tip	quartz	TP 52	24
Levanna point	quartz	EU 1	10-20
Projectile pt, frag	quartz	EU 1	10-20
Projectile pt, tip	USM	EU 1	10-20
Atlantic point, base	felsite	EU 1	20-30
Projectile point, base	felsite	EU 1	20-30
Biface/tip-midsection	quartz	EU 1	20-30
Levanna pt, tang	quartz	EU 1	20-30
Projectile pt, tip	quartz	EU 1	20-30
End scraper	quartz	EU 2	0-10
Projectile pt, tip	quartz	EU 2	10-20
Levanna pt, preform	felsite	EU 2	20-30
Tool, fragment	argillite	EU 2	20-30
Biface, tip	quartz	EU 2	20-30
Projectile pt, tip	quartz	EU 2	20-30
Projectile pt, tip	felsite	EU 2	30-40
Biface, rough	USM	EU 3	10-20
Biface, rough	quartz	EU 3	10-20
Projectile pt, tips (3)	quartz	EU 4	10-20
Tool, fragment	quartz	EU 4	10-20
Core, fragment	quartz	EU 5	20-30
Projectile pt, tips (3)	quartz	EU 5	20-30
Levanna pt, base	felsite	EU 6	20-26
Levanna pt, broken	quartz	EU 7	10-20
Tool, fragment	quartz	EU 7	10-20
Core, rough	quartz	EU 7	10-20
Levanna pt, base	quartz	EU 7	20-28
Levanna pt, frag	quartz	EU 7	20-28
Projectile pt, frag	quartz	EU 7	20-28
Biface	quartz	EU 7	20-28
Projectile pt, tip	felsite	EU 7	20-28
Projectile pt, tip	felsite	EU 8	10-20
Biface, tip	quartz	EU 9	10-20

Table 2. Distribution of Tools by Level from Cut River Point Site Meter Units.

Depth/cm	EU 1	EU 2	EU 3	EU 4	EU 5	EU 6	EU 7	EU 8	EU 9	Count
0-10	0	0	0	0	0	0	0	0	0	1
10-20	3	1	2	3	0	0	0	1	0	13
20-30	4	5	0	0	4	1	6	0	0	20
30-40	0	1	0	0	0	0	0	0	0	1
									Total Tools:	**35**

Percent 0-10 (3%); 10-20 (37%); 20-30 (57%); 30-400 (3%)

recovered during the intensive survey and Mark Lyons, a local artifact collector, also reported having found large quartz triangles at the site. This suggests that the site is, at least in part, a major Levanna point workshop, especially since preforms of these points were recovered. Two Levanna points were recovered from the test pits and seven were found in the meter units. Table 3 provides a summary of the Levanna points recovered from the meter units by depth.

It is clear from Table 3 that nearly all of the Levanna points in the meter units were found between 10 and 30 centimeters below the surface. This level is considered to be about the bottom of the plow zone and therefore one could argue that the lowest horizons of the site can be relatively dated to the Late Woodland period; no diagnostic artifacts were found beneath the plow layer in the B horizon subsoil. Based on the tool types recovered from the site, it appears that the artifacts are associated with a workshop. This is supported by the presence of rough cores, blanks, cobble decortication flakes, preforms, and the absence of a large variety of tools such as would be expected at a habitation site. Only one finished scraper was recovered during the site examination; no drills, adzes, axes, gouges, or ground stone tools were found. Scrapers were also found during Phase I.

Lithic Debitage

Lithic waste materials at the site include quartz, felsite, and fine-grained siliceous material (USM), quartzite, argillite, and chalcedony. Minor amounts of jasper and chert-like materials were also recovered. Each of the raw material types represented at the site is briefly described below.

Quartz. Several different types of quartz were found at the site including clear quartz, milky, smoky, and crystal.

Felsite. Five primary types of felsite were recovered from the Cut River Point site: maroon to red, gray-green, mottled brown to gray, weathered, and black. The maroon felsite often exhibited white phenocrysts (inclusions) and was probably part of the Lynn Volcanic Complex (MHC 1984:224). The origin of the weathered gray, gray-brown, and gray felsites is not known, but these are probably locally available.

USM: Unidentified siliceous material. This lithic material is very fine-grained, but was not similar enough to chert or jasper to classify it as such. It may in fact be very fine-grained quartzite or chalcedony. Colors include light green, buff, mottled white, and red. The majority of pieces were light green in color.

Quartzite. This material is similar to quartz, but has a sugary texture; it also lacks phenocrysts and inclusions and is less lustrous than quartz. Much of the quartzite at the site is gray-green in color and may come from sources in central Massachusetts.

Argillite. Two types of argillite were found at the site: green and brown-gray. The green argillite (indurated mudstone) is somewhat macroscopically similar to Narragansett Basin argillite. It is

Table 3. Levanna points from Meter Units by Level in Centimeters.

Depth/cm	EU 1	EU 2	EU 3	EU 4	EU 5	EU 6	EU 7	EU 8	EU 9
0-10									
10-20	1						1		
20-30		1				1	3		
30-40									

Total Levanna points: 7 (71%) from 10-30; total points at site Phase I and II: 11

fine-grained and has a light-colored weathering rind (for more details about this material, see Strauss 1989).

Chalcedony. This material is fine-grained but can be somewhat grainy and semi-translucent. The exact source is unknown, but it is most likely exotic to New England. Alternatively, the stone may be a variety of a very fine-grained quartzite or aporhyritic felsite; some of the chalcedony-like flakes have cobble cortex, which may suggest it is a local material. Source determination would require petrographic analysis.

Miscellaneous Lithics. There were only a few pieces of debitage that were fine-grained enough to be considered chert or jasper. Two waxy, reddish-brown flakes were recovered which appear to be somewhat similar to Pennsylvania jasper. The flakes are too small to make a definitive classification, however, if they are jasper then it would suggest long-distance exchange with Native American groups to the west (for more details about the use of jasper during the Woodland Period, see Strauss 1992). There was also one flake of very fine-grained and siliceous chert-like material. This classification is not positive, but may also indicate long-distance exchange or interaction with cultures to the west.

To summarize, the main types of lithics recovered from the site were locally available quartz and felsite and argillite. Almost all of the lithics utilized could have been locally obtained, with the exception of the chert-like and jasper flakes which could come from New York or Pennsylvania. Nearly all of the raw materials included flakes with cobble decortication surfaces, which indicates that the parent materials were probably derived from beach cobbles. This was a common practice at Native American sites, especially on Cape Cod. Table 4 summarizes the major raw materials by count and percent. The table includes all chipping debris, but not tools or tool allies such as cores or bifaces.

It is clear from Table 4 that the most commonly used raw materials at the site for stone tool manufacture was quartz and felsite.

Lithic Flakes

The flakes at the site were generally 1 to 3 centimeter or 3 to 6 centimeter (primary) bifacial thinning flakes, secondary flakes, and tertiary flakes, as well as some retouch flakes.

Floral Remains

One small, possible carbonized seed was recovered during the site examination from the soil

Table 4. Types and Percentages of Chipping Debris Recovered During Site Examination.

Material	Count	Percent of total
Quartz	3,371	57.48
Felsite	2,178	37.11
USM	265	4.51
Quartzite	25	.426
Argillite	14	.238
Chalcedony	8	.136
Jasper	2	.034
Chert-like	1	.017
TOTAL	5,864	100%

sample taken from the Native American cultural feature. Zooachaeologist and archaeological consultant Tonya Largy examined the seed and determined that it was actually a burned wood fragment.

Ancient Native American Ceramics

A total of twenty sherds of pottery were recovered during the site examination. All of the sherds, except two, were undecorated body fragments. The clay paste was sand-tempered and the vessel walls were thin. The two decorated pieces exhibited what may be cord-wrapped stick decorations. The sherds were so small, however, that no definitive statements can be made about their temporal affiliations. Based on temper and overall morphology, they would appear to be associated with the Late Woodland period. Based on the cord-wrapped stick decorative pattern, they could also perhaps be assigned to the Middle Woodland. Because the site contains a significant Late Woodland component, it is very likely that the ceramics are also Late Woodland; they were found in the same stratigraphic levels as Late Woodland Levanna points.

Summary and Interpretation

Seven meter-square units, two 50 by 100 cm units, and thirty shovel test pits were excavated during the Phase II site examination. Testing was designed to investigate the horizontal and vertical boundaries of the site, to establish a site chronology, and to make an assessment of the site's eligibility for inclusion on the National Register of Historic Places.

The majority of diagnostic artifacts from the Cut River Point site date to the Late Woodland Period (ca. 1,300 to 400 BP). One Late Archaic Atlantic-like point (ca. 4,100 to 3,600 BP) was also found, which suggests that the site is multicomponent. In addition to preforms and broken projectile points, several thousand pieces of debris were found. These pieces of tool manufacturing waste indicate that the site was the locality of one or more lithic workshops. In most cases, tools were manufactured from locally available stone cobbles.

Site Boundaries

Horizontal Boundaries. The area that was tested appears to be roughly 400 feet north-south by 160 feet east-west in size (see Figure 3). The site therefore extends to the complete limits of the area that was tested with subsurface units. While the southern end of the impact area contained low artifact densities, the northern end contained abundant densities of both tools and debitage. This is supported by the densities of chipping debris from each excavation unit. The highest densities of debitage were recovered from Excavation Unit 7 (1,301) and Excavation Unit 5 (1,195), which were located in the northern central portion of the site area that was tested. The lowest artifact counts were recovered from Excavation Unit 6 (61), which was located in the southern extent of the site. The original site was probably much larger than the tested area that remained intact. The debitage counts for each unit are as follows: EU 1 (944), EU 2 (766), EU 3 (685), EU 4 (420), EU 5 (1,195), EU 6 (237), EU 7 (1,301), EU 8 (61), and EU 9 (258). It should be noted that Excavation Units 8 and 9 were 50 by 100 centimeters in size. Based on the tools and debitage, the northern portion of the test area may have been a series of overlapping lithic workshops. It is estimated that 0.375 percent of the impact area has been excavated (that is the area that was outlined by MHC for testing, not the entire area that was proposed for development). The total site size in the area that was recommended for testing is about 4,125 square meters. A total of 15.5 square meters was excavated.

Vertical Boundaries. Artifacts were found to a maximum depth of about 30 centimeters. Most of the chipping debris (2,769) was concentrated between 20 and 30 centimeters below the surface in the plow zone. The majority of tools (20 out of 30) were also recovered from this level.

Five of the seven Levanna points (71%) found at the site were recovered from the plow zone level 20 to 30 cm. Table 5 presents a summary of all the cultural material by level (in centimeters) from the excavation units.

Site Chronology

Based on the diagnostic artifacts, the site can be relatively dated by typological comparison to the Late Woodland Period (ca. 1,300-400 BP). A radiocarbon sample from Feature 3 at the site was dated to 510+/- 95 years before present. Therefore, the C-14 date also supports a Late Woodland association for the site. Ritchie (1961) notes that Levanna points occur in the late Middle Woodland and Late Woodland periods in New York. There was also a second component, based on the Late Archaic Atlantic-like point, which is dated to about 4,100 to 3,600 BP. A third component may be suggested by the narrow bladed point tips that were recovered, and these may date to the Early Woodland Period, but this cannot be definitivelydetermined.

Site Function

The site appears to consist of one or more high-density quartz and felsite workshops. In addition to stone tool making, it is possible that pottery was made and used at the site. The presence of pottery, scrapers, projectile points, and small features may suggest that other activities also took place at the site, but this is just speculation. No living structures (post molds), drills, gouges, axes, or adzes were found. Cultural evidence suggests a short-term habitation, but no evidence of a large dwelling or permanent village. No data are available for seasonality or group size at the site.

Regional Context

There are eleven ancient Native American sites within the general project vicinity. Four of these sites are Late Woodland sites with Levanna points. Most of the recorded sites in the region are the result of avocational archaeologists collecting materials and there is little cultural or chronological data available. Late Woodland sites occur in a wide variety of habitats including estuarine environments such as site 19-PL-424 and -425 on Duxbury Marsh, 19-PL-426 at Green Harbor, and 19-PL-45 at Kingston Bay. The marine estuarine environment was obviously an important draw for Native American peoples. The Cut River Point site falls into a similar pattern for multicomponent sites (Late Archaic/Late Woodland) in the region. It is interesting to note that while several of the sites in the nearby vicinity contained shell middens, no shell deposits were identified at the Cut River Point site. Not all Late Woodland sites, however, have shell deposits.

National Register Site Evaluation

Based on the results of the Phase I and II archaeological studies, it appears that the Cut River Point site is not eligible for nomination to the National Register of Historic Places. The site has limited research potential, because all of the artifacts were confined to the plow zone. Second, only one confirmed ancient Native American feature was identified and it was shallow and likely truncated by agricultural plowing. The lack of faunal and floral remains also limits the site's research potential. Little can be said about the subsistence

Table 5. Cultural Material by Level, Cut River Point Site, Phase II.

Depth/level	EU 1	EU 2	EU 3	EU 4	EU 5	EU 6	EU 7	EU 8	EU 9	Count
0-10 Pz	1	21	17	55	17	14	18	8	13	164
10-20 Pz	486	168	470	440	280	178	470	31	246	2769
20-30 Pz	454	556	173	87	737	58	762	20	0	2846
30-40A/B	25	27	25	0	13	0	47	0	0	137

Percent: 0-10 (2.7%); 10-20 (47%); 20-30 (48%); 30-40 (2.3%); nothing in B horizon subsoil.

Figure 14. Selected Levanna points: Top row, left to right: Levanna preform, TP 36, 0-28; Levanna point, broken, EU 1, 10-20; Levanna point midsection, TP 52, 0-24; bottom row, left to right: Levanna point, EU 6, 20-26; Levanna point tip, EU 7, 10-20; Levanna point base, EU 7, 20-28.

strategies at the site. While the site contains a high density of debitage and tools, it does not represent a large habitation area and is not a unique find. Further testing at the site would likely only produce data similar to that already obtained. Because of the site's limited research potential, it is not considered eligible for listing on the National Register of Historic Places.

Conclusions

The Cut River Point site, located in an estuarine environment in Marshfield, Massachusetts represents a multicomponent Late Archaic and Late Woodland workshop site. Several thousand pieces of chipping debris, stone tools, preforms, cores, an end scraper, and 11 Levanna points were recovered from the combined Phase I and II projects (see Figure 14). A small amount of Native American pottery was also identified, as were two shallow Native American features. One feature provided a C-14 date of 510 +/- 95 years BP. The site is clearly a major Levanna point workshop primarily from the Late Woodland Period.

The restriction of the site's remains to the disturbed plow zone level, lack of internal site complexity, and low variety of tools, suggest that the site has limited research potential. No further archaeological investigations were recommended to the Massachusetts Historical Commission.

Data Availability Statement

Work was conducted under Massachusetts Historical Commission Permit Number 1343 for the site examination in compliance with Chapter 9 of Massachusetts General Laws (950 CFR 800), and the Massachusetts Environmental Policy Act (MEPA). All of the recovered artifacts from the site are curated at the archaeology laboratory of University of Massachusetts, Boston and at Cultural Resource Specialists of New England laboratories in Providence, Rhode Island. CRM reports for both phases of work are on file at MHC, Boston.

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NASHAQUITSA SITE, MARTHA'S VINEYARD

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Abstract

This article presents the results of an excavation of a Late Archaic, Transitional Archaic to Early Woodland, and Late Woodland archaeological site in Chilmark on Martha's Vineyard. The site was excavated by the senior author in the early 1970s, and overlaps with several other sites and excavations conducted in the area. Three strata were identified, as well as hearth, refuse, and post hole features representing a possible structure. Diagnostic artifacts from the Late Archaic and Woodland periods were found, along with a dog burial and two deer bone caches.

Introduction

Surrounding Menemsha Pond on Martha's Vineyard are a number of archaeological sites. These sites are located in the towns of Aquinnah and Chilmark, on the west and east sides of the pond, respectively. In 1971, the senior author (Andrew Stanzeski) was stationed at the U.S. Coast Guard's Gay Head Station (#49) in Menemsha. At that time, one of these sites, located at Nashaquitsa Pond, was disturbed by local collectors and some artifacts were left behind. Most noted were large steatite (soapstone) potsherds associated with a hearth feature. A number of units were excavated to learn about the cultural resources. During excavation, one Woodland Period feature had remains of a dog, possibly from a feast. Another feature held a cache of deer antlers. A reworked fluted point made into a Palmer Corner-Notched point was found in the lower stratum of the site (cf. Boudreau 2016:36). The main components found at the Nashaquitsa site are Late Archaic, Transitional Archaic to Early Woodland, and Late Woodland. This article describes the results of excavations begun in 1971 and continued the following year.

History, Location, and Field Work

The area around Chilmark and Gay Head, on the west end of Martha's Vineyard, has been subject to the most archaeological work on the island, beginning with Samuel L. Guernsey (1916), and followed by Douglas S. Byers and Frederick Johnson (1940). More recent work has been done by William Ritchie (1969), James A. Tuck (1972), James B. Richardson III (1985), Elizabeth S. Chilton (2002), Holly Herbster and Suzanne Cherau (2008), and Jessica Watson (2019a and 2019b). Farther inland, Gale Huntington (1959) and Andrew Stanzeski (2019a, 2019b) have done work.

The Nashaquitsa site is located on Martha's Vineyard, Dukes County, in the Township of Chilmark (Figure 1). The site is on the north side of Middle Road where Nashaquitsa and Stonewall ponds meet; it extends from a high rise (25 feet+/- feet) near the location of the Taylor's house, north to a small creek. Nashaquitsa Pond empties into Menemsha Pond, which in turn empties into Vineyard Sound. This is where Quint's boat, the *Orca*, left the harbor in the movie Jaws (the red roof of the U.S.C.G. boathouse can be seen in the distance). Byers and Johnson (1940:6) note a site on their map that is most likely the Nashaquitsa site, and likewise, William Ritchie (1969:194-203) excavated the Howland No. 1 site, which is very close to the Nashaquitsa site. Information on file at the Massachusetts Historical Commission indicates that the Nashaquitsa site is within the bounds of sites 19-DK-58 and 19-DK-122.

