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Situating the Pot and Potter: Ceramic Production and Use at the Silvercreek Sites, Two Early-Late Woodland Sites in Elgin County, Ontario

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A thesis submitted in partial fulfillment of the requirements for the degree in Master of Arts

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(Thesis format: Monograph)

by

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Abstract

This study examines the pottery from two archaeological sites that date to the beginning of the early Late Woodland period. In order to understand the production and use of ceramic vessels at the sites, a wide range of ceramic attributes are recorded and analyzed. A second component of the research is to understand the settlement patterns at the site, in order to determine how space was organized at the sites. Through these analyses, I situate these sites within the wider context of southwestern Ontario in the 11th century A.D. I adopt a 'communities of practice' approach, and conclude that the similarities in ceramics throughout the Great Lakes during this time period can be seen as indicating high levels of social interaction, as well as overlapping communities of practice, in which potters may have moved across the landscape and continued their craft traditions in new communities.

Keywords

Early Late Woodland Period, Western Basin, Princess Point, Glen Meyer, ceramic analysis, pottery production, attribute analysis, spatial analysis, settlement patterns, communities of practice, juvenile vessels.

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Chapter 1

1 Introduction

Pottery, one of the most abundant materials in the archaeological record, is a key part of reconstructing the cultural landscape of the Great Lakes region over the past 2,000 years. While archaeologists looking at pottery have often considered the decorative and stylistic attributes of vessels to be of most interest, recent work in petrography, clay sourcing, and manufacturing techniques has demonstrated the value of studying a wider variety of ceramic attributes. Moreover, these studies take into consideration the role of pottery within a larger taskscape, and as part of wider communities of practice and interaction spheres.

Many of the steps of the operational sequence of pottery production are recognizable on the finished clay vessel. Use-related activities also leave traces on the pot. For these reasons, pottery provides an invaluable resource for studying the past. In Ontario, pottery appears in the archaeological record during the Early Woodland Period (ca. 900-400 B.C.) in the form of what archaeologists have labeled Vinette 1 wares: coil-manufactured, thick, undecorated vessels (Ferris and Spence 1995:89-90). Many scholars have suggested that expediency and portability was favoured over durability in the early ceramic traditions of northeastern North America (Skibo 2013:40). By the Middle Woodland Period (ca. 400 B.C.–A.D. 700), pottery was defined by the increasing amount of decoration that was applied to vessels, in the form of pseudo scallop shell impressions, punctates, linear tool stamping, and dentate or rocker dentate stamping (Ferris and Spence 1995:98). The general trends for ceramics during the following periods include progressively thinner walled vessels made through modeling and paddle and anvil techniques, more highly decorated lip, rim and neck zones, as well as many changes in the technological choices that potters were making. By the Late Woodland Period (ca. 900-1550 A.D.), vessels were highly durable and made more resistant to abrasion, thermal shock and other impacts (Skibo 2013: Table 2.2). Vessels were also less expedient to produce, and much less portable. This is a reflection of simultaneous changes in settlement patterns, with the mobile lifeways of earlier periods giving way to more permanent village occupations.

Archaeologists working in the Great Lakes region have tended to focus much of their analyses of ceramics on the Iroquoian sites of the Late Woodland Period in southern Ontario, referred to as the Ontario Iroquoian Tradition, named for the connection that researchers have made between modern Iroquoian groups and past populations. The sites from this period are often large village settlements, with well-defined longhouse features, and artifact-rich middens. In the period between the large settlements of the Late Woodland, and the more ephemeral camps of the Early and Middle Woodland periods lies the Transitional Woodland (500 to 1050 A.D. [Creese 2013]), a period with poorly understood settlement patterns. The ceramics from this period might also be conceived of as transitional. Vessels are larger than earlier times and would have been much less portable than Early or Middle Woodland wares, they are elaborately decorated, and it is during this time that potters began to move away from coil manufacturing techniques. Much of the pottery of this time is in fact more decorated than later Iroquoian vessels, with the rim, neck and shoulder zones all featuring a variety of motifs and techniques.