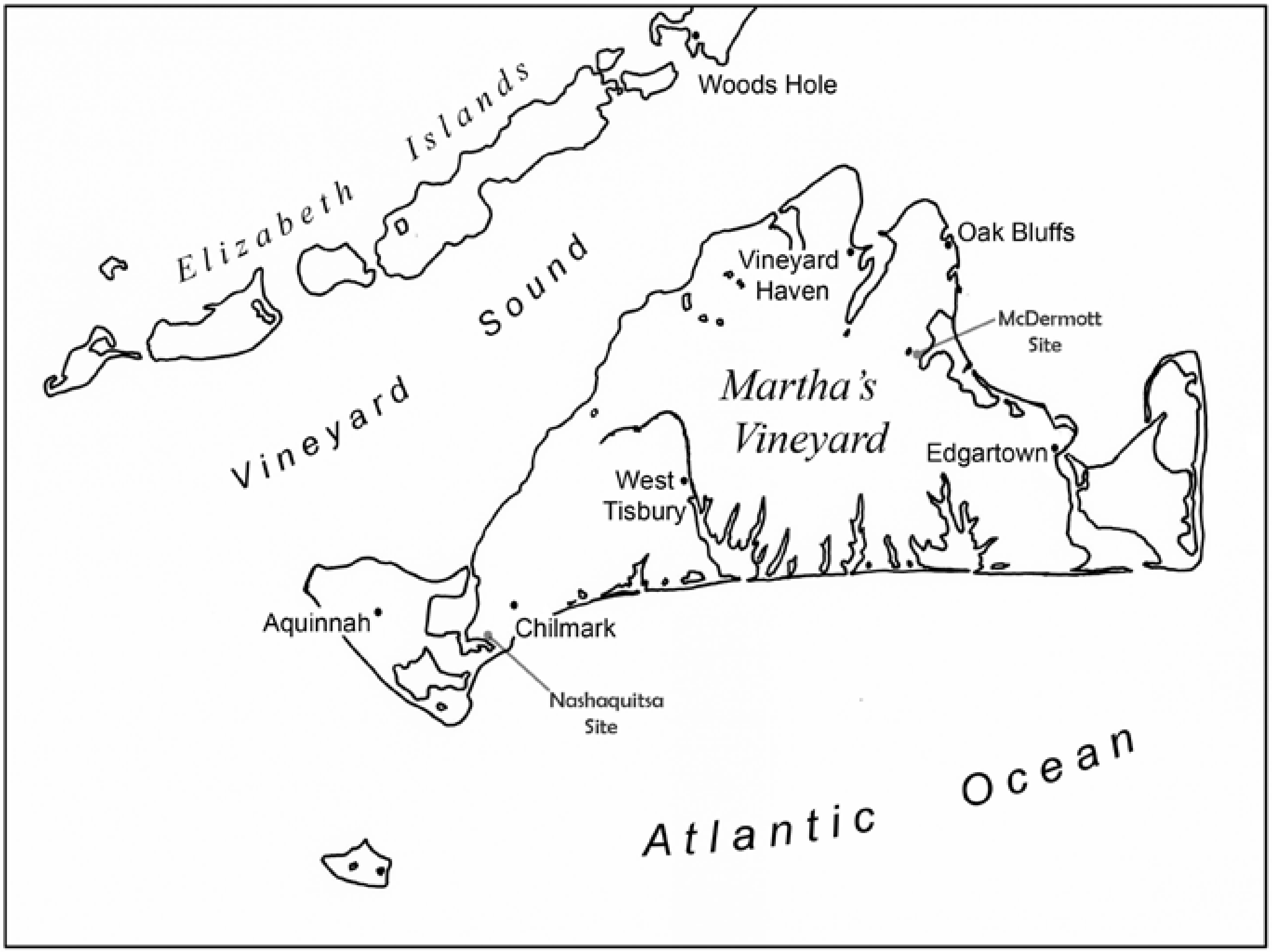

Figure 1. Map of Martha's Vineyard showing the general area of the Nashaquitsa site.

The site area closely matches William Ritchie's description of the Howland No. 1 site (19-DK-57) that he excavated in 1966. The significant difference being there was no poison ivy, with some wild roses, scrub oak, bayberry and local grasses. In the area of the excavation, the grasses were low on top of the high knoll that overlooked the ponds. Game crossing between the Nashaquitsa and Stonewall ponds could have been observed. Ultimately, the area was pastureland, and is now dotted with residences.

The site covers a large area with a shell midden in the area of the small creek. The shell midden did not extend to the southern part of the site near the property owner's house or dog pen. The owner's dog dug up a large biface in his pen. Local collectors disturbed the site, starting in the area from the creek to 300 feet north of the house. Collectors left steatite potsherds behind in their excavation made on the high rise. The senior author excavated this area, hoping to find the source of the steatite potsherds under the disturbed layers. A 5-foot grid was laid out between the previous excavations (Figure 2). The units were excavated by stratum, and features were excavated by stratum as well, following the descriptive terminology of Ritchie (1969) and Richardson (1985). Screens were not used, but the strata and features were troweled down in 3 inch levels and diagnostic artifacts and faunal remains were retained. Flakes were present, but not saved. The site had never been plowed and had undisturbed soils from upper Stratum I to lowest Stratum IV. The site was not a shell midden like other sites found on the Vineyard, though some areas had shell deposits, possibly the beginning of a shell midden. These shell deposits must have resulted

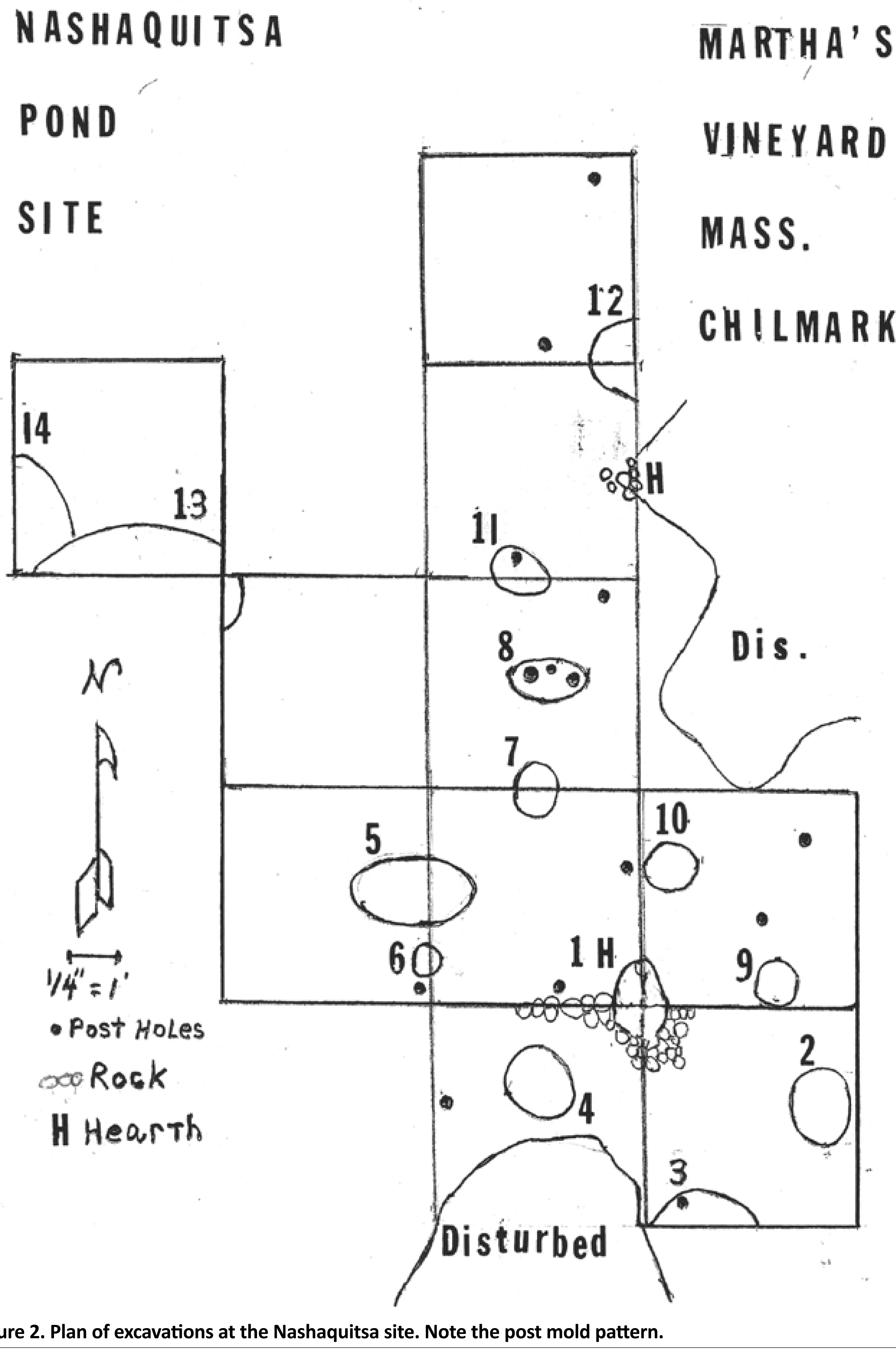

Figure 2. Plan of excavations at the Nashaquitsa site. Note the post mold pattern.

from small-scale shell dumping activities on an occupation surface. In well-developed shell middens, distinguishing individual dumping events (a facies) can be quite difficult (Stein 1992:95-162). At the Nashaquitsa site, the activities or dumping events where the features were found in Stratum I were easy to distinguish.

Stratigraphy, Features, and Post Holes

Stratum I was a dark brown sandy loam averaging 9-inches in depth. A scattering of whole and crushed shell and bone occurred throughout the stratum. Shells found include hard shell clam or quahog (*Mercenaria mercenaria*), soft shell clam (*Mya arenaria*), and Virginia oysters (*Crassostrea virginica*). Some mussel shell also was found, including blue mussel (*Mytilus edulis*) and Atlantic ribbed mussel (*Geukensia domissa*).

Artifacts were first encountered 1.5 inches below the surface. Humus was not found in the units, most likely due to winds blowing across the top of the knoll, depleting the soil. Seven features were encountered in Stratum I. The closing depths of the features were 5 to 10 inches. All features found in Stratum I were Woodland Period refuse deposits based on relative dating of artifact types.

Stratum II was a light brown sandy loam from 9 to14 inches in thickness with no shell or bone. Artifacts were found throughout the stratum. In Stratum II, four features were found, including one hearth. The features had a closing depth of 20 to 22 inches.

Stratum III had very light brown/reddish yellow sub soils, sand, gravels and cobbles. This sounds similar to the light tan-colored soils found in William Ritchie's Howland No. 1 site sub soil, with the gravels and cobbles, ranging in thickness from 14 to 24 inches. No shell or bone was found in this stratum. Most artifacts were found from 14 to 22 inches. Stratum III had four features that had a closing depth of 32 to 44 inches.

Stratum IV sub soils were a reddish yellow, with sand, gravel, cobbles and boulders, thickness 23 inches to an unknown depth. No artifacts were found in this stratum. Only a small number of units were excavated into Stratum IV. No features were encountered in Stratum IV.

A total of 10 post holes, each with a diameter of 2.5 to 3 inches, were found starting in Stratum I and extending down through Stratum II. Feature 8 is a cluster of three post holes, each with different depths and sizes (see feature description). Four post holes with burnt wood fragments in the southern part of the site formed a circular pattern. In Feature 8, two large posts were burnt. Returning to the site the following year, units were excavated north of Feature 8 in hopes of finding posts related to the feature and the southern post holes. One post was found in this search. The maximum distance or diameter of the structure represented by the Feature 8 posts is approximately 16 feet, north to south. This is similar to the 16-foot diameter post hole pattern found at the Cunningham site (Ritchie 1969:101-102). The Pilgrims observed post patterns like this as well among the Wampanoag dwellings in the seventeenth century (Cheever 1848:39-40).

Summary of Features

Fourteen features were discovered during the excavation, primarily localized refuse deposits, hearths, and post holes.

Stratum I Features

Seven features were found in Stratum I, and all had dark sandy soils with compact crushed shell and bone, except one (see Table 1). Only features in Stratum I had bone and shell; readers should consult Table 2 for a summary of fauna and Magee et al. (this issue) for details on the faunal remains. All features in Stratum I were confined to the stratum, began near the ground surface, and did not extend into the sub soil. The closing

Figure 3. Deer antler and bone artifacts: a) antler tool, Feature 11; b) antler tool, Stratum I; c-f) bone awls, Stratum I; g) bone awl, Stratum II; h) antler tool, Feature 7; i) deer mandible tool, Feature 5; j) deer femur head with drill marks, Feature 3; k) deer metapodial bone awl, Feature 5.

depth of Stratum I features were 5 to 10 inches below the surface. The features are interpreted as bone and shell refuse deposits left on past living floors. The features seem to be deposits made after one meal or feast. These deposits look like the beginning of a shell midden. Only one feature—Feature 8—did not have refuse but had three post holes, two of which were burned on the top, but no carbonized wood was found below the surface of the living floor.

Feature 3, measuring at 31 inches across, was only half excavated; it extended 8 inches in depth. This was the only feature with dog remains (30 fragments of dog bone were recovered) and 224 other bone fragments (see Table 2 for summary of faunal remains). One post hole was located in the feature. The feature had over twice the amount of bone than the other excavated features. One deer bone—the head of the femur of a sub-adult—with four drill marks on the round side, was found; its use is unknown (Figure 3). The feature possibly represented a feast.

Table 1. Features from the Nashaquitsa site.

Stratum	Feature #	Feature Type	Feature Dimensions	Closing Depth Below Surface	Diagnostic Artifacts
Stratum I	3	Refuse; dog burial	31 inches across	8 inches	
	5	refuse	48 by 24 inches	9 inches	Wading River point
	7	refuse; deer antler cache	24 inches in diameter	10 inches	Rossville point
	8	post holes	18 by 12 inches	6 inches	
	11	refuse	12 inches in diameter	8 inches	Levanna point
	12	refuse	24 inches in diameter	9 inches	
	13	refuse; deer astragali cache	48 by 30 inches	5 inches	
Stratum II	1	hearth	48 by 22 inches	18 inches	
	2	pit	26 inches in diameter	20 inches	
	4	pit	24 inches in diameter	20 inches	
	9	pit	18 inches in diameter	20 inches	
Stratum III	1-A		28 by 23 inches	36 inches	
	6	pit	12 inches diameter	42 inches	
	10	pit	30 inches diameter	32 inches	
	14	pit	36 inches diameter	44 inches	Squibnocket Triangle point

Table 2. Summary of faunal remains from the Nashaquitsa site (see Magee et al., this issue, for more detail on the fauna).

Common Name	Scientific Name	Total Element Amount	% of Total
Mammal	Mammalia	322	49.24
Deer	*Odocoileus virginianus*	215	32.87
Bird	Aves	51	7.80
Dog	*Canis familiaris*	30	4.59
Turtle	Testudines	17	2.60
Unknown	N/A	5	0.76
Fish	N/A	5	0.76
Canid	Canidae	3	0.46
Teleost Fish	Actinopterygii	2	0.31
Dolphin	Odontoceti	1	0.15
Gull	*Larus* sp.	1	0.15
Whistling swan	*Cygnus columbianus*	1	0.15

Feature 5 measured 48 inches long by 24 inches wide and closing at 9 inches. One artifact found was a Wading River point fragment (Boudreau 2016:67). One-hundred and nineteen bones and bone fragments were found in Feature 5. One bone was the proximal right humerus of a whistling or tundra swan, with cut marks and a puncture mark (see Magee et al., this issue). A portion of a deer mandible (specifically, part of the gonial angle) was worked into a possible cutting tool (Figure 3). One bone awl was made from a deer shaft bone fragment.

Feature 7 measured 24 inches around, closing at 10 inches. Stone tools found in the feature include one Rossville point fragment, one Rossville preform, another un-typed perform fragment, and one end scraper fragment (Boudreau 2016:115). Sixty-six bone fragments were found. Also, in this feature was a cache of 34 whole antlers and fragments, including some worked examples; this represented over half the bone count in the feature. Most of the smaller bone fragments were found below the antler cache. One deer antler with attached cranium had a rounded, worked edge.

Feature 8 measured 18 inches long by 12 inches wide, closing at 6 inches. Three posts were found in this feature. Two of the three posts had carbonized wood on the top; the carbonized wood did not continue below the living floor. These two posts had burned, but apparently, the charring

Table 3. AMS date from Feature 8. Calibration using IntCal Northern Hemisphere radiocarbon age calibration curve, CALIB Rev. 8.2 (Reimer et al. 2020).

Lab ID	Provenance	Material	Pretreatment	Radiocarbon age BP	Range, 68.3% probability (1 sigma)	Range, 95.4% probability (2 sigma)
20C/0831	Feature 8	Carbonized wood	AAA	690 +/- 30	cal AD 1280-1380	cal AD 1270-1390

had stopped at ground surface. One post in the center of the feature was 2.5 inches around, closing at 10 inches. The post on the right was also 2.5 inches around and extended for 14 inches, while the post on the left was 8 inches around and extended 4 inches in depth. Staining and charcoal were present, but there was no unburned wood. There was an absence of shell and bone in this feature. The features are the center post holes making up the house pattern found at the site. One carbonized hickory nut fragment was found in Feature 8. Carbonized wood from the large post was saved for radiocarbon dating, and, in August 2020, was submitted to International Chemical Analysis Inc. (ICA) in Sunrise, Florida for AMS dating (see Table 3). The resulting range is cal AD 1270-1390.

Feature 11 measured 12 inches in diameter and closed at 8 inches. Seventeen bone fragments were found. There were snail shells also found in the feature. One post hole was located in the feature. One quartz Levanna triangle point fragment (Boudreau 2016:122), one quartz end scraper, one quartz biface tip fragment, one quartz biface type tool (cortex found on both ends of the tool), and one paint stone made of graphite was found in the feature. One worked deer antler fragment also was found.

Feature 12 measured 24 inches in diameter, closing at 9 inches. One-hundred-and-one bone fragments were found, including one dolphin ear bone (petrosal bone).

Feature 13 measured 48 inches long by 30 inches wide, closing at 5 inches. Only half of the feature was excavated. Eighty-five animal bones were found. Noted were three left and three right deer carpals (also called astragali), possibly representing another cache. Astragali are often reported as gaming dice, and may have been used as bola weights in some cultures (Culin 1907:136, 148; Stanford 1976:38-39). Residents at the Nashaquitsa site may have retained the deer astragali for future use. One quartz perform fragment and fragments of grit and quartz temper potsherds also were found in Feature 13.

Features found in Stratum I date to the Late Middle to the Late Woodland periods, as indicated by the artifacts and the radiocarbon date. Each feature could represent separate deposits from one or more activities, a meal, or manufacture of bone grease. The broken-up deer bone in the features could specifically represent the making of bone grease, as described by Douglas Leechman (1951:355-356). Each feature was deposited on the occupation area and not dug into deeper levels. The Nashaquitsa site is not a true shell midden, but most likely represents the beginning of one; the majority of the features in Stratum I appear to be discrete refuse deposits of animal bone and shell made on the ground surface. If more deposits had occurred, the site may have become a midden. Animal bone varied in amount between the different features. Feature 3 had the largest amount of bone, including dog remains. The feature may represent a different type of meal, bone processing, or a larger group of people participating in an activity, like a feast.

Stratum II Features

Stratum II had four features. These features were composed of sandy brown colored soil with no bone or shell. Two hearths were located in Stratum II. One hearth in the northern part of the excavation was not numbered because it was mostly disturbed. Both hearths were restricted to

Figure 4. Fossil and stone artifacts from the Nashaquitsa site: top row) petrified wood, Stratum II; middle row, left to right) hammerstone, Stratum I; steatite sherd, Feature 1; bottom row) stone adze, Feature 1-A.

Stratum II. The other features found in Stratum II extended down into Stratum III.

Feature 1 was a hearth 48 inches long by 22 inches wide with cobbles in one main area and larger cobbles forming a wall to the west. The hearth cobbles were found only in Stratum II. Soapstone potsherds were found in and around the hearth, closing at 18 inches below surface.

Feature 2 measured 26 inches in diameter, closing at 20 inches.

Feature 4 measured 24 inches in diameter, closing at 20 inches. No diagnostic artifacts were recovered.

Feature 9 measured 18 inches in diameter, closing at 22 inches.

The presence of the steatite sherds suggest the features found in Stratum II date to the Transitional Archaic Period. Feature 1, the hearth, seems to have been a focus of activity at the site.

Stratum III Features

Stratum III had a total of four features. They were a sandy yellowish brown in color with some gravels. No bone or shell was found in these features. All features in Stratum III extended into Stratum IV.

Feature 1-A was found below the hearth and was 28 inches long by 23 inches wide, closing at 36 inches. One adze type tool was found in the top of the feature (Figure 4).

Feature 6 was 12 inches around, closing at 42 inches.

Feature 10 measured 30 inches around, closing at 32 inches. One Squibnocket Triangle point was found in the feature (Boudreau 2016:82).

Feature 14 measured 36 inches wide. Only part of the feature was excavated, closing at 44 inches. One Squibnocket Stemmed point was found in the feature (Boudreau 2016:83).

The features found in Stratum III date to the Late Archaic and Transitional periods.

Artifacts

Table 4 lists all lithic artifacts found at the Nashaquitsa site. The artifacts are discussed here by stratum, beginning with surface finds.