1.1 Organization of the Thesis

This study examines the pottery from two archaeological sites which date to the beginning of the early Late Woodland period, but retain several Transitional Woodland characteristics. In this chapter, I provide a brief summary of the two sites, including the material culture recovered, radiocarbon dates, settlement patterns and seasonality. Chapter 2 will provide background on the work done for the region of southwestern Ontario to date. I will focus broadly on the time period between about 500 and 1300 A.D., looking at the trends in pottery and settlement patterns. In Chapter 3, I provide a brief background on the ways in which archaeologists have conceptualized material culture style and variation, and discuss the theoretical approach to this research, which is a communities of practice perspective. In Chapter 4, I present the methodology of my research, for both ceramic and settlement analyzes. Chapter 5 will present the results of these analyzes, as well as some initial interpretations of the data. Chapter 6 will conclude by discussing in more detail how the Silvercreek sites fit into the wider cultural landscape of the time, through a communities of practice approach.

1.2 Silvercreek Archaeological Sites

The sites, known as Silvercreek Location 9 (AeHf-58) and Location 15 (AeHf-61), were excavated by Timmins Martelle Heritage Consultants Inc. (hereafter referred to as TMHC) in 2012 prior to the construction of a solar farm development on a rural property. The property is located northeast of the village of Port Bruce in Elgin County, Ontario (Figure 1). The sites were both located within agricultural lands drained by Silver Creek, a watercourse that flows into Lake Erie 4 km to the south of the sites. Both sites are in close proximity to the creek and several of its tributaries, with Location 15 located approximately 100 m south of a small tributary, and Location 9 about 100 m north of another (Figure 2). The agricultural fields in which the sites are located reflect the gently undulating terrain of the area, while the lands slope steeply down to the creek and its tributaries at the field edges.

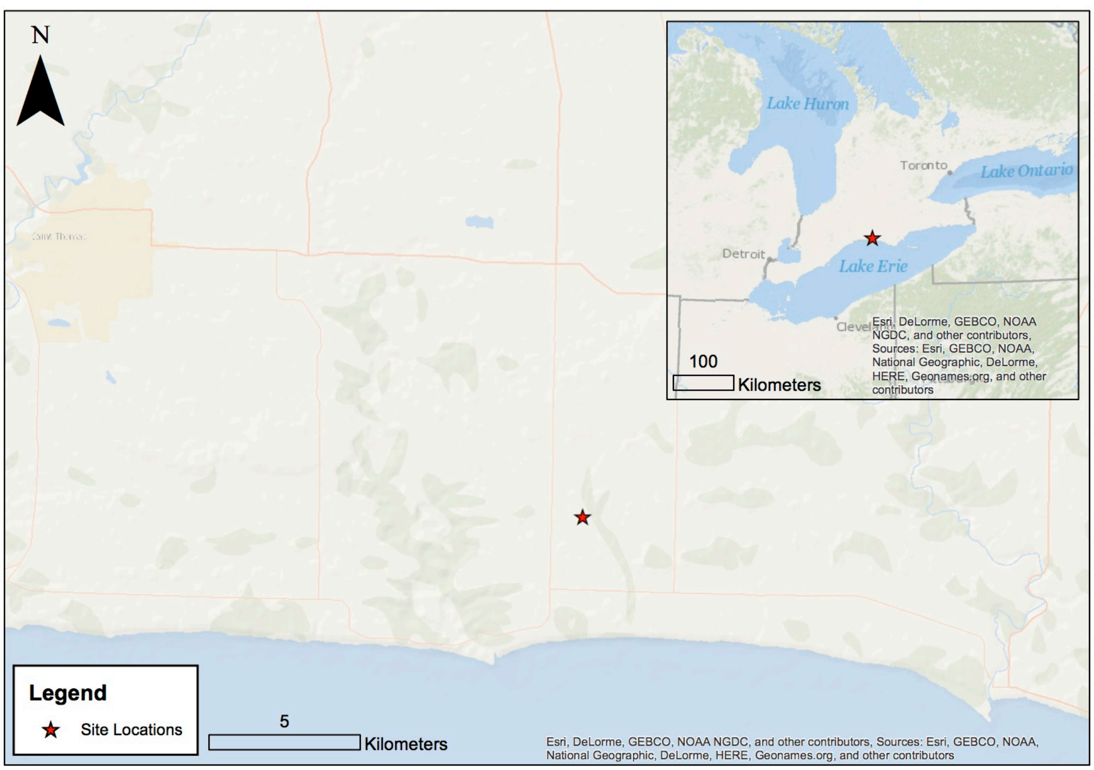


Figure 1: Location of the Silvercreek Sites

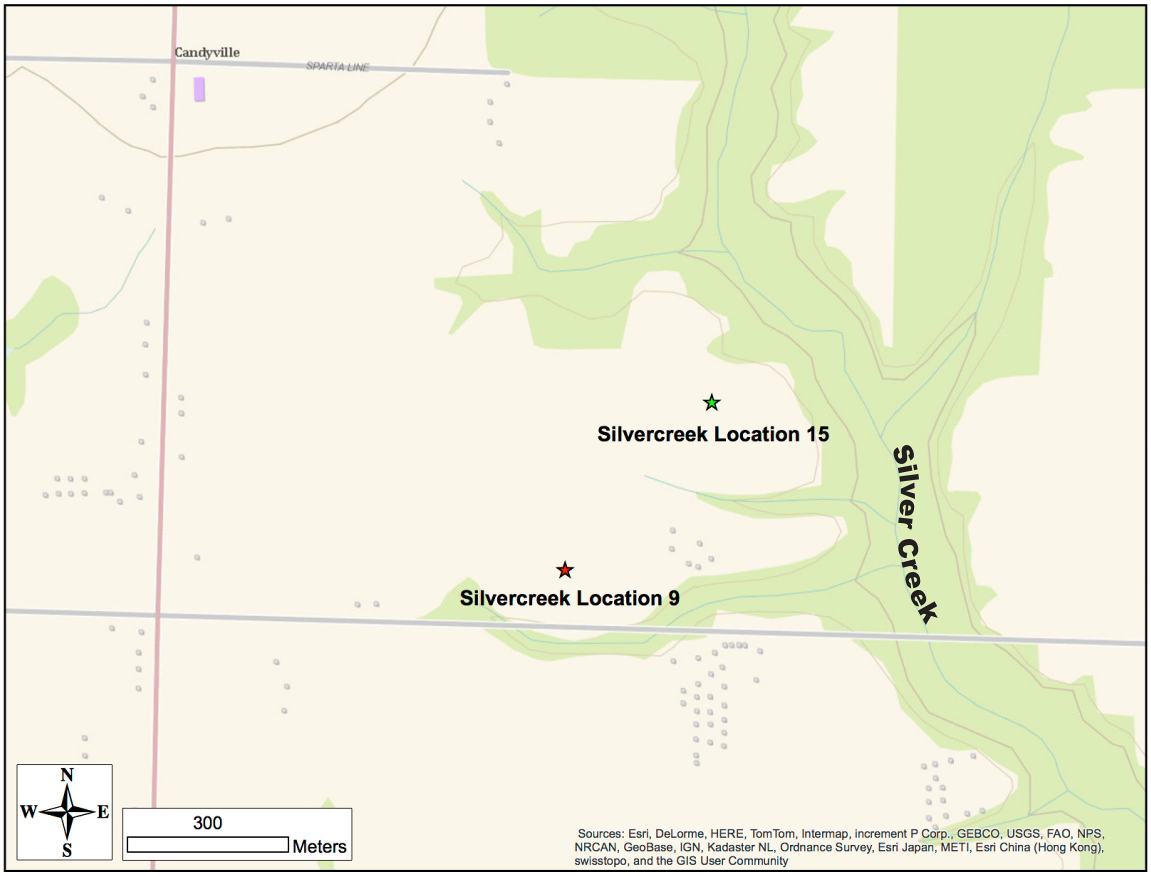


Figure 2: Location 9 and Location 15

The sites are located within the Norfolk Sand Plain physiographic region of Southern Ontario, an area of sands and silts that were deposited as a delta in glacial Lakes Warren and Whittlesey (Chapman and Putnam 1984:154). The dominant soil types found on the property are Plainfield Sand and Walsingham Sand. These soils are fine to loamy fine sands (TMHC 2012; Ontario Agricultural College 1930). Although only one archaeological site had been previously identified and registered within 1 km of the subject property, TMHC (2010:5) attributed this to a lack of archaeological/cultural resource management projects in the region, and not due to low archaeological potential.