Surface Finds

Artifacts found on the surface at the Nashaquitsa site were mostly from the top of the hill to a scattering along the pond. One artifact was in the area of the Howland No.1 site. The artifacts found on the surface were either discarded or overlooked by collectors during their excavation. The area selected for excavation at the Nashaquitsa site in 1971 was where the soapstone bowl fragments had been found. Most artifacts were made from pebble quartz, rhyolite porphyry, and quartz latite porphyry (David C. Parris, personal communication, 2021). The term rhyolite is used in this report, referring to an igneous-volcanic rock, likely originating in local Pleistocene deposits.

The point types found on the surface were one Levanna triangle point, four Squibnocket Stemmed points, three Wading River points, one Rossville point, and two point fragments (Boudreau 2016:67, 83, 115, 122). Other artifacts found on the surface were one quartz preform used as a tool (spokeshave), two quartz gravers, and a possible siltstone atlatl fragment. Three preforms included one of quartz, one of rhyolite, and one possible Neville preform (Boudreau 2016:42-45; Dincauze 1976:26-30). The possible Neville preform was made of grayish-green argillite material. One bone awl and a body sherd of steatite-tempered pottery were found in the area of the Howland No. 1 site and Menemsha Pond. Artifacts were very common around the margins of Menemsha Pond, and could be observed when walking along the shoreline. Other surface finds include one crude broken lanceolate biface with a heavy patina with end thinning flakes (flutes) on both sides; this is possibly an unfinished PaleoIndian biface or a Mansion Inn blade (Dudley Variety) made of rhyolite (Dincauze 1968:17-27).

Stratum I Artifacts

Artifacts from Stratum I were eight Levanna triangle points (Figure 6a), four Rossville points, two Squibnocket Triangle points, one Wading River point, one Poplar Island point, and five point fragments. Stratum I points were predominantly Late Woodland Levanna triangle points made of quartz and rhyolite. Other tools in Stratum I were one quartz scraper, an end scraper made of diabase, one sandstone grooved hammerstone (Figure 4), and a fragment of a siltstone gorget (Figure 5). Four rhyolite and two quartz (one used as a tool) preforms were found. The bone tools from Stratum I included five bone awls and one worked

Figure 5. Stone artifacts from the Nashaquitsa site. Top row: two fragments of a Poplar Island or Greene-like point of Barrington argillite, Stratum II; bottom row (left to right): chipped stone awl, Stratum II; drilled stone gorget, Stratum I; and stone plummet, Stratum III.

Figure 6. Stone tools from the Nashaquitsa site: a) Levanna triangle point, possibly argillite or hornfels, Stratum I; b) paint stone, Stratum II; c) ceramic rim sherd with scallop shell decoration, Stratum I; d) Jack's Reef Pentagonal, rhyolite, Stratum II; e) leaf-shaped Middle Archaic point or Poplar Island, rhyolite, Stratum III; f) Rossville, rhyolite, Stratum I; g) Meadowood, rhyolite, Stratum II.

antler fragment. Thirteen small fragments of pottery were found, mostly in the area of Feature 13. Other potsherd fragments were two Late or Middle Woodland grit-tempered body sherds, smooth on the interior, incised on the exterior. Two Late Woodland rim sherds with scallop shell decoration on the exterior (Figure 6c), and one Late or Middle Woodland shell-tempered body sherd also were found. Bone and antler artifacts include three awls made from deer antler shaft fragments, two worked deer antlers, and the distal fragment of a deer metapodial awl.

Stratum II Artifacts

Bifaces from Stratum II include one Jack's Reef (Figure 6d), two Poplar Island (possibly Greene-like), one Meadowood (Figure 6g), three Rossville points, twelve Squibnocket Stemmed, one Squibnocket Triangle point, seven Wading River points, one Brewerton Side-Notched, and six point fragments (Boudreau 2016:73, 80, 120-121). In Stratum II, the predominant point was the quartz Squibnocket Stemmed point. Most of the Squibnocket Stemmed and Wading River points were found in the five excavation units made around the hearth area during the first year of excavation. Other artifacts found were one argillite awl, one quartz graver, two graphite paint stones, one quartz knife, and one rhyolite chopper. Petrified wood, likely part of a glacial drift deposit transported during the Pleistocene Ice age from the Middleboro-Plympton area, was found in Stratum II (Mills and Hotchkiss 2019:366-369) (Figure 4). In New Jersey, petrified wood fragments have been associated with Late Archaic sites, where they were found in hearths and burials (Mounier 1974:25-26). Doyle (1995:302) indicates that basalts from the Turner Farm site in Maine contained chalcedonic materials, including agate/petrified wood. Overall, it is unclear how common petrified wood is at Massachusetts sites or in the Northeast broadly. Five quartz (one used as a tool), one rhyolite, and one quartzite preform were found. Only one potsherd was found. It was a quartz-tempered body sherd, exhibiting incising on the exterior, and fiber impressions on the interior. The soapstone fragments were found in Stratum II in and around Feature 1; these are discussed below. One bone awl made from a deer shaft fragment was found at the interface of strata I and II. The point diagnostic point types suggest a date during the Late and Transitional Archaic into the Woodland period; excavation of a nearby site shows that Squibnocket points, often associated with the Archaic, continued to be made and used into the Woodland period on Martha's Vineyard (Jeremiah 2015).

Stratum III Artifacts

Bifaces from Stratum III were one Poplar Island (possibly a Middle Archaic Stark-like), three Squibnocket Stemmed points, two Squibnocket Triangle, one Wading River, one reworked fluted point (reworked into a Palmer Corner-Notched or an Archaic Notched point), one Otter Creek, and six point fragments (Boudreau 2016:36, 60, 67, 80, 82, 83). Quartz Squibnocket Stemmed points were the predominant point found in Stratum III. Other artifacts found were one quartz flake tool and one fragmentary shale plummet (Figure 5). The plummet was found by accident. During the excavation, a large boulder tumbled out of the wall. Beneath the boulder, there was a plummet. The plummet could have been hidden in that location on purpose, though it is difficult to be certain because of the uncontrolled way the object was discovered. No potsherds were found in Stratum III. No artifacts were found in Stratum IV.

Projectile Points

Table 5 lists the type of points by stratum and material. Measurements for Squibnocket and Wading River points were taken. These were the predominant points found at the site. Most were found in Stratum II in the first year of excavation. This would be in the area of the hearth (Stratum II, Feature 1) and the soapstone bowl fragments.

One reworked, fluted point made of a heavily patinated stone was found in Stratum III (Figure 7).

Table 4. Lithic artifacts from the Nashaquitsa site.

Type	Material	Feature	Strat	Strat I	Strat II	Strat III	Total	Notes
Flake Tools	Argillite, Rhyolite				2	1	3	
Scraper	Rhyolite, Quartz	F. 7		1			2	
End Scraper	Quartz, Rhyolite	F. 11		1			2	
Awl	Argillite				1		1	
Spoke Shave	Quartz		1		1		2	+ 1 Scraper
Graver	Quartz		1		1		2	
Cutter	Quartz	F. 11					1	Dec. on ends
Knife	Quartz				1		1	
Adze	Quartz	F.1A					1	
Hammerstone	Sandstone			1			1	
Plummet	Shale					1	1	
Gorget	Shale			1			1	
Atlatl	Shale		1				1	
Paint Stone	Graphite	F. 11			2		3	
Petrified Wood	Fossil				1		1	
Chopper	Rhyolite						1	
Total		**5**	**3**	**4**	**9**	**2**	**24**	
%		**.21**	**.13**	**.17**	**.38**	**.08**		

* Does not count bifaces repurposed into gravers or perforators.

The point was fluted on both sides, one side had one flute and two flutes on the other all going about 1/3 the length of the point; the flutes are like those found on other fluted point types (Jack Cresson, personal communication, 2021). There was heavy grinding present on the base and notches. The point blade edges were resharpened to form a beveled edge showing heavy wear. The reworked point would fit into the Hardaway Side Notched (Coe 1964:64-69; Justice 1987:36-44), Palmer Corner-Notched (Boudreau 2016:36), or Broad Eared or Archaic Notched types (Johnson and Mahlstedt 1984:82-85). William Moody (2008:6-11) has documented other PaleoIndian and Early Archaic points on the Vineyard. Similar points have been found in New Jersey at the West Creek site (Stanzeski 2019b:111-133) and dated there to 9850 +/-160 B.P.

Figure 7. Reworked fluted point from the Nashaquitsa site, possibly of patinated Braintree hornfels, obverse and reverse, Stratum III. The point was reworked into a Palmer Corner-Notched or Archaic Notched point.

Similarly, Boudreau (2016:36) affirms an Early Archaic date for Palmer Corner-Notched points in the Northeast, with dates around 9,000 years ago. Similar Late Archaic types would date from 5,000 to 4,000 B.P. The material could be Wakefield salt and pepper rhyolite (Boudreau 2019:164) from north of Boston or patinated Braintree hornfels. This is the only point made of this material found on the site.

One Otter Creek point fragment found in Stratum III and one broken Brewerton Side-Notched point found in Stratum II were both made of rhyolite (Figure 8). Both points are from the Late Archaic Period.

Twenty Squibnocket Stemmed points were found, nineteen of quartz and one of rhyolite (Figures 9 and 10). A random sample of these (n=11) were measured and closely examined. The points averaged 2.8 cm (1.10 in.) in length (5 were broken, however), 0.66 cm (0.26 in.) thick, 1.25 cm (0.50 in.) wide at the shoulder, and 2.2 grams (0.08 oz.) in weight. Measurements from shoulder to base were not made because the shoulder on either side of the points varied considerably. Ten points of were of quartz, one was rhyolite. The consistent measurement was the thickness of the points, which ranges from 0.6 cm to 0.7 cm (0.24 to 0.28 inches). Quartz was the predominate material. Almost half of Squibnocket Stemmed points were tools used as perforators, reamers, or drills (Jack Cresson, personal communication, 1974). Jeff Boudreau (2008:12-18) also noticed this wear pattern. This could have been the end stage use of the Squibnocket Stemmed points after other functions were exhausted. One point also was found in Stratum III, Feature14. The Squibnocket Stemmed points are typically considered markers of the Late Archaic Period, though more recent research indicates origins in the Middle Archaic and continuity well into the Woodland Period (Donta 2017). At Ritchie's (1969:52, 220) Hornblower II site, Feature 10, Stratum 3 to 2190 B.C.+/- 100 years (Y-1529) and Feature 6, Stratum 4 to 2270 B.C. +/-160 (Y-1530) both contained Squibnocket Stemmed points. These are the same dates for Squibnocket Triangle points.

Thirteen Wading River points were found; eleven made of quartz and two made of Barrington argillite (Figures 9 and 10). Barrington argillite is

Figure 8. Chipped stone points from the Nashaquitsa site (left to right): repurposed Otter Creek or Orient Fishtail made into end scraper, Stratum III; notched preform or biface, possibly a Brewerton Side-Notched, Stratum II. Both rhyolite.

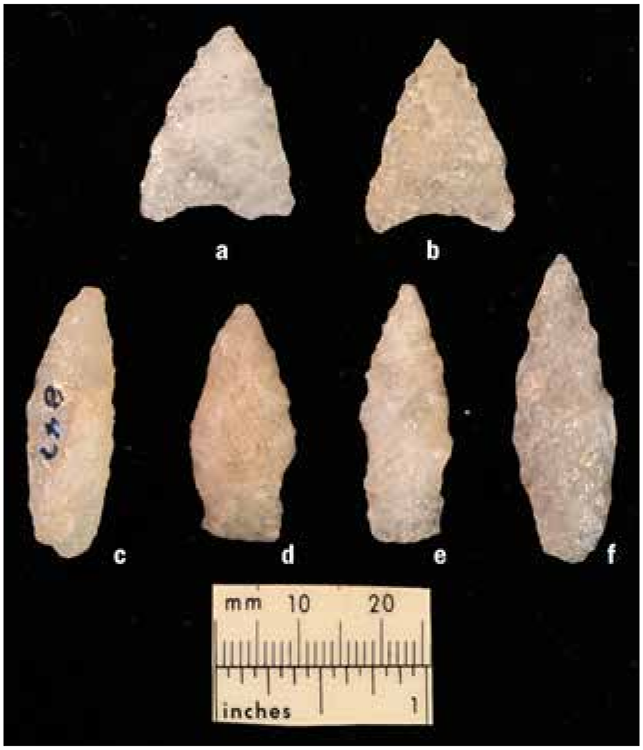

Figure 9. Quartz chipped stone tools from the Nashaquitsa site: a) Squibnocket Triangle, Stratum I; b) Squibnocket Triangle, Stratum III; c) Squibnocket Stemmed, Stratum III; d) Wading River, Stratum II; e) Wading River, Stratum III; f) Squibnocket Stemmed, Stratum II.

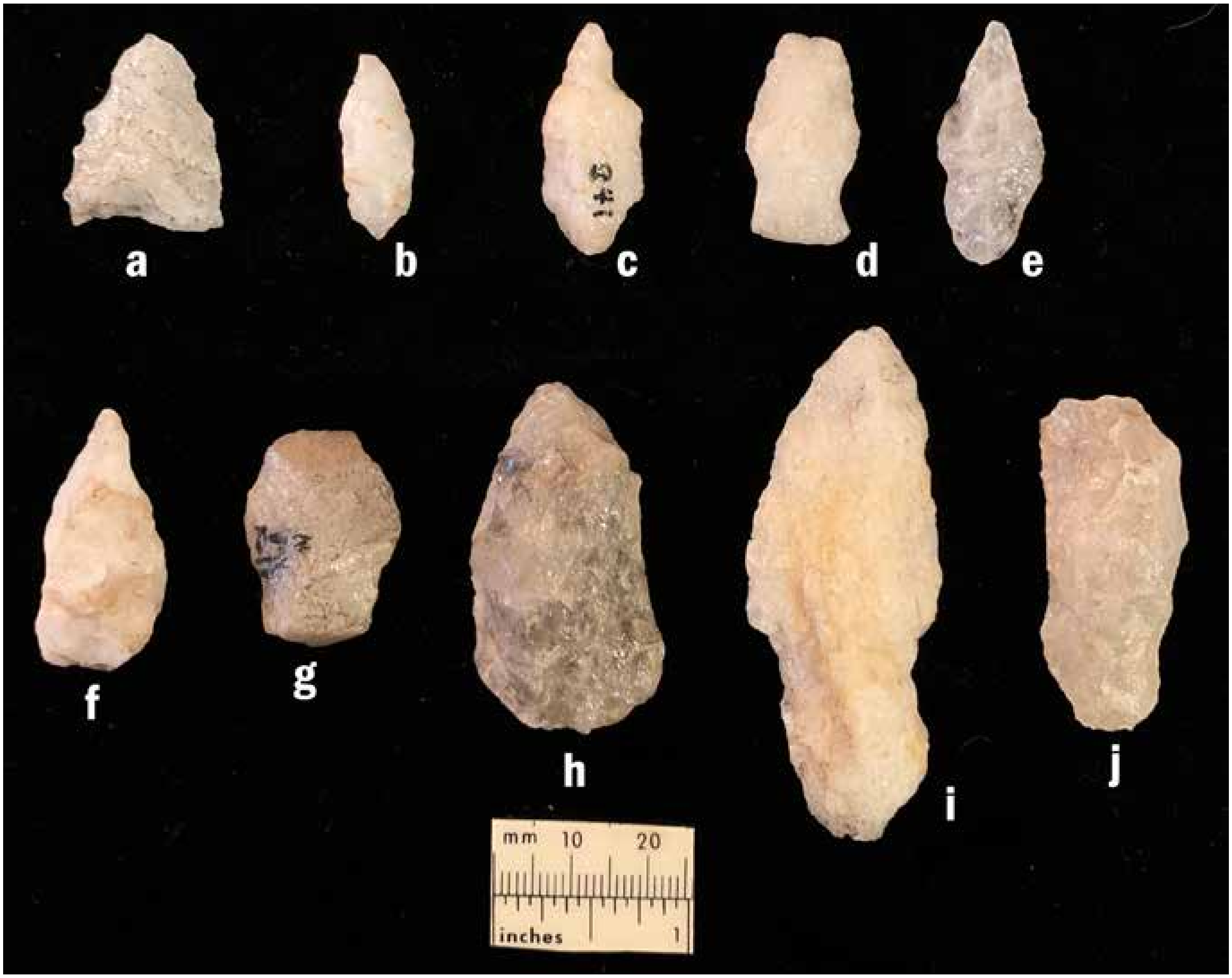

Figure 10. Quartz tools from the Nashaquitsa site: a) Squibnocket Triangle cutter, Feature 10; b-c) 2 stemmed bifacial awls, Strata I/II interface; d) Wading River scraper, surface; e) Squibnocket Stemmed awl; f) awl, Stratum II; g) scraper, Feature 11; h) end scraper, Feature 11; i) knife, Stratum II; j) spokeshave, surface.

found in outcrops in southeastern Rhode Island (Boudreau 2016:165). Six Wading River points were selected at random, measured, and closely examined. The points averaged 3.1 cm (1.22 in.) in length, 0.68 cm (0.27 in.) thick, 1.5 cm (0.59 in.) wide at the shoulder, 1.2 cm (0.47 in.) from shoulder to base, and 3.1 grams (0.11 oz.) in weight. Five were of quartz, and one was of Barrington argillite. Some points showed edge damage from use as tools and others had been resharpened (Boudreau 2008:12-19; Jack Cresson, personal communication, 1974). All had likely been used as projectile points first before being reworked and reused. Wading River was the predominate point found in Stratum II after Squibnocket Stemmed. Most were found in the area of the soapstone bowl fragments. At the Vincent Site, soapstone bowl fragments also were found associated with Wading River points (Ritchie 1969:145-152). Wading River points intergrade with Bare Island points (Ritchie 1969:242). Wading River points are from the Early Woodland (Transitional) to Late Archaic periods, and most likely are associated with the steatite bowl fragments (Kinsey 1959:109-133; Ritchie 1971:14-15).

Six quartz Squibnocket Triangle points were found (Figures 9 and 10). Resharpening was found on most of the Squibnocket Triangle points. One point had a possible impact fracture, and evidence of reworking after being broken. Two

Squibnocket Triangle points were in Stratum III, one in a Stratum II, two in Stratum I, and one in Feature 10, a Stratum III feature. The Squibnocket points are indicative of the Late Archaic Period.

Poplar Island points span the Late Archaic to the Early Woodland. One was found in Stratum I, two in Stratum II, one in Stratum III (Figures 5 and 6). The long timeframe of the Poplar Island points is supported by its presence in all three strata. The Poplar Island points were made from rhyolite (n=2), quartz (n=1), and fragmented bluish-green Barrington argillite (n=1) (Boudreau 2016:81, 165). Some of these may represent other types as well. For example, the argillite point could also be Greene-like (Johnson and Mahlstedt 1984:120-121) and one of the rhyolite points is Stark-like (Johnson and Mahlstedt 1984:74-75).

One point from the Early Woodland was a Meadowood point (Figure 6). The Meadowood point was possibly made of Blue Hills/Mattapan rhyolite (Dudek, personal communication, 2021) was found in Stratum II. On Martha's Vineyard, four Meadowood points were found at the McDermott site (Stanzeski 2019a:59). Meadowood points are known to be made from Onondaga chert and are made with a bone or copper flaking tool (Ritchie 1965:183-184). The author has found Meadowood points of Onondaga chert and a copper flaking tool in a cremation burial at the Abbott Farm site in New Jersey. The switch in material from Onondaga chert to local rhyolite may affect the appearance of the point; despite this difference, the points at the McDermott site were likely Meadowood points.

Dating from the Middle and Late Woodland periods were nine Rossville points all made of rhyolite (Figure 6). One found in Feature 7, one on the surface, four in Stratum I, and three in Stratum II. Four preforms found in Stratum II are most likely Rossville preforms. One Jack's Reef Pentagonal point (a Fox Creek point look alike) made of rhyolite was found in Stratum II. The two point types are almost identical. Jack's Reef Pentagonal points tend to be smaller in size and made of rhyolite. Fox Creek points are made from a mix of materials, local and non-local. For example, the Fox Creek point found at the McDermott site, Martha's Vineyard was made from a non-local Lockatong argillite from New Jersey, over 300 miles to the west (Stanzeski 2019a:57).