Following Stage 3 test excavations it was determined that a portion of Location 9 lay outside of the development area. It was avoided and protected while the remainder of the site was excavated (TMHC 2012). The entirety of Location 15 was subjected to Stage 4 mitigative excavation.

The Stage 4 excavations of both Location 9 and Location 15 consisted of plough zone excavation in one-metre-square units within areas of high artifact density, followed by the mechanical removal of topsoil, which identified subsoil features (TMHC 2013a; 2013b). These features were carefully recorded and hand-excavated. At Location 9, 136 one-metre square units, 49 cultural features, and 18 post molds were excavated, which produced 7,632 artifacts (TMHC 2013a) (Table 1). Diagnostic artifacts indicated that the site was likely Transitional Woodland, however radiocarbon dates from two feature clusters at the sites were later than expected: Feature 32 in Cluster 5 produced a date of 860 +/- 30 rcybp (radiocarbon years before present), which yielded five 2 sigma calibrated date ranges (98% accuracy), ranging from A.D. 1050-1080 to A.D. 1250. Feature 2 in Cluster 1 produced the date of 950 +/- 30 rcybp, which yielded a 2 sigma calibrated range from 1020-1160 A.D. This places the site at the end of the Transitional Woodland, and the beginning of the Late Woodland Period (TMHC 2013a:28-30). The lithics from Location 9 conformed to the Transitional/early Late Woodland assignment of the site, with the assemblage dominated by triangular Levanna-style projectile points; one Middle Woodland Raccoon Notched type was found as well.

Table 1: Artifact Totals From Features and Post Molds

Artifact Type	**Location 9**	**Location 15**
Lithics	4,678	22,947
Scrapers/Perforators	28	44
Groundstone	5	31
Ceramics	459	4,087
Pipes	4	68
Bone Artifacts	3	8
Faunal	887	5,085
Total	**6,349**	**32,270**

Based on the floral and faunal evidence, TMHC concluded that Location 9 might represent a late summer-fall occupation, although the evidence was largely inconclusive. The majority of faunal remains consisted of mammal elements, including beaver, small rodents, and deer. In addition, small amounts of bird, turtle, and fish bone were identified. Although the dominance of mammal specimens suggested a winter occupation, TMHC (2013a:31) noted that these animals could be hunted year-round. Turtle typically indicates a warm season occupation, however, turtle shells were utilized for numerous purposes during this time and may have been curated. The faunal assemblage contained burnt, calcined, and butchered bones, suggesting that these specimens represent the remains of food refuse deposited within pits. The archaeobotanical analysis of floral samples identified nine taxa, including a single maize kernel, as well as 11 maize kernel fragments. Additionally, varying quantities of seeds and nuts including sumac seeds (n=7), grass seeds (n=1), acorn (n=145), and a fragment of *Juglans* sp. (walnut) shell were recovered (TMHC 2013a:31). The large quantities of nut remains suggest that the site was occupied into the fall, since this is when nuts would be ready for harvest, although nuts could also have been stored. Lastly, sugar maple, ash, birch, and beech tree species were also identified.

Settlement patterns at Location 9 were also largely ambiguous. Forty-nine cultural features were excavated, which could be assigned to five discrete feature clusters along with several outlying features. Most of these features were classified as storage or refuse pits, appearing oval or circular in plan view, and basin- or cylindrical-shaped in profile (TMHC 2013a:23). Only 18 post molds were identified. TMHC concluded that three feature clusters (clusters 1, 2, and 5) might represent within-house storage pits, although house wall post molds were not identified. These clusters were rich in artifacts and covered roughly 30 to 40 m^2. Clusters 2 and 5 were associated with smaller feature clusters (clusters 3 and 4), which yielded fewer artifacts. Clusters 3 and 4 were hypothesized to be related to external activity areas, while clusters 1, 2 and 5 were suggested to represent wigwam-like short-term housing structures. TMHC also concluded that the clusters were not necessarily contemporaneous, and could in fact represent seasonal visits over several years by the same group.