Table 5. Projectile points from the Nashaquitsa site (compare with Boudreau 2016).

Type	Material	Feature	Surface	Strat I	Strat II	Strat III	Total	%
Levanna	Quartz, Rhyolite	F. 11	1	8			10	5%
Jack's Reef	Rhyolite				1		1	2%
Rossville	Rhyolite	F. 7	1	4	3		9	14%
Meadowood	Rhyolite				1		1	2%
Stemmed point, could be Poplar Island	Quartz, Rhyolite, Argillite			1	2	1	4	6%
Wading River	Quartz, Argillite	F. 5	3	1	7	1	13	20%
Squibnocket Stemmed	Quartz, Rhyolite	F. 14	4		12	3	20	30%
Squibnocket Triangle	Quartz	F.10		2	1	2	6	9%
Otter Creek	Rhyolite					1	1	2%
Brewerton Side-Notched	Rhyolite				1		1	2%
Reworked fluted point	Rhyolite					1	1	2%
Total	**41 Q, 22 R, 3 A**	**5**	**9**	**16**	**28**	**9**	**67**	
%	**62% Q, 33% R, 5% A**	**6%**	**14%**	**24%**	**42%**	**13%**		

* Q – Quartz, A- Argillite, R- Rhyolite

From the Late Woodland Period were nine Levanna triangle points; four made of quartz, and five of rhyolite (Figure 6). One point was found on the surface and eight in Stratum I.

Soapstone Analysis

The soapstone fragments were found in Stratum II in and around Feature 1. Soapstone outcrops and quarries are known in Connecticut, Massachusetts, and Rhode Island (Snow 1980:250; Tweedie 2014:60-72). Archaeologists have been interested in sourcing the objects made of soapstone that are found at archaeological sites in the region (e.g., Strauss 2021; Tweedie 2014). The senior author submitted one of the soapstone vessel sherds and a ceramic sherd with a soapstone inclusion to Heather Wholey, PhD, anthropology faculty member at West Chester University, for analysis. Dr. Wholey used a portable spectrometer (pXRF) to determine the elemental composition of the soapstone vessel sherd, though the soapstone inclusion in the ceramic sherd was too small for pXRF analysis. Using a scanning electron microscope with spectroscopic capability, Dr. Wholey and her colleague Dr. Samantha Shumlas, of the West Chester University Center for Microanalysis and Imaging Research and Training were able to analyze the soapstone inclusion.

Results of the analysis are presented in Tables 6 and 7. While the SEM was limited to major elements, the pXRF tested for major and trace elements. The major elements silicon, potassium, calcium, titanium, manganese, and iron were

Table 6. Soapstone sherd, pXRF data supplied by Heather Wholey, PhD, West Chester University. Data collected with Bruker Tracer 5 portable XRF spectrometer and Mudrock trace calibration.

	Scan 1 %	Scan 2 %	Scan 3 %	Scan 4 %	Scan 5 %	Scan 6 %	Average	Standard Deviation
Si	19.64	17.93	5.65	13.28	14.62	6.10	12.87	5.88
K	<LOD	<LOD	0.16	<LOD	0.09	<LOD	0.13	0.05
Ca	0.17	0.25	0.14	0.38	0.18	0.14	0.21	0.09
Ti	0.02	0.01	0.05	0.06	0.08	0.04	0.04	0.03
V	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Cr	0.58	0.09	0.09	0.19	0.19	0.12	0.21	0.19
Mn	0.12	0.07	0.09	0.18	0.15	0.07	0.11	0.05
Fe	3.96	3.41	2.99	5.91	5.03	2.69	4.00	1.25
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Ni	0.15	0.18	0.09	0.09	0.11	0.11	0.12	0.04
Cu	0.00	0.00	0.00	0.01	0.00	0.00		
Zn	0.01	0.00	0.01	0.01	0.01	<LOD	0.01	
As	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Rb	0.00	0.00	0.00	0.00	0.00	<LOD		
Sr	<LOD	0.00	0.00	0.00	0.00	<LOD		
Y	<LOD	<LOD	0.00	0.00	<LOD	0.00		
Zr	<LOD	<LOD	0.00	<LOD	0.00	<LOD		
Mo	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Ba	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Pb	<LOD	<LOD	<LOD	0.00	0.00	<LOD		
Th	0.00	0.00	0.00	0.00	0.00	<LOD		
U	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		

Table 7. Soapstone inclusion in ceramic sherd, SEM data supplied by Heather Wholey, PhD and Samantha Shumlas, West Chester University Center for Microanalysis and Imaging Research and Training. Data collected with FEI Quanta 400i ESEM with an Oxford XMax 80 SDD detector for EDS analysis, running Aztec EDS analysis software.

	Spec 1	Spec 2	Spec 3	Spec 4	Spec 5	Spec 6	Spec 7	Spec 9	Spec 11	Average	Standard Deviation
C	22.39	36.48	39.44	17.7	26.89	25.92	40.51	36.69	22.71	29.86	8.48
O	53.1	43.8	41.93	54.22	47.29	55.53	47.9	45.7	52.68	49.13	4.9
Na	0.28	0.26	0.18		0.34		0.11	0.29		0.24	0.08
Mg	0.16	0.48	0.51	0.13	0.45	0.33	0.27	0.44	0.27	0.34	0.14
Al	0.26	5.02	4.39	0.14	6	0.83	0.85	5.03	0.79	2.59	2.44
Si	0.12	6.58	5.89		6.61	0.81	0.94	6.81	0.88	3.58	3.11
P	0.1	0.47	0.52	0.08	0.96	0.19	0.17	0.55	0.26	0.37	0.29
S	0.12		0.13		0.13	0.12	0.09	0.08	0.08	0.37	0.29
Cl							0.05				
K		0.79	0.75		1		0.08	0.71		0.67	0.35
Ca	23.46	3.81	3.89	27.72	7.27	16.12	8.91	1.42	22.05	12.74	9.8
Ti		0.31	0.22		0.29			0.27		0.27	0.04
Mn			0.15		0.22			0.1		0.16	0.06
Fe		2.00	1.99		2.54	0.15	0.12	1.92	0.29	1.29	1.05

detected in both samples, though in differing proportions. The pXRF identified trace elements nickel, copper, and zinc in the soapstone vessel sherd. Both the major and trace elements detected seem to be common in New England soapstone quarries, as presented by Tweedie (2014:141-144). Further analysis and inclusion of additional soapstone quarry sources are needed to draw specific conclusions.

Feasting, Caching and Charms

In this section, we discuss the dog remains, and their possible connection to feasting; the caches of antlers and astragali; and the presence of bones and other objects that may have been charms.

Dog Remains and Feasting

Dog remains—possibly used in sacrifice, burial, food, and ceremony—are well known at ancient Native American archaeological sites. Jordan E. Kerber's (1997) Lambert Farm book provides an in-depth study. Three dog burials found at the Lambert Farm in Rhode Island had one thing in common: an abundance of food remains (Kerber 1997:77). Most sites on Martha's Vineyard have dog remains. A dog burial found at the Pratt Site was a medium sized animal, buried on its side and exhibiting no trauma (Ritchie 1969:67, 71). At the Vincent site, a skinned dog carcass was thrown into a feature; between its ribs was a Rossville point (Ritchie 1969:138). The Cunningham site was of interest because the dog bones were found scattered in both strata I and II with a scatter of broken and burned human bones (Ritchie 1969:94, 113). Also, the cranium and cervical vertebrae of a medium-sized dog was found, interpreted by Ritchie (1969:113) as evidence of a decapitation. At the Frisby-Butler site, a dog burial was found in Stratum III interred with a Brewerton point near its head. This was an older dog whose right front leg had broken and healed before death (Richardson 1985:40). The faunal remains from both the Hornblower II and the Frisby-Butler sites also include dogs (Watson 2019a:40, 41, 49; 2019b:29). There is considerable room for conjecture and speculation about the dog remains found at the Nashaquitsa site and the activities that led to their deposition. Dog remains at Native American sites reflect a variety of activities, including sacrifice, healing, weather control, war preparations, thanksgiving, or subsistence (Kerber 1997:98-100). One ethnographic example was the war feast where the head of the enemy captive or an animal head (e.g., dog) went into a kettle for soup. The choice morsel went first to the chiefs (Fenton 1953:106-107; Tooker 1964:72-74).

Feature 3 at Nashaquitsa site contained the remains of a dog, deer, bird, fish, and shellfish. Feature 3 may represent a feast for a larger group pf people. Feature 3 had double the faunal remains than any of the other features found on the site. The dog is a medium sized, short-nosed dog (Figure 11). Wear on the teeth indicate a mature animal. The mandible was broken mid-way, with the front part missing. Other fragments found were femur, skull, rib (n = 1), vertebrae (n = 8), the axis, and the sacrum. The left proximal femur exhibits a puncture mark from an unknown implement. Similar features with a lot of food refuse also were found at the Middle Woodland Pennella site on the Jersey shore (Stanzeski 1996:15-18) and the Late Woodland Pahaquarra site in the Delaware Water Gap area (Kraft 1986:192-193). Like Feature 3 at the Nashaquitsa site, Pennella and Pahaquarra had features with a lot of food refuse, possibly representing a feast for a large number of participants.

In the past wild dogs on Martha's Vineyard were noted for killing swimming deer. In a storm

Figure 11. Dog remains from Nashaquitsa site, Feature 3: left) dog mandible and tooth fragments; right) left proximal femur with puncture mark.

evacuation of Buzzards Tower (the senior author was stationed on the tower) by a 44-foot boat, deer were seen swimming from Cuttyhunk Island to Nashawena Island (Elizabeth Islands). A ranger on the Vineyard told me he had seen wild dogs sit and wait to attack and kill swimming deer after they come out of the water. This has happened on other islands where dogs run wild and kill wild sheep. For example, on Hog Island in Virginia's eastern shore, wild dogs were eradicated (Herman 2019:254-255). There could be a type of love and hate affair with dogs in the past on the Vineyard. Some dogs aided in hunting, but others were competition for food like deer. Depending on the human and deer population on the island, there could be conflict. This could be why some dogs were found in burials and others thrown in the pot.

Antler and Deer Bone Caches

Two Woodland Period caches were found. In Feature 7 were six whole deer antlers and 28 antler fragments that could have been saved to make tools, retained as trophies, or used as part of headgear (Figure 12). The cache found in Feature 13 included six deer deer astragali. Many cultures from different times and different places used astragali like dice (Culin 1907:136, 148). Roger Williams (1643:177, 179) describes the use of dice, called "plumbstones," among the Wampanoag in a number of gambling games. Caching has been noted at other Woodland sites as well. The Willowbend site on Cape Cod had pigment stones, four deer antlers, reddish-colored clam valves, ten deer phalanges, a beaver incisor, and turtle bone all found together in one feature (Shaw 2008:48). The caching of objects is likely to hide, stockpile, or save items for future use.

Charms

Artifacts that might be charms were found at the site. Only one dolphin bone, the petrosal, was found at the site in Feature 12. The petrosal is a dense part of the skull, near the inner ear; sometimes these are called ear bones. McNiven (2010), writing about marine mammal hunters in the Torres Strait, makes a connection between charms and the sensory organs of the hunted animals. He argues that hunters in northeastern Australia extracted the ear bones of marine mammals, like dugongs, to use as charms to influence the outcome of hunts (McNiven 2010:219-220). Likewise, Lenik (2016:57) says that "sculpted fish, shell, and marine mammal effigies and engraved fish and sea mammal figures on pendants, pipes, and cobbles" might be personal charms or lures, or used in giving thanks to achieve success in search of marine foods. Similarly, Koerper et al. (2013) argue that marine mammal ear bones could have been charms or curiosities in ancient California where there also are effigies of these animals. Readers also are referred to research by the late Brian Robinson and his colleagues (2017) regarding Native American marine mammal fishing in Maine and the implications of skull bones found at sites.

One piece of petrified wood was found in Stratum II in the area of the hearth (Figure 6). One fragmentary shale plummet was found in Stratum III (Figure 5). Possibly the location on top of the hill can be related to the charms and feasting. The site is not a shell midden, but an occupation from the Transitional Archaic Period (focused around the hearth feature) and an occupation level from the Woodland Period (Stratum I features and house pattern). The list of faunal remains from sites on Martha's Vineyard includes more than food remains, like the dogs interred as humans or deposited in ritual contexts. Watson (2018; 2019a:43) documents ritual or caching use of dog, bald eagle, and box turtle at the Frisby-Butler site on the Vineyard, as well as single instances of animal bones that might be charms, including bear teeth (2018:164). These singular bones might be charms used to bring luck in a hunting, fishing, or as elements of medicine bundles (Tooker 1964:120-124). The petrosal bone from the dolphin is most likely a charm or fetish that was lost or intentionally left behind. There could be other

Figure 12. Deer remains from the Nashaquitsa site: top row) antler cache and tool, Feature 7; bottom row) deer astragali cache, Feature 13.

symbolic meanings to these charms, like thanksgiving for successful fishing trips or aid in future hunting or fishing trips. The one piece of petrified wood was most likely part of the glacial drift deposits or another charm. Petrified wood was used in New Jersey in burials and for magic when thrown into a hearth. The plummet was hidden in a safe place, under a boulder, possibly to be used in the future. All of the above were most likely important to the owners of the objects.

Summary and Conclusion

The Nashaquitsa site is a multicomponent site located along the east side of Nashaquitsa Pond. The site is part of one of many found around the Menemsha Pond area. The site includes shell deposits, but is not a well-developed shell midden; shellfish must have been brought to the site from marine environments on the island's margins. The site located on a high rise with fresh air and view of the area, may have been occupied during the summer.

A reworked fluted point made into what may be a Palmer Corner-Notched biface, dating to the Early Archaic around 9000 +/- years ago is the earliest artifact found at the Nashaquitsa site; it also is possible that it was reworked into an Archaic Notched point dating to the Late Archaic. A small number of Late Archaic bifaces found at the site were Otter Creek and Brewerton Eared-Notched.

The main component found on the site is represented by the Transitional Archaic Period. The point types, like Wading River, were associated with the hearth, soapstone sherds, the adze, and plummet.

A Meadowood point dating to the Transitional-Early Woodland Period was found; it is possibly made of a fine grain rhyolite from the Blue Hills. The point was pressure flaked. On Martha's Vineyard, only a small number of Meadowood points have been found. The McDermott site also had points of this type (Stanzeski 2019a:55-69). At both sites, these Meadowood points diverge from the classic type description because of material or tools used in manufacture.

Rossville, Jack's Reef Pentagonal, and Levanna points along with a small number of potsherds represent the end of the Middle and Late Woodland periods at the site. They were associated with features found in Stratum I and with the fragmented house pattern. During this time, there is evidence for caching of deer antlers and bones, the possible use of charms, making tools, and feasting involving dogs.

Many bifaces found are part of the Squibnocket Complex (Ritchie 1969:215-221), with most bifaces and tools made of quartz. The end use of these bifaces can be seen in their worked down blade, as they were made into perforators and cutters. These tools represent continuity from the Archaic into the Woodland era.

Data Availability Statement

The recovered cultural materials will be donated to the Martha's Vineyard Museum, 151 Lagoon Pond Road, Vineyard Haven MA 02568.

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THE ZOOARCHAEOLOGICAL REMAINS OF THE NASHAQUITSA SITE, MARTHA'S VINEYARD

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Abstract

The following report is a brief summary of the zooarchaeological remains excavated at the Nashaquitsa site on Martha's Vineyard, Massachusetts, during the early 1970s by archaeologist Andrew Stanzeski. This report serves as a supplement to Stanzeski & Stanzeski (see this issue), which provides interpretation of the findings in addition to archaeological and geological context. The site dates from 8,000-1,000 years BP, spanning the Late Archaic and Early Woodland periods.

The purpose of this study is to understand the abundance and distribution of fauna within the Nashaquitsa assemblage. Out of four strata excavated, all of the material was recovered from Stratum I, though artifacts such as arrowheads and fishing points have been found in two of the other strata (Stanzeski & Stanzeski, this issue). A total of 654 bones comprise the Nashaquitsa sample, with only five fragments unable to be assigned to a specific taxonomic group. The identified remains range from turtle *(Testudines)* to domestic dog *(Canis familiaris)*, though most bones are of the common white-tailed deer *(Odocoileus virginianus)*. Some of these bones exhibit anthropogenic cutmarks, burning, and sharpening, suggesting meat consumption and tool manufacture by the Indigenous inhabitants of the site. These modifications will be discussed later in this report.

This discussion will be restricted to a summary of material identified as part of the Stanzeski collection of the Nashaquitsa site, with some brief analyses and conclusions derived from the material. This report serves to highlight the abundance and intriguing diversity of the fauna present at the Nashaquitsa site during the Late Archaic and Early Woodland periods.

Introduction

The Nashaquitsa site, situated in Dukes County, Massachusetts (see Figure 1), spans the Late Archaic to Early Woodland periods (8,000–1,000 years BP), though the majority of prehistoric sites on the island date from 7,500 to 3,000 BP. The Nashaquitsa site, along with much of Martha's Vineyard, has been continuously occupied by the Wampanoag people for at least 10,000 years, with non-natives appearing in the early 1600s (Guernsey 1916; Hufstader 2018). Martha's Vineyard is therefore rich in archaeological history, with nearly 400 sites in Aquinnah alone (Hufstader 2018). The Nashaquitsa site is part of 19-DK-58 and 19-DK-122, sites recorded with the Massachusetts Historical Commission. From the Archaic Period, common artifacts include arrowheads and hammerstones among other stone tools. Woodland Period (3,000-400 BP) sites often yield pottery, trade goods, and agricultural implements in addition to stone tools.

Martha's Vineyard today is the largest island separated from mainland Massachusetts. The commonly known shape of the Island is fairly recent, having been decided by receding waters around 5,000 years ago (Richardson 1985). At this time, sea levels had stabilized to approximately ten meters below the present level; however, the island had been separated from the mainland for quite some time before that. Unfortunately, due to the constant transgression of the sea, much of the evidence for early habitation at the Nashaquitsa site — along with many coastal sites along the eastern United States — has been washed away. From around 15,000 BP to 12,000 BP, the exposed continental shelf around Cape Cod sustained mainly tundra-type grasses; following this was an emergence of boreal trees, such as spruce, alder, and jack pine (Richardson 1985). Some of the most up-to-date ecological data which covers both prehistoric and modern vegetation patterns of the Vineyard are presented in Foster and Motzkin (1999), which also includes information on conservation initiatives for the Vineyard's ecosystems. Animals common to this region during the periods considered in this paper are largely similar to the fauna present in Martha's Vineyard today: large herbivorous cervids, waterfowl, bony fish, and turtles, amongst other small- to medium-sized mammals (Banks 1911). Perlman (1981) notes that the species availability for Martha's Vineyard has remained stable from 4000-3000 years BP to the present according to available climatic, faunal and floral evidence.

Materials and Methods

Zooarchaeological remains, previously collected by Andrew Stanzeski, were brought to the New Jersey State Museum (Trenton, NJ) in October 2019 for identification by lead museum curator David Parris and intern Sara Magee. While the primary identification was the duty of the intern, David Parris, D. Ehret, and G. Lattanzi all offered their expertise and assisted greatly with identification. Identifications were confirmed by the staff at the Museum in addition to reference from the osteological collection and texts available at the Museum. The specimens were grouped in bags based on the level from which they were recovered prior to their arrival at the Museum (see Stanzeski & Stanzeski, this issue). Over a roughly two-month period, the content of each bag was examined individually, and over 600 animal bones were identified as specifically as possible. The material was separated by the first author according to the taxonomic group and element for each level and recorded in an Excel sheet (see pages 77-82 for the full dataset). This dataset also includes notes, such as identifying features present, as well as anthropogenic modifications.

In total, eight separate groupings of material represent this sample, and are henceforth referred to as "levels": F3, F5, F7, F11, F12, F13, 800-Series, and S-Series. For some remains, only a general order or other taxonomic category was ascribed (e.g., Testudines, Mammalia) due to lack of more identifiable features. Other material

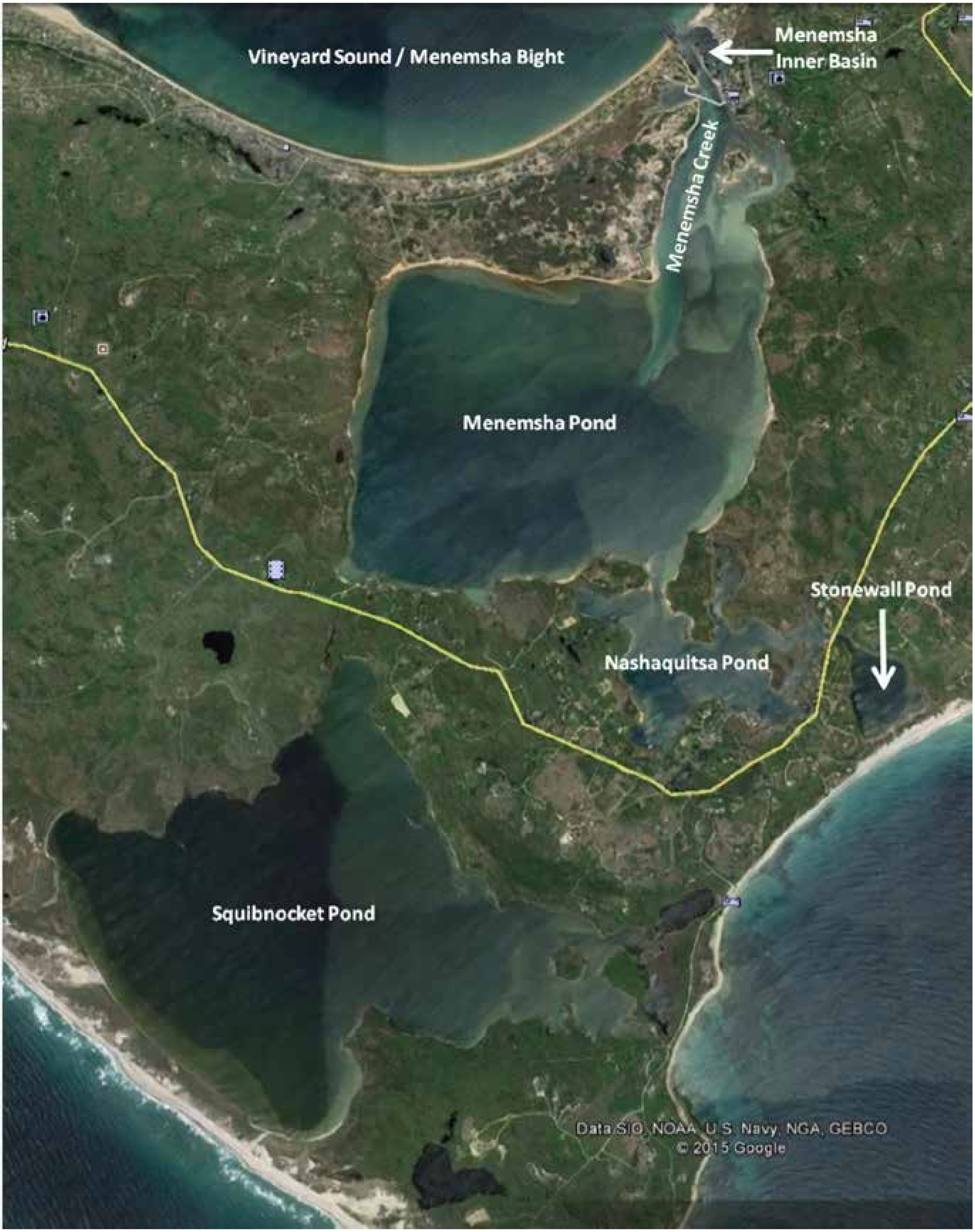

Figure 1. Location of the Nashaquitsa Pond, part of the Menemsha-Squibnocket Pond Embayment System, and associated bodies of water in the southwestern corner of Martha's Vineyard (Howes et al., 2017).

could only be grouped generally with similar fragments (e.g., *O. virginianus* rib fragments). Nearly all of the material is fragmented. For the purposes of this study, the bones were not measured, separated by size or weighed, but the material is intact enough for future studies to examine the assemblage in this way.

All values in the dataset, as well as the following tables, were recorded in NISP. Due to limitations in resources at the time of this analysis, MNI and MNE were not calculated. Only 50 out of the 654 elements in the sample were able to be sided, and these details are also reported in the Appendix. For NISP calculations, a table was created for each level which included a separate column for each taxon and 46 rows for specific element categories, such as "Cranial (General)," "Terminal Phalanx," and "Capitis Femoris" (see pages 77-82). Each of these categories is represented by at least one fragment. This information was also consolidated into one large table for the entire sample. A more generalized table of this information for the entire sample is restricted to 14 categories, including broader terms such as "Cranial," "Long Bones," and "Pectoral Girdle" (Table 2).

Summary of Material

F3 Assemblage

The F3 series of material is predominantly generalized mammal bones, most of which are likely deer, but are too small, weathered and/or fragmented to be identified further. Out of 253 fragments in this level, 157 belong to this taxonomic category. 143 of the Mammalian bones in F3 are limb/shaft fragments, 9 are unidentified, and the remaining few are pelvic, rib, vertebra, and tibia fragments. The second most abundant remains in F3 – and the most abundant species in the entire sample – are attributed to the white-tailed deer (*Odocoileus virginianus*), represented here by 58 fragments. The most common deer elements are overwhelmingly metapodial fragments (24), most of which included epiphyses as well as partial shaft fragments. The other elements represented are present in much smaller quantities. This includes phalanges (7), limb or shaft fragments (5) and scapula fragments (3). Overall, identifiable deer elements are represented in 16 element categories.

The second most common species represented in the F3 level is the domesticated dog (*Canis familiaris*), which comprises 30 out of 253 fragments

Table 1. Elements per assemblage for each represented taxon. All values reported as NISP.

Scientific Name	Common Name	F-3 (n=253)	F-5 (n=119)	F-7 (n=66)	F-11 (n=17)	F-12 (n=101)	F-13 (n=85)	800 (n=8)	S (n=4)	Total (n=653)
Mammalia	Mammal	157	6	29	0	47	58	4	1	302
Odocoileus virginianus	Deer	58	95	35	6	12	24	4	1	235
Aves	Bird	7	16	2	3	21	2	0	0	51
Canis familiaris	Dog	30	0	0	0	0	0	0	0	30
Testudines	Turtle	0	0	0	8	9	0	0	0	17
-	Unidentified	0	0	0	0	5	0	0	0	5
Canidae	Canid	0	1	0	0	0	0	0	2	3
Teleostei	Teleost Fish	1	0	0	0	5	1	0	0	7
Delphinoidea	Dolphin	0	0	0	0	1	0	0	0	1
Larus sp.	Gull	0	0	0	0	1	0	0	0	1
Cygnus columbianus	Tundra Swan	0	1	0	0	0	0	0	0	1

Figure 2. Some selected elements of the Nashaquitsa sample, obverse and reverse of each: a) *Canis familiaris* mandible with three teeth; b)C. columbianus proximal humerus with carnivore bitemarks c) *Larus* sp. first phalanx; d) Delphinoidea petrosal.

in this assemblage. More fragile bone fragments are present for *Canis,* such as parietal fragments (2), ear region fragments (2), and an ulnar fragment. However, the *Canis* sample also shows much diversity, including vertebral fragments (8), mandible and teeth fragments (2; 2), and metapodial fragments (5) (see Figure 2).

The F3 grouping is the only level which has associated *Canis familiaris* remains, spanning 14 element categories. The authors also considered additional canids native to the island — such as foxes — so some of these identifications may need further attention. We are confident in the *C. familiaris* identifications made here, though in other assemblages a general Canidae category was included to account for this potentiality.

Following *Canis* is the generalized Aves category, of which the elements most likely belong to a seabird species of the orders Charadriiformes (gulls, auks, and waders) or Anseriformes (ducks, geese, and swans) due to the proximity of the site to the shore and the overall size of the fragments in the entire sample. The Aves remains comprise only about 3% of the F3 assemblage, with only seven fragments present. All seven of these fragments are limb and/or shaft fragments, and could not be further identified.

There is one final fragment represented in the F3 assemblage: one, a teleost fish (class Actinopterygii, infraclass Teleostei) vertebra.

The F3 level reveals eleven modified remains and is tied with the F5 assemblage. Five of these are from *Odocoileus,* four from Mammalia, one from *Canis* and one from Teleostei. The white-tailed deer remains are metapodials (2) which are a distal pair and exhibit burning and punch-hole markings, in addition to three limb/shaft fragments with cutmarks. The Mammalian bones are all burnt and include limb/shaft fragments (3) and a single rib fragment. The *Canis* element is a proximal left femoral fragment which also displays what appears to be a punched hole indicative of human modification, but these may be carnivore bitemarks, which also are present on this fragment. Lastly, the Teleostei vertebral body in F3 also appears to be burnt.

F5 Assemblage

A total of 119 bone fragments are included in this grouping, with the majority belonging to the white-tailed deer (95). The most common elements are limb/shaft fragments and mandibular fragments, with a total of 23 and 22 fragments, respectively. The second and third most common category of elements for *Odocoileus* are general cranial fragments (16) and molars (10). The additional 9 elemental categories for *Odocoileus* in the F5 assemblage are represented by fewer than 5 elements each (unguals, phalanges, metapodial fragments, etc.) aside from premolars (8).

Aves fragments, although only about 13% of the F5 assemblage, are the second most abundant category for F5. Fifteen of the sixteen Aves bones are limb/shaft fragments, while the other is a phalanx fragment. Generalized mammal bones totaled only six (limb/shaft fragments, 3; incisor, 1; premolar, 1; unidentified, 1). Only two other animal groupings are represented in F5. One fragment appears to be fossilized tooth enamel, and due to its shape, appears to belong to a canid. For this reason, it is assigned to the family Canidae.

The last fragment of the F5 assemblage is a single proximal humerus fragment of *Cygnus columbianus,* or the tundra swan. This identification was confirmed by David Parris. This is of particular interest, as it is a seasonal migratory species, which would likely have occupied the area during the winter months. This is the only fragment of this species present in the entire Nashaquitsa faunal sample discussed here.

Eleven of the elements in F5 are believed to be anthropogenically modified. Three elements of Aves, all limb/shaft fragments, appear to be sharpened and display cutmarks. The remaining eight modified fragments are all *Odocoileus* and include a variety of elements. There are four mandibular fragments (right mandible with tooth; left mandibular ramus; right mandibular gonial region; general mandible fragment) and each is sharpened with cutmarks. The mandible fragment with a tooth still embedded in the corpus has possible burning. The gonial region fragment is particularly interesting, and may have been used as a cutting tool, as the entire gonial angle was sharpened. The last four fragments representative of *Odocoileus* element modification are three shaft fragments and one rib fragment, which appear to be sharpened and burnt, as well as cut, respectively.

F7 Assemblage

The F7 fauna are limited, with 66 fragments in total from only three taxonomic groups: *Odocoileus virginianus* (35), Mammalia (29), and Aves (2). Breaking these numbers down further results in a similar lack of diversity; 34 of the deer remains are antler fragments, and the remaining fragment is mandibular. The mammal bones are predominantly cranial and limb/shaft fragments (12 each), while the remaining elements are either metapodial (2), unidentified (2), or humeral (1). Lastly, the two bird remains are of a limb/shaft and a phalanx.

Seven fragments in this level display anthropogenic modification: one burnt Aves phalanx, and six *Odocoileus* antler fragments which appear generally worked and potentially sharpened. One of these is attached to a partial cranial fragment from the right side of the cranium.

F11 Assemblage

Only 17 fragments comprise the F11 assemblage. These fragments include eight turtle (Testudines) fragments, six white-tailed deer fragments, and three Aves fragments.

F11 is one of two groupings that include Testudines remains. The turtle remains are broadly classified as shell fragments, though upon closer attention they may be more specifically identified as costal, peripheral, neural, gular, entoplastral, hyoplastral, hypolastral, or xiphiplastral. Due to the fragility of the fragments and lack of identifiable features, these elements could not be identified beyond taxonomic order. However, due to the environmental setting and smaller size of the fragments, it is likely that these remains belong to families such as Chelydridae (snapping turtles), Emydidae (box turtles), or Kinosternidae (common musk turtles).

No limb-like turtle remains are present. The six *Odocoileus* fragments are all antler pieces, and the three Aves remains are all limb/shaft fragments. Two of the white-tailed deer fragments in F11 are modified, one with a distinguishable cut mark and another which appears to be generally worked.

F12 Assemblage

The fauna of this level are the third most abundant in the site, with a total of 101 remains. F12 also has the most taxa present, with six out of eleven taxa represented. The three most common taxonomic groups in this level continue along the previous pattern: Mammalia, Aves, and *Odocoileus.* The mammal bones are almost exclusively limb/shaft fragments (42), while the remaining elements are a rib fragment, a tarsal, and three unidentified fragments.

Generalized bird remains are the next most common for F12. Limb/shaft fragments (7) and rib fragments (7) are the most common, while the others account for just one element per category. These include a phalanx, a humerus, a coracoid, and a scapula. There are three miscellaneous fragments that could not be more accurately identified. White-tailed deer remains number at only twelve, with the largest amounts belonging to metapodial fragments (4). Two fragments represent the categories of scapula, teeth (general), and talus fragments. Only one bone represents the metatarsal and calcaneus categories for this assemblage.

Nine turtle remains are present in F12, all of which are considered unidentified but are carapace and/or plastron remains. Five bone fragments are attributed to an unidentified teleostean: One fin ray, two mandibular fragments, and two unidentified fragments. There are also five fragments from an unspecified taxon, three of which are unidentified, while the remaining two appear similar to enamel.

The last two taxonomic categories present in F12 are among the least prevalent at Nashaquitsa: parvorder Delphinoidea and *Larus sp.* Within the superfamily Delphinoidea is the family Delphinidae, which includes oceanic dolphins such as the Atlantic white-sided dolphin (*Lagenorhynchus acutus)* and the short-beaked common dolphin (*Delphinus delphis).* Both of these species are common to the northeastern waters of the United States and so it is possible that the single petrosal fragment representative of this taxon may be attributable to either of the aforementioned species (see Figure 2). The identification of the petrosal, a specific bone of the ear region, was confirmed by Dana Ehret. This fragment is the only aquatic mammal represented in the entire sample.

Lastly, a fully intact first phalanx 1 of what is likely the American herring gull (*Larus smithsonianus)* is present in this level. The exact species was not confirmed, and so this report refers to it by *Larus sp.* (see Figure 2). This species, like the probable species of Delphinoidea and the tundra swan *Cygnus columbianus,* is a migratory one.

Six of the remains for this level show anthropogenic modification: 1) the Aves coracoid, which has cutmarks; 2) Four Mammalian limb fragments, three of which are sharpened and one of which is burnt, and 3) the Delphinoidea petrosal, which has cutmarks.

F13 Assemblage

The fauna present in this location are both less numerous and less diverse than F12. A total of 85 fragments were recovered for this level, with nearly 70% of all material belonging to the generalized mammal category (58). Limb/shaft fragments (47) starkly outweigh any other element category. Ten bones cannot be identified for Mammalia, while the remaining fragment for this taxon is of a metapodial (1).

Odocoileus virginianus retains second place, although with only 24 bone fragments to contribute. There are more element categories represented here than bones themselves; one ischium fragment, one olecranon process, one navicular-cuboid, one ulna, one trochlear fragment, and one scapula fragment. In addition to these, there are also one cranial fragment and one vertebral fragment. The most numerous categories include astragali (6), metapodials (5), and phalanges (3).

The last of the F13 set is limited to two Aves limb/shaft bones and a singular teleost fish fin spine. One of the Mammalian fragments — a limb/shaft — is burnt.

800-Series

In the 800-Series each bone has a unique written number assigned by Stanzeski during the initial excavation. Three of the eight fragments present are attributed to *Odocoileus,* and the remaining four are Mammalian. The four mammal bones are all limb/shaft fragments, while the deer bones include antler fragments (3) and a metapodial (1).

Interestingly, all eight fragments in the 800-Series level have some type of anthropogenic modification, which will be discussed below.

S-Series

The least numerous assemblage in the entire Nashaquitsa sample is the S-Series, and all material present for this level is also ascribed a unique identification number by Stanzeski. The S-Series assemblage includes only four fragments: one Mammalian limb/shaft fragment, one *Odocoileus* antler fragment, and two Canidae bones. The

Table 2. Simplified element category table for each taxon in the dataset. All values reported as NISP.

Element	Mammal	Deer	Bird	Dog	Fish	UID	Swan	Gull	Canid	Dolphin	Turtle	Totals
Antlers		44										44
Cranial	12	18		4						1		35
Jaw		26		2	2							30
Long bones	257	76	36	9			1					380
Other					1	2			1			4
Pectoral Girdle		6	2									8
Pelvic Girdle	1	6		1								8
Phalanges		18	3					1				22
Ribs	3	2	7	1								13
Shell Fragments											8	8
Tarsals	1	14										15
Teeth	2	21		5					2			30
UID	25	3	3		2	3					9	45
Vertebrae	1	1		8	2							12
Totals	**302**	**235**	**51**	**30**	**7**	**5**	**1**	**1**	**3**	**1**	**17**	**654**

Mammalian fragment is likely of a white-tailed deer and displays anthropogenic sharpening and appears to have been cut in half. The Canidae elements include one incisor and one premolar. These bones may well be *Canis familiaris,* as the size and shape are consistent with previous identifications, but the possibility of red fox (*Vulpes vulpes)* and/or coyote (*Canis latrans)* should not be overlooked.

A single non-faunal component of the S-Series is a large piece of petrified wood that likely belongs to a native tree such as pine (*Pinus)* or oak (*Quercus*) but could not be confidently ascribed to a botanical taxon.

Discussion

Overall, the dominant taxonomic category is generalized mammal (n=302), making up 46.18% NISP of the total sample. This is likely due to fragmentation, and based on the abundance of *Odocoileus* remains and the general attributes of the mammal bones present, it is likely that many of these bones are also white-tailed deer. It is also possible that these remains belong to other small- to medium-sized mammalian species common to the area of the Nashaquitsa site and the island of Martha's Vineyard in general, such as cats, raccoons, skunks, and muskrats. The material in this sample would need to be revisited and assessed more strictly in terms of general size and thickness, in addition to a more focused consideration of identifiable features, in order to arrive at a more comprehensive conclusion for the true faunal diversity of the Nashaquitsa site.

At present, *Odocoileus* is responsible for 35.93% of the sample, with 235 white-tailed deer bones identified.Aves represents roughly 7.8% of the sample (n=51), while the other fauna all account for under 5%. Thirty *Canis familiaris* (4.59%) and 17 Testudines (2.6%) fragments are present. The Teleostei and Unidentified categories have seven and five fragments respectively, while the general Canidae category has just three. The outliers are certainly the migratory species — Delphinoidea, *Larus sp.,* and *Cygnus columbianus* — each represented by a single fragment. More focused consideration of these remains may allude to aspects of the seasonal use of the site by the Wampanoag tribe.