The TMHC report concluded that despite the later-than-expected radiocarbon dates, Location 9 appeared to represent a Princess Point occupation, due to the presence of Princess Point-like wares from the site, including Vessel 1, which featured cord-wrapped stick impressed decoration, punctates, a semi-conoidal base, and cord-marked body (Figure 8). The settlement patterns, however, which suggest a short-term occupation at an upland location, are in contrast to models proposed by Smith and Crawford (1997) for Princess Point settlement systems. TMHC (2013a:33) acknowledged that the settlement patterns may conform more closely with Western Basin systems, seen on sites to the west of the Silvercreek sites. Thus, TMHC suggested that perhaps Location 9 represented a Princess Point group that followed a seasonal round similar to those of Western Basin groups.

Location 15 was located approximately 400 metres to the northeast of Location 9. At Location 15, 184 one-metre-square units, 49 cultural features, and 28 post molds were excavated, yielding 40,852 artifacts (Table 1). Radiocarbon dates from Location 15 were obtained on two charcoal samples from two discrete feature clusters and are roughly contemporaneous. Feature 2 in Cluster 1 produced a date of 940 +/- 30 rcybp, and Feature 76 in Cluster 2 produced the date of 900 +/- 30 rcybp. The dates, based on a 2 sigma calibrated result with 95% probability, range from between A.D. 1020- 1160 (cal) and A.D. 1030-1220 (cal), respectively (TMHC 2013b:38). These dates also place Location 15 at the beginning of the Late Woodland Period. Unlike Location 9, Location 15 yielded a majority of ceramic vessels that TMHC concluded were associated with the Younge Phase of the Western Basin Tradition, along with several vessels that could be considered Princess Point-like and Rivière au Vase-like ceramics. Diagnostic lithic artifacts consisted of triangular projectile points (Levanna), typically of the Transitional Woodland, as well as one Middle Woodland Raccoon Notched point, and four points and/or cache blades that could possibly be assigned to the Early Woodland Meadowood complex (TMHC 2013b:40).

The faunal assemblage at Location 15 was similar to that of Location 9: white-tailed deer dominated the collection, in addition to black bear, grey squirrel, mole, walleye and snapping turtle (TMHC 2013b:29). The presence of deer remains as well as evidence that deer was being processed at Location 15 suggest that the occupation included winter, as deer is easiest to hunt during cold-weather months. The bear, fish, and turtle remains suggest a warm-weather occupation, although it is not clear if these animals were being collected near the site or brought from another location and stored there. The faunal samples from the site contained 18 taxa, including seeds (elderberry, bramble, sumac, lamb's quarters and cherry), nuts (black walnut, hickory, beech and butternut), and tree species (beech, ash, birch, sugar maple, white elm, ironwood, *Juglans* sp., pine and chestnut) (TMHC 2013b:30). The emphasis on nut collection and/or storage at the site suggested a late summer-fall occupation. Cultivated plant remains included one possible bean cotyledon, two maize kernels, 58 kernel fragments, eight cupules, four cupule fragments, and a single embryo, suggesting that the site's occupants likely performed some agriculture. Overall, the floral and faunal evidence suggest a spring to fall occupation, with the possibility for year-round habitation.

Settlement patterns were also very similar between Location 15 and Location 9. At Location 15, 49 cultural features grouped into five discrete feature clusters were excavated. They consisted of storage or refuse pits, usually circular or oval in plan view and basin- or cylindrical-shaped in profile. Only 28 post molds were found, and these did not appear to delimit structures. It is worth noting that the Norfolk Sand Plain was settled very early, after townships were opened in 1792 to 1812, but many farms were quickly abandoned as the light-textured, sandy soils were prone to wind erosion after the land was cleared and cultivated (Chapman and Putnam 1984:154). Tobacco farming was soon found to be the most productive type of agriculture in the region. The paucity of preserved post molds may be more an indication of the poor preservation at the site due to soil erosion and sustained farming for nearly two hundred years, rather than the absence of housing structures.

Clusters 1 and 2 at Location 15 were hypothesized to represent house structures, due to their size and high artifact densities, and clusters 3, 4 and 5 were seen to be activity areas situated outside of the possible houses. Like Location 9, it was not clear if the clusters were contemporaneous, or represented seasonal occupations over several years. Unlike Location 9, the settlement patterns at Location 15 appeared to coincide more closely with the cultural affiliation assigned to the site. The Younge Phase of the Western Basin Tradition is characterized by short-term seasonal occupations represented by clusters of features, interpreted as either external food storage or within-house storage pits (TMHC 2013b:42).

As TMHC outlined in the reports for these sites, there have not been many archaeological investigations in the Silver Creek area, and in particular, little is known about the Transitional or early-Late Woodland in the area. While many Glen Meyer village sites have been documented on the Norfolk Sand Plain (see Chapter 2), and much work has been done on the Grand River drainage to the east (e.g., Crawford and Smith 2002; Smith and Crawford 2002), and the London-Chatham-area to the west (see Murphy and Ferris 1990), the archaeological record between these two regions remains largely unstudied during this time period. Thus, the Silvercreek sites provide a unique opportunity to explore the material culture and settlement patterns of this time period within Malahide Township. Furthermore, the ceramics from these sites display intra-site variability, reflecting a range of temporal and regional traits.

This thesis aims to explore how these sites fit within the larger archaeological landscape during this period, through the analysis of the pottery recovered from the sites. The objective is to examine the intra-site and inter-site ceramic variability, using an attribute-based approach in which manufacture-related, morphological, functional/use-wear, and decorative attributes of the vessels are all examined. Using this approach, I hope to explore the production and use of pottery at the Silvercreek sites. By examining pottery not as a marker of ethnicity, but as a product of the wider community of practice, information regarding the lifeways of a site's inhabitants can be explored. I will also explore how the Silvercreek pottery relates to other ceramics from this period, addressing the degree to which that these ceramics display stylistic similarities to ceramics from sites around the Great Lakes region. The high number of juvenile vessels at both sites will be examined, providing a glimpse into lives of the youngest potters at the site.

The second component of my project aims to contextualize the ceramic analysis by examining the settlement patterns from each site. There is a paucity of settlement data for this region, particularly during the time period of the Silvercreek sites. Although settlement patterns are mainly restricted to clusters of subsurface storage/refuse pits, an attempt will be made to explore artifact densities and distributions, with particular attention paid to the clusters of subsurface features as evidence for possible habitation structures or activity areas.

1.3 Conclusion

This chapter has provided a brief summary of the two archaeological sites that form the basis of my analysis. These sites are located in Malahide Township and have been radiocarbon dated to the early Late Woodland Period. Through an examination of the pottery and settlement patterns from the sites, I hope to situate these sites within the wider context of southern Ontario at this time. In the next chapter, I will review the archaeological research done for this time period within southwestern Ontario to date.

Chapter 2

2 The Early Late Woodland Period

This chapter seeks to provide an overview of the ceramic and settlement trends of the Transitional to early Late Woodland, as well as the historical context for the current chronological and cultural-historical labels in place for this region of southern Ontario. As the discussion is framed in regards to the study of ceramics, it is important to first briefly mention the two forms of ceramic analysis that have dominated archaeology in the Great Lakes: attribute analysis and the typological approach. The typological method involves the formulation of pottery types, or the use of existing types, to categorize vessels. This method has been criticized for it results in a more subjective assignment of pots into types, and does not account for the variation within assemblages (Wright 1967). Attributes provide a finer level of analysis, and are often more objective. Attributes are small units of analysis – for example, wall thickness or decorative technique (Curtis 2004:78).

2.1 Typological Approach

Much of the initial work on pre-contact ceramics in southern Ontario revolved around Late Woodland Iroquoian pottery. Studies focused largely on decorative elements of vessels, and the assignment of archaeological sites into categories of historically documented ethnic groups. In 1949, William A. Ritchie and Richard S. MacNeish set forth to establish "ceramic type categories" for the Middle and Late Woodland manifestations in New York State, such as Owasco and Point Peninsula (Ritchie and MacNeish 1949). They were primarily concerned with establishing a chronology of ceramics that could be useful throughout the New York area, as well as answering questions of ethnic affiliation, and broader processes of cultural change.