Anthropogenic Modifications

Out of 654 remains for the entire Nashaquitsa sample, only 48 appear to have been anthropogenically modified. These instances are summarized below in Table 3 and Table 4, the latter being a more concise summary of the modified material. The most abundantly modified remains were from *Odocoileus virginianus* (n=25), followed by Mammalia (n=16) and Aves (n=5). Both Teleostei and *Canis familiaris* each only have one apparently modified element. In total, 16 elements were burnt, 9 sharpened, 17 with cutmarks, and 11 with evidence of being otherwise worked. In the opinion of the primary author, these modifications indicate meat consumption of *Odocoileus* and tool manufacture of white-tailed deer and other mammalian elements due to the evident sharpening. It is uncertain whether the burning present in some elements was intentional, refuse from a cooking pit, or naturally caused. It is also possible that some of this material was used for ornamentation, but this could not be stated for certain.

Limitations and Future Directions

Several limitations of this study have been outlined earlier in the report, although they are important to reiterate. Much of the identifications, as well as identification of anthropogenic modification, were carried out by the first author during an internship at the New Jersey State Museum. Despite their osteological training and completion of an undergraduate degree in evolutionary anthropology, it is possible that some identifications are incorrect. To a more trained eye, it would probably be possible to further identify the fragmented elements from the general

Table 3. Anthropogenically modified elements per level. All values reported as NISP.

Assemblage	Name	Element	Count	Notes	Modification
F3	*O. virginianus*	Metapodials	2	Distal pair	Burnt, punch marks
	O. virginianus	Shaft fragments	3		Cutmarks
	C. familiaris	Femur	1	Proximal	Anthropogenic punched hole, carnivore bitemarks
	Mammalia	Shaft fragments	3		Burnt
	Mammalia	Rib fragment	1		Burnt
	Teleostei	Vertebral body	1		Burnt
F5	Aves	Limb shaft fragments	3		Sharpened, cutmarks
	O. virginianus	Mandible with tooth	1	Posterior area, includes last molar	Cutmarks, possible burning
	O. virginianus	Mandibular ramus	1	Ascending ramus	Cutmarks
	O. virginianus	Shaft fragment	1		Sharpened
	O. virginianus	Mandibular gonial region	1	Gonial angle	Sharpened, potential cutting tool
	O. virginianus	Rib fragment	1		Cutmarks
	O. virginianus	Mandible fragment	1	Anterior, with symphysis	Cutmarks
	O. virginianus	Shaft fragments	2		Burnt
F7	Aves	Phalanx	1		Burnt
	O. virginianus	Antler fragments	5		Worked
	O. virginianus	Antler with partial cranium	1	Proximal, with partial cranium	Worked
F11	*O. virginianus*	Antler fragment	1	Quite large	One cutmark
	O. virginianus	Antler fragment	1		Worked
F12	Aves	Coracoid	1		Cutmarks
	Mammalia	Limb fragment	1		Sharpened
	Mammalia	Limb fragment	1		Burnt
	Mammalia	Limb fragment	2		Sharpened
	Delphinoidea	Petrosal	1		Cutmarks
F13	Mammalia	Limb fragments	3		Burnt
800-Series	*O. virginianus*	Antler fragments	2	Pair from same piece	Cutmarks
	O. virginianus	Metapodial	1	Distal, with partial shaft	Cutmarks
	O. virginianus	Antler fragment	1		Partially burnt
	Mammalia	Shaft fragment	1	"Howland Site 1 Surface" written by Stanzeski	Burnt, worked
	Mammalia	Shaft fragment	1		Burnt
	Mammalia	Shaft fragment	1		Worked
	Mammalia	Shaft fragment	1		Worked
S-Series	Mammalia	Shaft fragment	1	Likely deer metapodial	Sharpened; cut in half

Table 4. Simplified table of modified faunal material according to broad element category for each taxon represented in Table 3.

Element	O. virginianus	C. familiaris	Mammalia	Aves	Teleostei
Antler	11				
Coracoid				1	
Femur		1			
Limb/Shafts	6		15	3	
Mandible	4				
Metapodials	3				
Phalanx				1	
Ribs	1		1		
Vertebrae					1
Totals	25	1	16	5	1

taxonomic categories of Mammalia, Testudines, Aves, and Delphinoidea, as well as those classified under the Unidentified category. Despite this, almost every identification was confirmed by David Parris and/or other experts at the Museum, and so the authors are confident in the identification of much of the material. Ages were not assessed for any of the teeth in the sample, though many of them appear to be complete enough to be revisited for an assessment of deer capture age or season of capture in the future. Similarly, a closer look at the antler fragments may provide some insight into seasonality or age groupings for the white-tailed deer remains. The limb/shaft material was not separated by weight or size due to time constraints, though this is entirely possible in the future.

All findings are presented in NISP, though this is not the best indicator for species importance in terms of diet or other usage. Much of the material is from the fairly large *Odocoileus,* and therefore would produce more fragments, which may have biased the sample. Most of the metapodials described were shaft fragments, though some did include epiphyses. This consideration was not distinctly separated in the dataset. Only 50 out of the 654 fragments in this sample were able to be accurately sided, and so calculations of MNE or MNI were not able to be completed in full. This would be a beneficial addition to the study at another time in order to provide a more holistic understanding of species distribution, though much of the material is severely fragmented.

It is the opinion of the first author that much more information about this sample could be gained from discussions with the modern Wampanoag tribe. Insight into their cultural traditions and customs could alleviate some of the unknowns surrounding the anthropogenic modifications of potential tool manufacture and meat consumption, as well as site usage, modes of living, and hunting practices.

Though this report is a cursory overview of the material recovered from the site, and a supplement to Stanzeski & Stanzeski (this issue), the authors believe that it serves its purpose to provide a general understanding of the faunal abundance and some human-environment interactions present at the Nashaquitsa site during the Late Archaic and Early Woodland periods. This report could be expanded upon with closer analyses of the material, a reconsideration of assigned taxonomic categories and identifications, and an ethnographic perspective in collaboration with the present Wampanoag peoples.

Acknowledgments

This report would not have been possible without the contributions of Andrew Stanzeski, in both material and guidance. His entrusting of this material to the Museum enabled the primary author to gain additional experience in identifying faunal material and creating faunal reports. John Stanzeski was of great assistance with photographing the material as well as providing comments and suggestions. Lastly, it is important to thank the editor, Ryan Wheeler, in addition to Jessica Watson and Sean Rafferty for their edits, recommendations and reviews.

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Category #	Identification	Portion	Count	Side	Comments	Modifications
F3	Bird	Shaft fragments	7		One possibly a humerus	
	Deer	M3	1			
	Deer	Fibula	1	Left		
	Deer	Capitis Femoris	1		Subadult	
	Deer	Mandible fragments	2			
	Deer	Metapodials	2		Distal pair	Burnt, punch marks
	Deer	Illium fragment	1	Right	With partial acetabulum	
	Deer	Illium fragment	1	Left	With partial acetabulum	
	Deer	Astragalus	1	Right		
	Deer	Ulna fragment	1			
	Deer	Calcaneus fragment	1	Left		
	Deer	Ischium fragment	1	Right		
	Deer	Phalanges	5		Mostly 1st and 2nd phalanges	
	Deer	Shaft fragments	2		One possibly proximal metapodial	
	Deer	Shaft fragments	3			Cutmarks
	Deer	Metapodial shaft fragments	22			
	Deer	Tibia fragment	1	Right	Articular surface, proximal	
	Deer	Terminal phalanx	2		Terminal	
	Deer	Scapula fragments	3			
	Deer	Ischium fragment	1	Left		
	Deer	Tibia fragment	2	Left	Distal	
	Deer	Radius fragment	1	Left	Proximal	
	Deer	Calcaneus fragment	1	Right		
	Deer	Radius fragment	1		Proximal	
	Deer	Ischium fragment	1	Left	Left	
	Deer	Astragalus	1		Juvenile	
	Dog	Metapodials	5		With epiphyses	
	Dog	Femur	1	Left	Proximal	Possibly a punched hole (anthropogenic), carnivore bitemarks
	Dog	Vertebrae	8			
	Dog	Femur	1		Proximal	
	Dog	Tibia fragment	1		Distal	
	Dog	Ulna fragment	1		Proximal	
	Dog	Parietal fragments	2			
	Dog	Rib fragment	1			
	Dog	Pelvis fragment	1			
	Dog	RM1	1	Right		
	Dog	Ear region fragments	2			
	Dog	Mandible corpus with teeth	1	Right	Includes m1. Likely short-nosed dog	
	Dog	Teeth (general)	2		Likely short-nosed dog	
	Dog	Rp4	1	Right	Molar. Likely short-nosed dog	

Category #	Identification	Portion	Count	Side	Comments	Modifications
	Dog	Lm1	1	Left	Molar. Likely short-nosed dog	
	Dog	Mandible corpus with teeth	1	Left	Includes m1-m2, appears to match line 39 mandible. Likely short-nosed dog	
	Mammal	Unknown	9			
	Mammal	Shaft fragments	3			Burnt
	Mammal	Large shaft fragment	1		Potentially human or very large mammal	
	Mammal	Pelvic fragment	1			
	Mammal	Tibia	1		Small/juvenile. Proximal	
	Mammal	Rib fragment	1			Burnt
	Mammal	Vertebral fragment	1			
	Mammal	Spongy bone fragments	2			
	Mammal	Shaft fragments	137			
	Mammal	Rib fragment	1			
	Teleostei	Vertebral body	1			Burnt
		TOTAL:	**253**			

Category #	Identification	Portion	Count	Side	Comments	Modifications
F5	Bird	Phalanx	1			
	Bird	Limb shaft fragments	3			Possibly sharpened, cutmarks
	Bird	Limb shaft fragments	12			
	Canidae	Enamel sheath	1		Likely maxillary incisor	
	Deer	Mandible with tooth	1	Right	Posterior area, includes last molar	Cutmarks, possible burning
	Deer	Mandibular ramus	1	Left	Ascending ramus	Cutmarks
	Deer	Parietal	1	Left		
	Deer	Terminal phalanges	2			
	Deer	Metapodial shaft fragment	2			
	Deer	Shaft fragment	1			Possibly worked (sharpened)
	Deer	Mandibular gonial region	1	Right	Gonial angle	Possibly worked (cutting tool)
	Deer	Rib fragment	1			Cutmarks
	Deer	Mandible fragment	1		Anterior, with symphysis	Cutmarks
	Deer	Cranial fragment	1			
	Deer	Unguals	4			
	Deer	Mandibular ramus	1	Right	Ramus, with condylar process	
	Deer	Mandible fragment	1	Right	Anterior, with symphysis	
	Deer	Mandible corpus	1	Left	Corpus, posterior, no teeth	
	Deer	Mandible	1	Right	With two molars, one premolar	
	Deer	Mandible	1	Left	With two premolars	
	Deer	Mandible	1	Left	With one and a half molars, posterior	

Category #	Identification	Portion	Count	Side	Comments	Modifications
	Deer	Mandible	1	Left	With last molar and partial gonial angle	
	Deer	Maxilla	1	Right	With second molar	
	Deer	Molar	1	Right	Likely second molar, crown only, mandibular	
	Deer	Molar	1		Juvenile, posterior, mandibular	
	Deer	Premolars	2		Mandibular	
	Deer	Molar	1		Juvenile, mandibular, crown only	
	Deer	Molar	1		Mandibular, crown only	
	Deer	Premolar	3		Mandibular	
	Deer	Cranial fragments	14		Unfused, most appear to be subadult	
	Deer	Mandible fragments	2		Likely condylar and gonial fragments	
	Deer	Premolars	3		Deciduous	
	Deer	Mandibular fragments	3		Likely corpus	
	Deer	Mandible	1	Left	Posterior corpus with third molar	
	Deer	Molars	4		Maxillary	
	Deer	Molars	2		Mandibular	
	Deer	Shaft fragments	20			
	Deer	Tibia	1		Distal	
	Deer	Mandible	1	Left	Anterior, with symphysis	
	Deer	Unknown fragments	3			
	Deer	Rib fragment	1			
	Deer	Mandibular fragments	4			
	Deer	Shaft fragments	2			Burnt
	Deer	Cranial	1	Right	Juvenile, male, posterior with partial antler	
	Mammal	Unknown fragment	1			
	Mammal	Shaft fragments	3		Likely deer	
	Mammal	Premolar fragment	1		Likely deer	
	Mammal	Incisor	1		Likely deer	
	Tundra Swan	Humerus	1	Right	Proximal	
		TOTAL:	**119**			

Category #	Identification	Portion	Count	Side	Comments	Modifications
F7	Bird	Phalanx	1			Burnt
	Bird	Shaft	1			
	Deer	Antler fragments	11			
	Deer	Mandible	1		With molar, posterior	
	Deer	Antler fragments	5			Appears worked
	Deer	Antler fragments	17		A few have small cranial attachments	

Category #	Identification	Portion	Count	Side	Comments	Modifications
	Deer	Antler with partial cranium	1	Right	Proximal, with partial cranium	Appears worked
	Mammal	Unknown	2			
	Mammal	Limb fragments	12			
	Mammal	Cranial fragments	12		Likely deer	
	Mammal	Metapodial	1		Distal, likely deer	
	Mammal	Humerus	1		Distal, likely deer, with partial shaft	
	Mammal	Metapodial	1		Proximal, likely deer	
		TOTAL:	**66**			

Category #	Identification	Portion	Count	Side	Comments	Modifications
F11	Bird	Shaft fragments	3			
	Deer	Antler fragment	1			Possibly worked
	Deer	Antler fragments	4			
	Deer	Antler fragment	1		Quite large	Has cutmark
	Turtle	Shell Fragments fragments	8		Possibly snapping turtle; one posterior peripheral	
		TOTAL:	**17**			

Category #	Identification	Portion	Count	Side	Comments	Modifications
F12	Bird	Coracoid	1			Cutmarks
	Bird	Humerus	1			
	Bird	Scapula	1			
	Bird	Phalanx	1			
	Bird	Rib fragments	7			
	Bird	Unknown	3		One possibly gull quadrate	
	Bird	Limb shafts	7			
	Deer	Metapodial fragments	2		Distal	
	Deer	Scapula	1	Left		
	Deer	Talus	2			
	Deer	Teeth fragments	2		One with partial mandible	
	Deer	Metapodial fragment	1	Right	Proximal	
	Deer	Metapodial fragment	1		With broken fitted piece, distal	
	Deer	Scapula fragment	1			
	Deer	Calcaneus fragment	1	Left		
	Deer	Metatarsal	1	Right	Proximal	
	Dolphin	Petrosal	1			Cutmarks
	Gull	First phalanx	1		First phalanx	
	Mammal	Unknown fragments	2			
	Mammal	Shaft fragments	8			
	Mammal	Tarsal	1			
	Mammal	Rib	1			
	Mammal	Long bone fragment	1			Sharpened

Category #	Identification	Portion	Count	Side	Comments	Modifications
	Mammal	Long bone fragment	1			Burnt
	Mammal	Long bone shaft fragments	29			
	Mammal	Unknown	1		Likely pelvic	
	Mammal	Long bone shaft fragment	1		With four broken fitten pieces	
	Mammal	Long bone fragments	2			Possibly sharpened
	Teleostei	Fin ray	1			
	Teleostei	Mandible	1			
	Teleostei	Fragments	2			
	Teleostei	Mandible	1			
	Turtle	Fragments	9		Some may be bird: skull fragment	
	Unidentified	Fragments	3			
	Unidentified	Nail/claw	2		Keratin	
		TOTAL:	**101**			

Category #	Identification	Portion	Count	Side	Comments	Modifications
F13	Bird	Limb shafts	2			
	Deer	Metapodial shafts	3			
	Deer	Scapula fragment	1	Right		
	Deer	Metapodial	1		Distal	
	Deer	Phalanges	3			
	Deer	Ulna	1		Proximal	
	Deer	Terminal phalanx	1		Proximal end	
	Deer	Navicular-cuboid	1	Left		
	Deer	Cranial fragment	1			
	Deer	Calcaneus	1	Left	Unfused (juvenile), with epiphysis	
	Deer	Olecranon process	1	Left		
	Deer	Astragalus	3	Right	Do not appear to be used as dice as inquired.	
	Deer	Astragalus	3	Left		
	Deer	Ischium fragment	1	Right		
	Deer	Trochlear fragment	1	Right		
	Deer	Vertebral fragment	1			
	Deer	Metapodial	1	Right	Proximal	
	Mammal	Limb fragments	3			Burnt
	Mammal	Unknown fragment	1		Mandibular symphysis Or cancellous Long bone	
	Mammal	Unknown fragments	9			
	Mammal	Shaft fragments	44			
	Mammal	Metapodial fragment	1		Proximal, likely deer	
	Teleostei	Vertebral Spine	1			
		TOTAL:	**85**			

800-Series	Identification	Portion	Count	Side	Comments	Modification
813	Deer	Antler fragments	2		Pair from same piece	Cutmarks
817	Deer	Metapodial	1		Distal, with partial shaft	Cutmarks
823	Deer	Antler fragment	1			Partially burnt
809	Mammal	Shaft fragment	1		"Howland Site 1 Surface" written by Stanzeski.	Burnt. Worked
816	Mammal	Shaft fragment	1			Burnt
821	Mammal	Shaft fragment	1			Worked
822	Mammal	Shaft fragment	1			Worked
		TOTAL:	**8**			

S-Series	Identification	Portion	Count	Side	Comments	Modifaction
S-I	Canidae	Incisor	1	Right	Likely dog. Likely maxillary third incisor	
I-3	Canidae	Premolar	1		Likely dog	
S-2	Deer	Antler fragment	1			Does not appear to be worked
S-2	Mammal	Shaft fragment	1		Likely deer metapodial	Sharpened; cut in half
		TOTAL:	**4**			

TOTAL FAUNAL ELEMENTS IN COLLECTION:	**653**	
Non-Faunal:	**1**	**Petrified Wood Fragment (Denoted 'S-III'), Unidentified Species**

PREDICTIVE MODELS FOR LOCATING INLAND AND COASTAL VILLAGES IN NORTHERN ESSEX AND MIDDLESEX COUNTIES, MASSACHUSETTS

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Abstract

This paper presents the results of a study using geospatial analysis to test criteria for predicting the location of coastal and inland Indigenous village sites in New England. These results support the utility of this method for field archaeologists. The method involves geophysical mapping in conjunction with cultural geography and ethnohistorical data to locate settlement sites when archaeological evidence alone does not suffice.

Introduction

This paper follows up on a project introduced in a recent issue of the *Bulletin of the Massachusetts Archaeological Society* (Lepionka 2020). That project explored issues in the archaeology of Late Woodland and Contact Period agricultural villages in New England, and in particular the problem of locating village sites on the basis of archaeological evidence alone, considering characteristically low artifact densities and the highly mobile mixed economy of Late Maritime Woodland people here, not to mention the poor preservation conditions and disturbed or compromised terrains. A result of that project was a comprehensive set of physical criteria for locating Algonquian agricultural villages in this part of New England based on inference from cultural ecology and input from ethnohistorical data.

These physical criteria were tested against selected documented villages and settlement sites identified in the archaeological literature. For purposes of this study, selection was for "village" and "settlement" sites identified on maps by Warren K. Moorehead in his 1930 survey of the Merrimack Valley and Parker River watershed, and by Ripley Bullen in his 1940 survey of the Ipswich and Shawsheen river valleys. These data sources were selected as comparable professional surveys with detailed maps, thus avoiding the publication of GPS data points or vectors, where known. Any weaknesses in data selection stemming from sampling errors or historical changes in professional standards in the field of archaeology do not invalidate the predictive models presented in this paper. Geospatial analysis of these data resulted in a set of testable locational criteria for both coastal and inland villages in northern Essex and Middlesex counties (Gondola 2021a). The results were further subjected to Bayesian and multivariate analyses to optimally cluster variables predicting the greatest likelihood of village siting (Gondola 2021a, b). It is hoped these predictive models will prove useful in informing archaeological investigations in Essex County and other parts of New England as well.

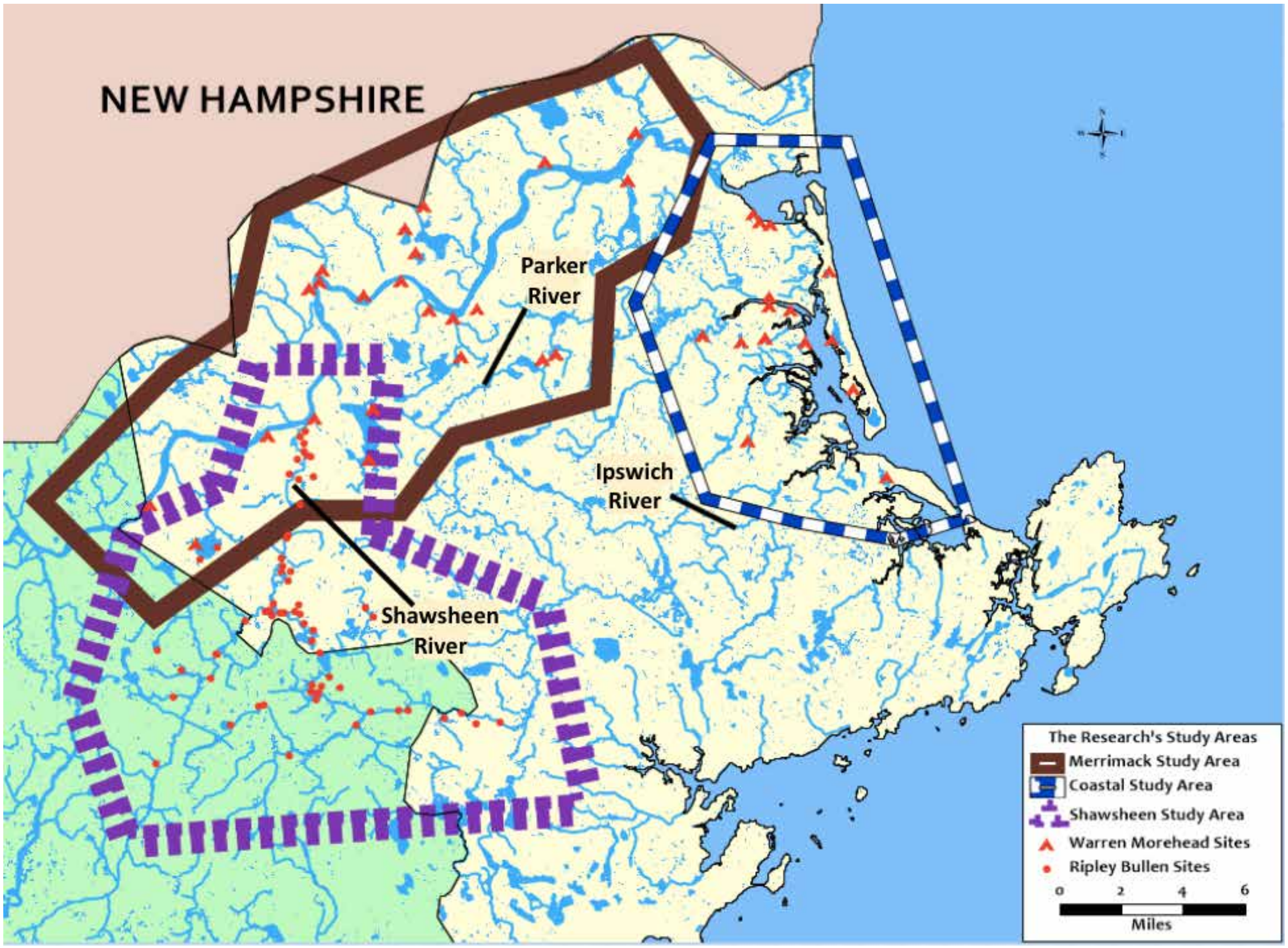

Figure 1. The three study areas with the locations of Moorehead's and Bullen's sites.

Goal and Methods

As Part 1 of this project (Lepionka 2020) noted:

> *Ample ethnohistorical data indicate [Algonquians] had agricultural villages prior to European contact, with mixed economies combining maize agriculture, intensive horticulture of non-cereal crops, hunting and gathering, fishing and fowling, and on the coast, clamming. While keeping camps for seasonal subsistence resource procurement, they were moving their agricultural villages within arable areas for proximity to whatever fields they were planting in a given year. [The term "mobile farming" was introduced and described by Elizabeth Chilton (2010:96).] Locating those mobile villages may need to rely not on artifact densities and other archaeological evidence but on ethnohistorical clues and geospatial analyses of environmental features.*

Part 1 identifies primary and ethnographic sources of data on Algonquian settlement and subsistence patterns, and Algonquian horticultural and agricultural practices in New England. Diverse observers include, for example, Samuel de Champlain, Marc Lescarbot, French Jesuit and Dominican missionaries, several of the first English settlers, Pilgrim and Puritan clerics, Massachusetts Bay Colony governors and "Indian agents," and early geographers and ethnographers. These non-archaeological references, while imperfect as scientific data, nevertheless overwhelmingly confirm their value to archaeologists.

Geospatial analysis for archaeological purposes, only recently pioneered, has already proven useful in locating archaeological sites and features (e.g., Brandt et al. 1992; Farley et al. 2019; Kvamme 1988, 2006; Warren and Asch 1999). In this study, the goal of the geospatial analysis was to quantify, illustrate, and assess the relationship between 103 Algonquian village sites and their in situ water and land features. The sample sites were digitized from Warren K. Moorehead's and Ripley P. Bullen's archaeological survey maps in northeastern Massachusetts, and partitioned into three study regions: Merrimack River Valley, Shawsheen River Valley, and Coastal Study Area (Figure 1). Moorehead and Smith (1931) and Bullen (1946) distinguished only two types of settlement, "villages" and "camps." Camps were occupied seasonally in connection with the availability of particular subsistence resources. The Moorehead and Bullen data were selected to create and test the predictive models after attempting to secure the Massachusetts Historical Commission site file data, which the MHC declined to share. To build the predictive models, seven indicators were ultimately used as independent variables in binary logistic regressions:

- Rivers (or permanent streams large enough for canoe travel)
- Confluences (terraces or kames between waterways where they join)
- Interior (swamp), coastal (saltmarsh), or other wetlands
- Hills above 20 meters in elevation

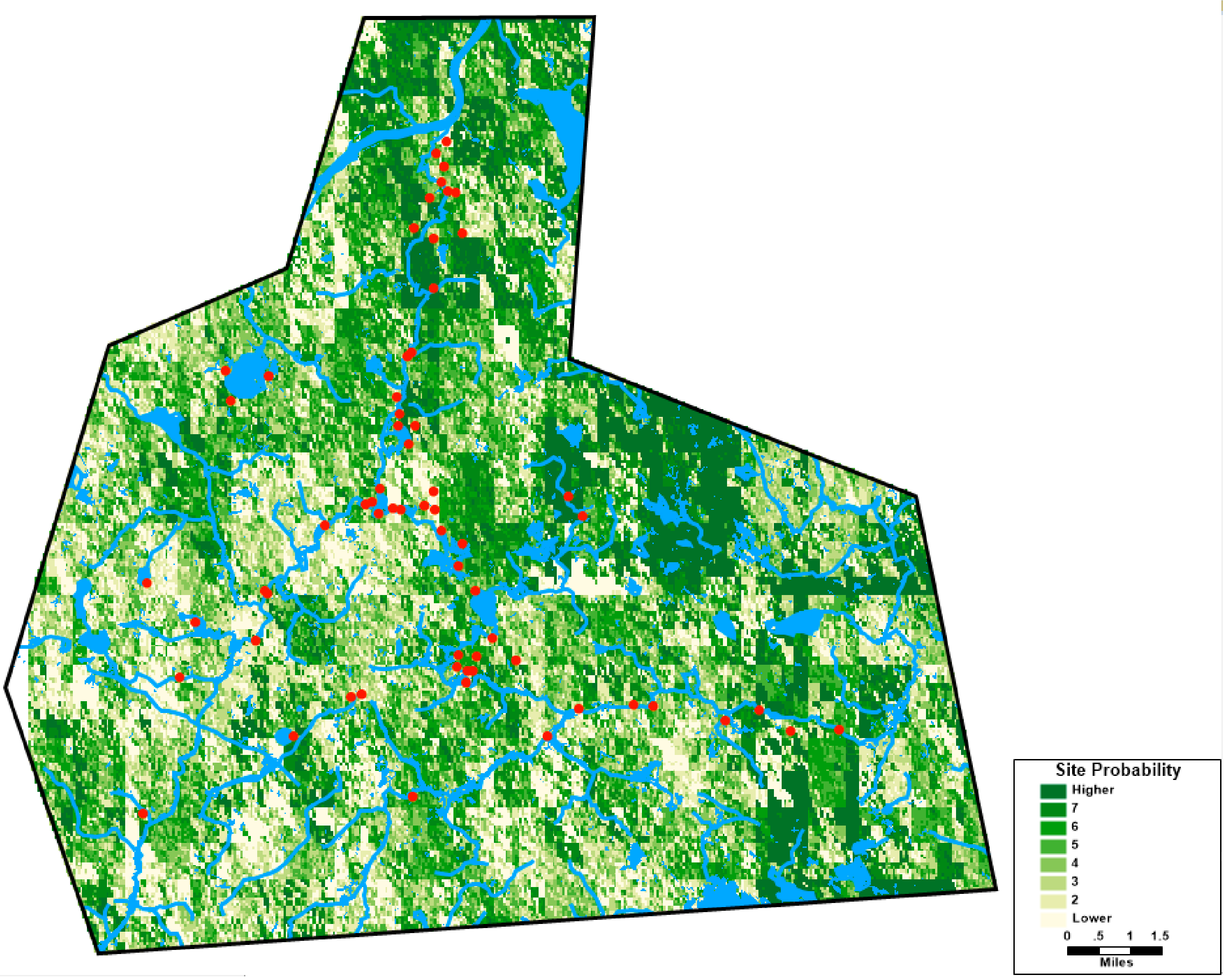

Figure 2. Comparative influence map for Shawsheen River Valley and Ipswich River Headwaters.

- Smooth or flat terrain (less than 10 degree slope)
- Evergreen forest
- Trails, trail heads, or trail crossings (treated separately)

The Atlantic Seaboard Fall Line, an escarpment spanning the entire East Coast, is used as a measure of the coastal/inland divide. The fall line coincides with the convention adopted for this study that sites within five miles of the ocean are "coastal." "Coastal wetlands" refers to barrier beach systems and tidal flats. "Inland wetlands" include deep freshwater marshes, shallow marshes or fens (beaver ponds), open water in the form of lakes and ponds, and wooded swamps with mixed trees. For purposes of analysis, "Terrain" values were based on changes in the density of contour lines and line nodes within a given area, using a Digital Elevation Model. Elevation maps for the three study regions are in Gondola (2020a).

An area grid was superimposed over each digitized study region, then filled with values representing to what extent the grid cells contain the indicators being tested (Table 1). A portion of each grid area was sampled, based on the hypothesis that Algonquians favored proximity to the indicator features for siting their villages. Proximity to "arable" soil, while certainly a factor, was not included because of the complexity and diversity of soil type classifications in the study areas. Also, the Algonquians were planting in new, small, discontinuous pockets of arable soils every

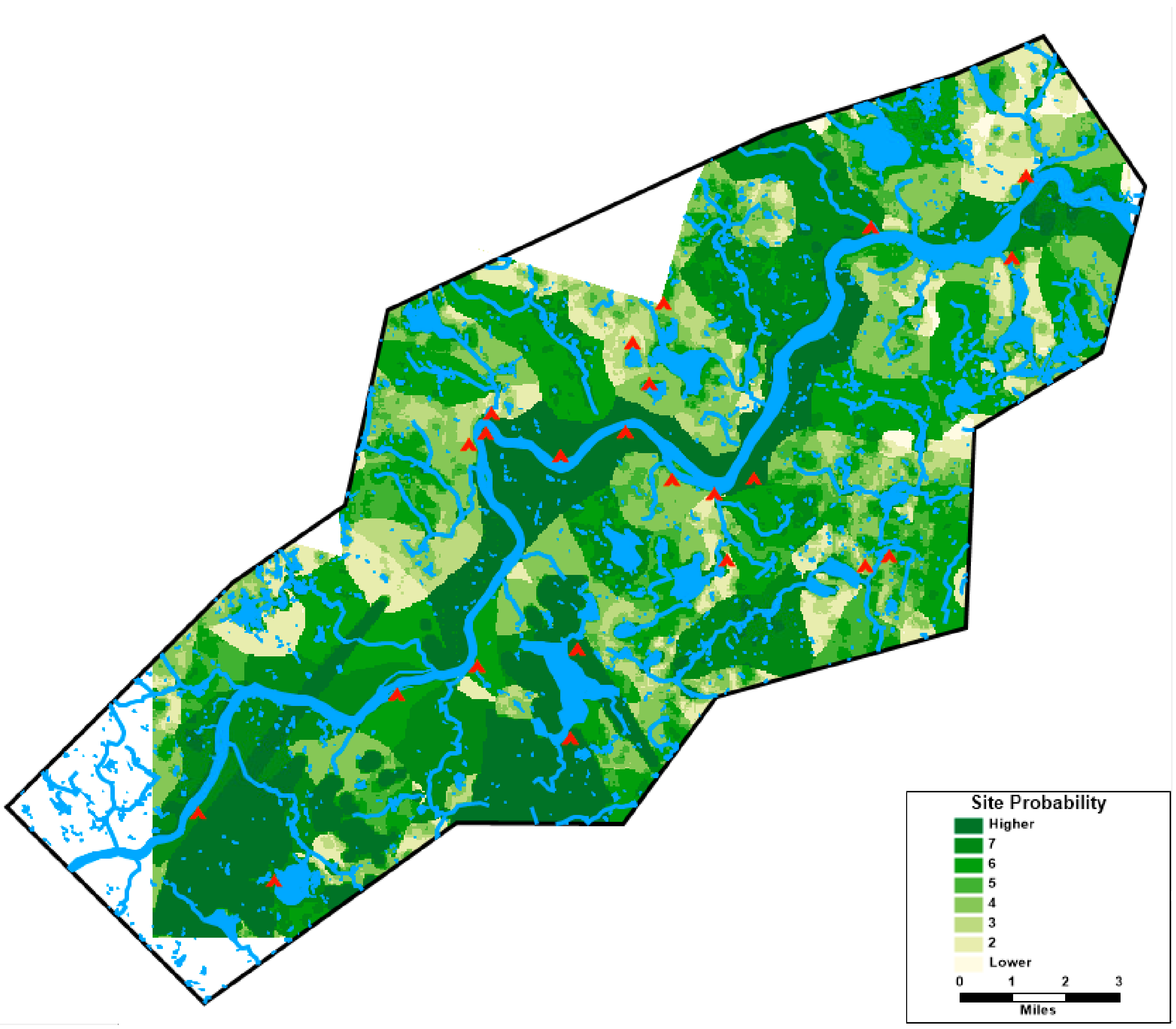

Figure 3. Comparative influence map for Merrimack River Valley.

Table 1. Study Region Dimensions [Convertible to the metric system]

Study Region	Geographic Dimensions	Grid Area Dimensions	Grid Point Dimensions	# of Sites
Merrimack	17 X 16 mi.	500 X 500 ft.	750 X 750	23
Shawsheen	15 X 15 mi.	425 X 425 ft.	650 X 650	65
Coastal	21 X 16 mi.	400 X 400 ft.	600 X 600	15

few years to accommodate the nutrient needs of corn, a heavy nitrogen feeder. Instead, evergreen trees were included as a potential indicator of the intentional use of fire to clear land for planting.

Using TransCAD, the predictive model was built from an area grid overlaying each study region. TransCad is a state-of-the-art GIS used to create and customize maps, build and maintain geographic data sets, and perform spatial analysis. Area and point dimensions were different for each study area, in order to create grid cells with similar proportions of roughly 200 square feet. An additional, smaller point grid was overlaid to ascertain how much of each indicator is present within the grid cells. To determine this, subsets of grid points were derived for three of the variables (wetland, evergreen trees, and hills) by selecting only those points that lie within the polygon layers.

A kernel density operation was used in the point selection process, through extending a 500-foot buffer when counting the number of points in each grid cell. In statistics, kernel density estimation (KDE) is a non-parametric way to estimate the probability density function of a random variable. Kernel density estimation is a fundamental data smoothing problem where inferences about the population are made, based on a finite data sample.This enables a more accurate spatial representation for how these features (evergreens, wetlands, hills) are distributed across and impact the landscape. “Select by Location” was used to build archaeological sites into the grid. Grid cells with an archaeological site present were given a value of 1 and labeled “Existing Sites;” all other cells were given a value of 0.

TransCAD provides valuable built-in statistical modeling tools. Using the “Model Estimation” tool, a binary logistic regression model was built, with “Existing Sites” as the dependent variable, and the indicators as the independent variables. Binary logistic regression is a regression system built for dependent variables with dichotomous values: yes/no, or 0/1. The “Model Estimation” tool produces a series of coefficients for each variable, along with a Rho(ρ) value. The ρ value is the equivalent of r2 in conventional linear regression. Through binary logistic regression, a probability output was generated for each grid cell.

“Model Evaluation” was used to apply the sample-derived model to the entire grid. The tool calculates a predictive value for each grid cell, based off of the binary logistic regression. The result: a probability value between 0 and 1 for archaeological sites to be within a grid cell, based on proximity to and presence of the six indicators. 0 represents total prediction, while 1 represents no prediction. Maps in Figures 2, 3, and 4 show the comparative influence of each variable for each study area along with tables that show their binary logistic regression coefficients (Tables 2, 3, 4). Map squares with the darkest shades are most likely to contain village sites. Tables are interpreted in a brief summary for each area.

Table 2. Binary Logistic Regression coefficients for Shawsheen River Valley.

Indicator	Coefficient
Constant	10.028545
Rivers	-15.183245
Confluences	-1.16481
Inland Wetlands	0.253331
Evergreens	-3.584782
Hills	-0.7.870701
Terrain	-0.504996
Rho (þ)	**0.919096**
Adjusted rho (þ)	**0.91899**

Table 3. Binary Logistic Regression coefficients for Merrimack River Valley.

Indicator	Coefficient
Constant	33.238518
Rivers	-15.678245
Confluences	-11.637386
Inland Wetlands	-0.496769
Evergreens	-0.611601
Hills	-11.411736
Terrain	-0.042501
Rho (þ)	**0.914151**
Adjusted rho (þ)	**0.913771**

Table 4. Binary Logistic Regression coefficients for Coastal Study Area.

Indicator	Coefficient
Constant	-1.582814
Rivers	-1.41838
Confluences	-3.962262
Inland Wetlands	-0.073645
Coastal Wetlands	-5.483866
Evergreens	-1.149798
Hills	-8.829356
Terrain	-0.034822
Rho (þ)	**0.887095**
Adjusted rho (þ)	**0.885675**

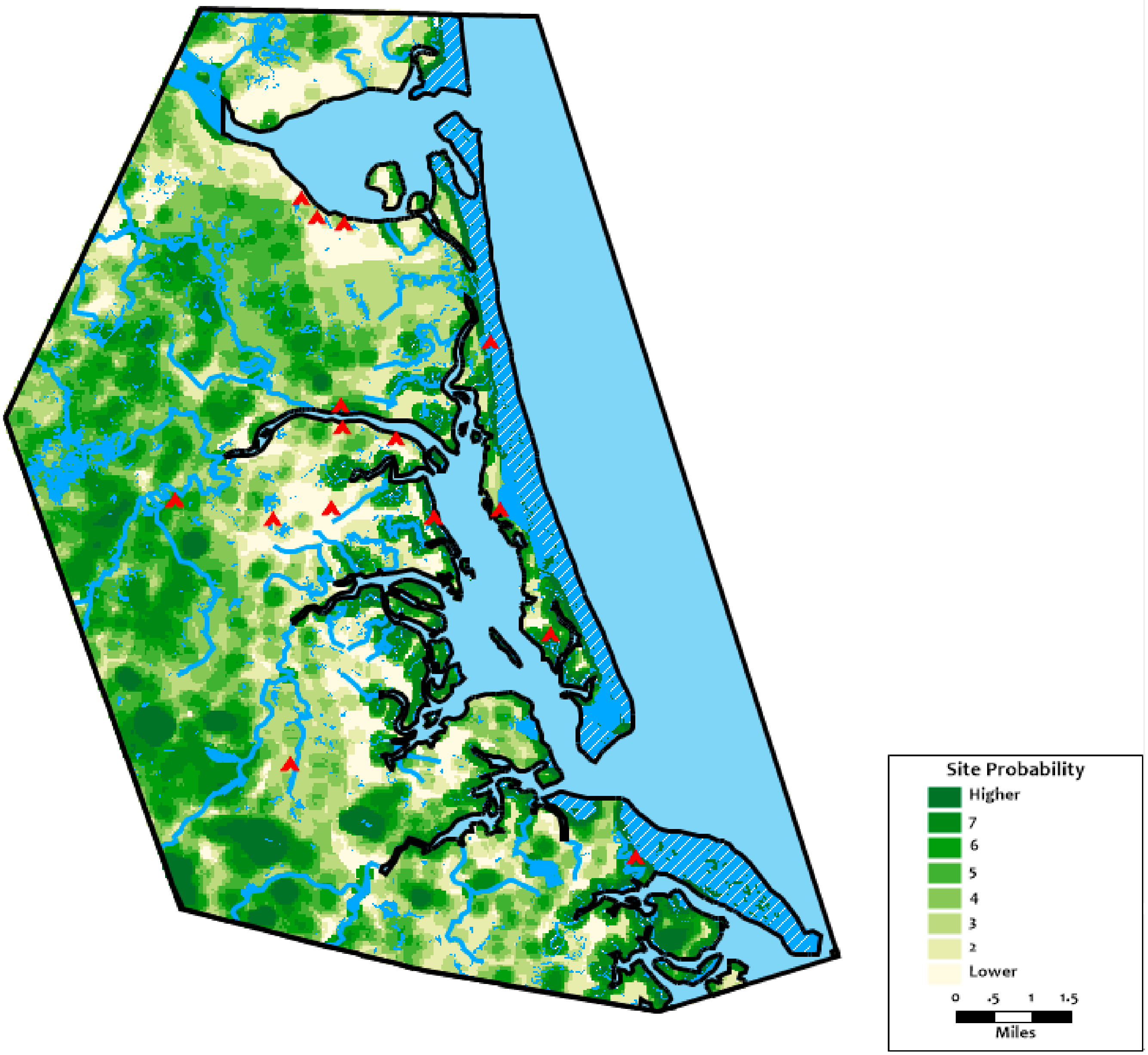

Figure 4. Comparative influence map for Coastal Study Area.

Shawsheen Area Summary

The coefficients reveal the indicators' importance from greatest to least in the following order: rivers, hill presence, evergreen trees, confluences, smooth terrain, and wetlands. As would be expected, rivers, with a coefficient of -15.18, were by far the most influential for the Shawsheen Valley sites. Bullen's survey focused on the Shawseen and the Ipswich, as well as the connections between Haggett's Pond, Martin's Brook, and Pomp's Pond. The targeted sampling of the original grid area into subsets was fruitful in minimizing this "rivers" confirmation bias. Second in importance are hills, with a coefficient of -7.87. With a ρ value of 0.919096, we can be confident that the six indicators as a whole are meaningfully predictive of site locations.

Merrimack Area Summary

The high ρ value of 0.914151 again furnishes confidence in the data earnestly. The Merrimack River itself, of course, proves most predictive, with a coefficient of -15.678245. Next in order of predictive weight are hills and confluences, equally, with evergreens, wetlands, and smooth terrain having very little weight. The high "Confluence" coefficient of -11.637386 reflects the significance of the Merrimack's value as a main migration and trade route for Late Woodland Pennacook and Abenaki people coming into Massachusetts, as well as the great number of the Merrimack's many tributaries. Ethnohistorical data supports the observation that many villages were located at the confluences of tributaries and their junctions with the river.

Coastal Area Summary

The predictive power of the variables for coastal sites/villages have the following order of importance: hills, coastal wetlands, confluences, evergreen trees, inland wetlands, and finally smooth terrain. Essex County's coastal plain is on average only about 10 feet above sea level, so terrain smoothness has no predictive weight for village site location. With a significant hill coefficient of 8.8296356, it is clear that Indigenous farmers would prefer any slight advantage of elevation. Saline and sandy coastal soils and the flood plains of tidal rivers were not suitable for agriculture or horticulture. Crops were grown on gher ground while life centered on shellfish gathering in the clamflats and fishing in the bays. Additional proximity to a freshwater swamp, while not highly predictive, would have been a plus. A ρ value of 0.887095 again supports the predictive value of the regression coefficients.

Study Area Comparisons

The regression models confirm a strong preference for water access in the form of rivers and coastal wetlands, and for inland areas suggest only a slight preference for lakes, ponds, and other types of wetland. Comparison of the three model outputs (Table 5) reveals that the weight of river confluence in site location varies depending on the geography of local water features. Interestingly and unexpectedly, the models consistently emphasize hills as a highly predictive variable, especially on the coast, and evergreens and flat, smooth terrain as the least predictive of village site location. In addition to their importance in coastal farming, the general importance of hills, especially those with exposed bedrock or boulder fields, most likely reflects Algonquian spirituality and calendric needs for places of astronomical observation and ceremonial gathering as well as their practical needs for defensive positioning and reconnaissance. Hills also were administrative centers and preferred for conducting diplomacy.

That evergreen groves in the Coastal Study area are not highly predictive does not mean that the people were not routinely clearing cropland through slash and burn, as was suggested recently in the literature (Oswald et al. 2020). It more likely means that swidden plots were too small and scattered to consistently measure the extent

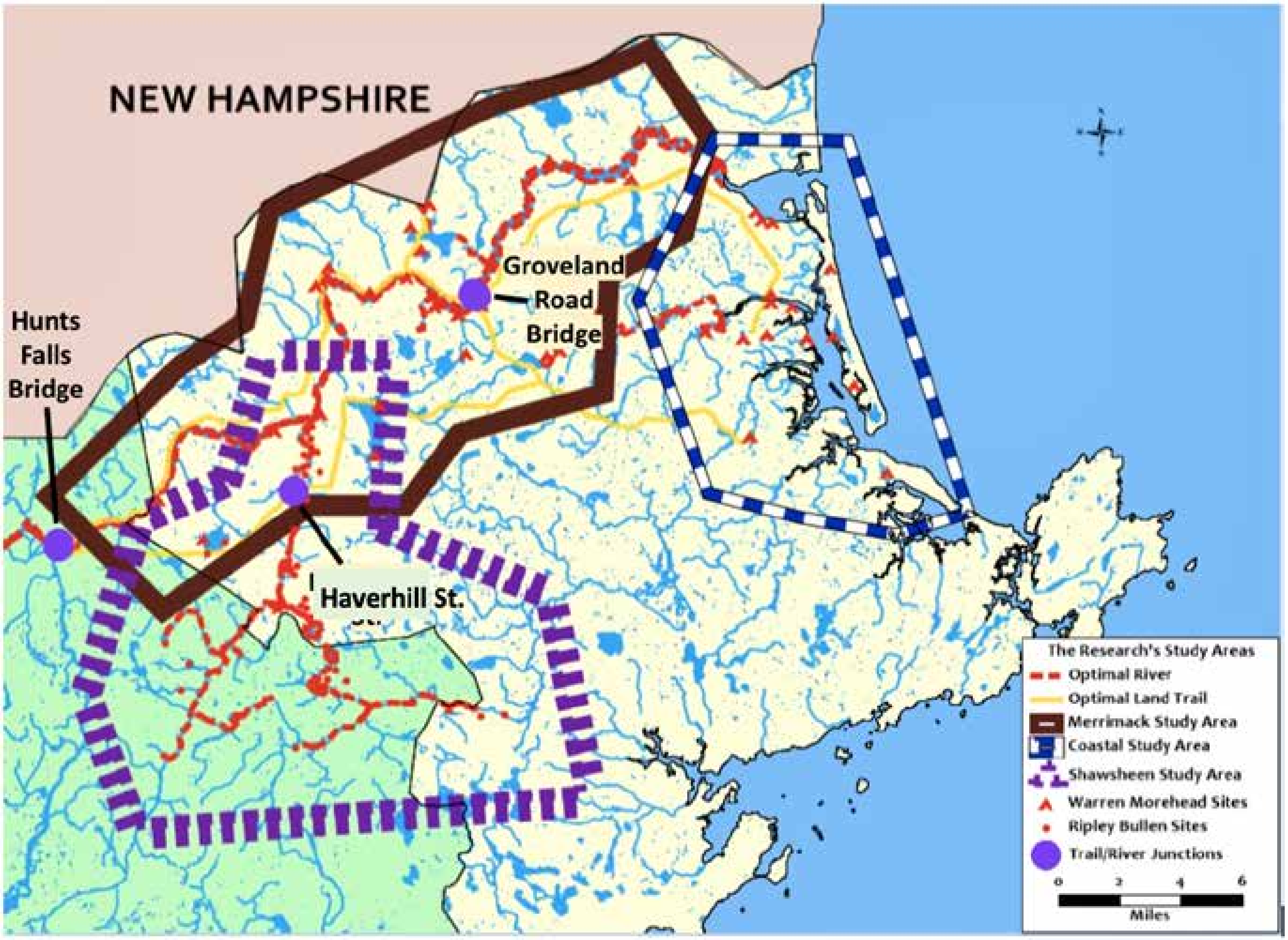

Figure 5. Optimal land and canoe trails in the study areas. Optimal overland trails are routes 113, 1A, 97, and 113. Optimal canoe routes are the Merrimack, Shawsheen, and Ipswich. Intersections of these routes had the highest probability of site location. The three sites indicated, for example, are the villages of Pentucket and Wamesit and the Shawsheen Village Historic District.

of groves of fire-resistant trees in the region's present-day largely deforested mixed deciduous woodlands. The pollen data cited in the Oswald et al. (2020) article are much less convincing than the many primary accounts of Algonquian use of fire in agricultural practice, with both early explorers and early colonists reporting twice-a-year burnings. Intentional forest fires were used by Indigenous people in conjunction with game drives as well as in clearing land and securing potash as a natural fertilizer. Indigenous land stewards, e.g., Leonard et al. (2020), have taken serious exception to the Oswald et al. (2020) article. In the seventeenth century, Massachusetts Bay Colony initially reduced traditional native burnings to once a year, then restricted them to the early spring months, then used them just to burn off brush on the margins of their pastures and fields to expand them, and then banned intentional forest fires altogether, making it a crime even to smoke tobacco in a cornfield. Many present-day forestry management experts attest to the value of controlled intentional fires to maintain the health of forests and understory plants and to reduce the threat of wildfires.

That flat/smooth terrain is not especially predictive contradicts criteria from the office of the state archaeologist, which specified an optimal 8-degree slope (Lynch 2012). The optimum of a flat smooth terrain possibly is based on archaeological evidence from Late Woodland sites in the Connecticut Valley, different in many ways from terrains in Essex County and more suitable for farming on floodplains. In Essex County flat/smooth terrain is not optimal for the cultivation of corn in the absence of irrigation, however. The Algonquians were planting in rows of mounds on gentle hillsides perpendicular to groundwater flows. Agricultural villages likely would have been sited on comparatively level ground near the foot of such hills.

Table 5. Most to Least Important Variables in Predicting Site Location (based on binary logistic regression coefficients).

Merrimack	Shawsheen	Coastal	
Rivers	Rivers	Hills	**Most Important**
Confluences	Hills	Coastal Wetlands	↓
Hills	Evergreens	Confluences	
Evergreens	Confluences	Rivers	
Inland Wetlands	Smooth Terrain	Evergreens	
Smooth Terrain	Inland Wetlands	Inland Wetlands	
		Smooth Terrain	**Least Important**

Algonquian Villages as a Social Network

Spatial optimization, based on the idea that Algonquian settlements did not exist in isolation but were linked in a communication network, provided the capstone to this location analysis (Gondola 2020b). This part of the study focused on all the transportation options by water and by land that would best facilitate travel among the 103 archaeological sites in the study sample. A line shapefile layer of all potential travel paths was created by conjoining canoe routes with known land trails. Within TransCAD, the new line layer and the village sites point layer were built into a line/node network. TransCAD's routing and logistics tool for "minimum spanning tree problem" was used to determine which of the network's lines were the most optimized paths of travel, minimizing distance cost between all sites. The "minimum labeling spanning tree problem" in a network is to find the most efficient "spanning tree" (set of linkages) associated with labels from a finite label set, expressed in a graph. ArcMap's intersect tool was then used to identify the water/trail junctions (ArcMap is an application used to view, edit and query geospatial data, and create maps). Least-cost transportation networks proved to be highly predictive of village site location.

The Indigenous trails tested include present-day highway routes 1A, 22, 62, 97, 110, 113, and 133. Of these, the most spatially optimal trails were state routes 110, 133, and 97 and US Route 1A. The most spatially optimal rivers were Lubbers Brook, Martins Brook, Merrimack River, Mill River, Parker River, Shawsheen River, and Strong Water Brook. These waterways provide access between the Merrimack and the Parker River and the Ipswich River, and to the resources of Plum Island sound and Ipswich Bay. There were three junctions of optimal trails with optimal rivers with the highest probability of village site location (Figure 5), which proved to be 100 percent accurate. The dots in Figure 5 coincide with the three largest Pawtucket villages in the areas under study at the time of European contact, from east to west: Pentucket (Haverhill), Shawsheen Village Historic District (Andover), and Wamesit (Lowell).

Conclusion

Geospatial analysis provides an alternative or contributory means of locating archaeological sites from data describing geographic features of land, water, and biome distribution. This is not an example or defense of "geographic determinism"—the prejorative meaning of this term is well defined at Jared Diamond's website (n.d.); it is simply a recognition of the fact that as a practical matter people take environmental factors into account when making decisions about siting their habitations and subsistence activities, and they value some environmental factors over others when doing so. This study supports existing ethnohistorical data about Algonquian settlement patterns. In northern Essex and Middlesex counties, village sites most likely will be found on rivers where they are met by their tributaries and/or cross trails, especially where there is proximity to a hill of some elevation and a wetland of some kind. The more factors that obtain in a place, the greater the likelihood of a find.

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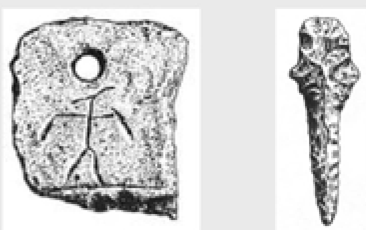

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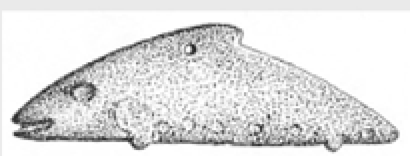

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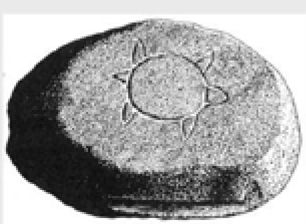

Turtle Petroglyph

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Purpose

The collective record of human existence is a powerful source for understanding human life. Questions such as "Where did we come from?" and "Where are we going?" can only be considered in light of knowledge of the past and its effect on the present and future. Archaeology, the systematic recovery and analysis of the material remains of past cultures, helps to provide that knowledge.

MAS stimulates the study of archaeology and Native American cultural history, especially in Massachusetts, and serves as a bond between students of archaeology. It fosters public under-standing through educational programs and publications, and promotes scientific research; careful, well-directed archaeological activity; conservation of sites, data, and artifacts; and seeks to prevent the collection of specimens for commercial purposes.

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Gregory D. Lattanzi, PhD is Curator for the Bureau of Archaeology & Ethnography at the New Jersey State Museum in Trenton, and the New Jersey State Archaeologist. He obtained his Bachelor's degree in Anthropology from the State University of New York at Binghamton. He went on to earn a Master's degree in Anthropology from the City University of New York, Hunter College, and in May 2013 received his PhD from Temple University. Before working at the New Jersey State Museum, Dr. Lattanzi was employed at a number of contract archaeological firms in the northeast participating in excavations in New Jersey, New York, and Pennsylvania. He worked on all types of cultural resource management projects from archaeological excavations to state and national register nominations. In the fall of 2001, Dr. Lattanzi started his career at the NJ State Museum as Registrar, working his way up to become Curator and State Archaeologist. He has published many articles, book reviews, and given public presentations at national, state, and local venues. Since 2015, Dr. Lattanzi has served on the New Jersey State Review Board, reviewing applications for the state and national register of historic places.

Mary Ellen Lepionka is an independent scholar researching the indigenous history of Essex County, Massachusetts. Mary Ellen lives on Cape Ann as a retired college instructor and author with a Master's degree in anthropology from Boston University and PhD work at the University of British Columbia. She taught anthropology at Boston University and other post-secondary institutions, participated in Ipswich MA salvage archaeology, excavated an Early Iron Age Bantu refuge site in Botswana, and had a career in higher education publishing as a developmental editor of college textbooks. Mary Ellen's work has appeared in the Bulletin of the Massachusetts Archaeological Society, NEARA Journal, historicipswich.org, capeannhistory.org, enduringgloucester.com, and capeannslavery.org.

Sara M. Magee is a PhD student in the Department of Anthropology at the University at Albany, SUNY, where she recently received an M.A. in Anthropology. Prior to attending graduate school, Sara spent a year with the New Jersey State Museum as an intern with the Bureau of Natural History, after receiving her B.S. in Evolutionary Anthropology from Rutgers University. In her undergraduate career, Sara completed a senior thesis investigating the relationship between feeding behavior and cranial morphology in mammals, and her recent master's work sought to explore the ecological consequences of lemuriform extinctions in the recent past and present of Madagascar. Her interests are varied, but primarily concern functional morphology, paleoecology, zooarchaeology, extinctions, and anthropogenic impacts through time.

David C. Parris is Curator of Natural History at the New Jersey State Museum, where he has worked since 1971. A native of Kansas, he studied geology and paleontology at the New Mexico Institute of Mining and Technology (B.S.), the South Dakota School of Mines and Technology (M.S.), and Princeton University (M.A.). His research interests are vertebrate paleontology, biostratigraphy of North America, zooarchaeology, and archaeological numismatics.

Andrew Stanzeski is an avocational archaeologist and long-time member of the Archaeological Society of New Jersey and the Eastern States Archaeological Federation. He has been actively publishing his research since the 1970s. He has identified sites from diverse eras, spanning the PaleoIndian through Euro-American periods. Andrew has worked extensively with museum and private collections, and is currently revisiting sites that he documented on Martha's Vineyard.

John Stanzeski has been a lab supervisor at AECOM for the last ten years. He did earlier archaeological work with Ron Thomas in Delaware. He has a bachelor's degree in environmental science from Temple University.

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Notes to Contributors

The Editor solicits for publication original contributions related to the archaeology of Massachusetts. Authors of articles submitted to the Bulletin of the Massachusetts Archaeological Society are requested to follow the style guide for American Antiquity (https://www.saa.org/publications/american-antiquity) and Gregory Younging's 2018 *Elements of Indigenous Style: A Guide for Writing By and About Indigenous People* (Brush Education Inc.). Manuscripts should be sent to the Editor for evaluation and comment at ryanjwheeler@gmail.com. The Editor will arrange for peer review of all submissions.

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