In 1952, MacNeish undertook the formulation of additional pottery types, attempting a seriation of pottery types and trends in 'Iroquois prehistory'. MacNeish analyzed ceramics from over 75 sites from the Great Lakes region, including many from southern Ontario, and defined 59 Iroquois pottery types. This led him to conclude that Point

Peninsula and Owasco pottery was 'ancestral' to Iroquois pottery, based on the features, styles, and types he identified (MacNeish 1952:88-89). Types were, therefore, often used by MacNeish to identify group or ethnic boundaries in the archaeological record. Following MacNeish's initial typology, new research resulted in the revision of MacNeish's pottery types or the creation of additional types (Wright 1966, 1967:66). As Wright (1967:66) argued, this process was exacerbated by a lack of communication between researchers, which led to the creation of a variety of local types, many of which could have been combined into existing categories.

2.2 Attribute Analysis

In 1967, Wright advocated for the adoption of attribute analysis, and abandonment of the type approach. Wright saw many weaknesses in the type approach, including the continual need for revision of the typology, and the issue of reproducibility: different analysts could easily classify the same sherd into a different type based on their preference for particular diagnostic traits over others. Wright believed that attribute analysis would produce greater clarity when studying change over time, and argued that attributes were a more sensitive, accurate indicator of space and time given their more precise nature (Wright 1967:67). Although Wright acknowledged that the seemingly limitless number of attributes could be a problem, he argued for selectivity: focusing on those attributes that demonstrate significance in measuring time and space.

Wright's proposition that attribute analysis replace type analysis in ceramic studies was influential, as was his application of the approach in his work on Iroquoian ceramics (Wright 1966). One application of the attribute approach to ceramics was Ramsden's (1977) seminal analysis of pottery from 28 Iroquoian sites in Ontario, in which attributes were studied to reconstruct relationships between site clusters. However, the cultural-historical paradigm remained in place, as did a focus on questions of chronological organization and ethnic affiliation (Howie-Langs 1998:6). Furthermore, analysts continued to focus largely on decorative elements on the rim and neck portion of vessels; likely a result of the types of questions being asked about the ceramics under study. Today, the type approach to ceramics is occasionally still employed for Late Woodland pottery, although often in conjunction with attribute analysis (Williamson and Powis

1998), or it may be adopted when data is used from previously published site reports (Wright 2006). Attribute analysis is much more regularly employed, particularly for pottery that falls outside of the spatial-temporal boundaries of MacNeish's Iroquoian pottery types. The attribute approach is also well suited to recent inquiries being made into pottery production (Martelle 2002), use (Schumacher 2013), variability (Howie-Langs 1998), and the ways in which pottery can inform our understanding of cultural change and interactions (Curtis 2004), and community organization (Watts 2006).

While strides have been taken to change the methodological approaches to Late Woodland ceramics, the chronologies established for the archaeological record of the region are still largely associated with notions of cultural, ethnic or group identity. Archaeologists in the Great Lakes region continue to argue for an end to the emphasis placed on taxonomic classification systems, referring to cultural-historical taxa as "a straightjacket, serving to define the research agenda and restrict the questions asked about the past" (Hart and Brumbach 2003:737). As many researchers have argued, categories created by archaeologists would almost certainly bear little significance to those in the past, and equating attributes such as rim sherd decoration to cultural or ethnic identity is highly problematic. Furthermore, "cultural historical boxes drawn around… two phases" or two regions are often arbitrary distinctions (Ferris 1999:12-13), which would have borne little relevance to past peoples.

Despite its many shortfalls, however, the cultural-historical approach has remained a dominant paradigm within Ontario archaeology. This may be due in part to the dominance of the cultural resource management industry in the province. For example, archaeological site forms submitted to the provincial government require that "cultural affinities" be recorded (von Bitter et al. 1999). This information is entered into the Ontario archaeological sites database, and is available to researchers. This means that quick identifiers and categories become important to researchers wanting to ensure the proper documentation of an archaeological site, although it can be a challenge for the numerous sites with small assemblages and few diagnostics. The cultural-historical approach also provides a framework for thinking about the material culture of the Great Lakes, and while many researchers have expressed discontent with the use of labels

(Engelbrecht 1999; Ferris 1999; Watts 1999), they remain firmly rooted in the discourse of the field.

2.3 Culture-History of the Early Late Woodland in Southern Ontario

In southern Ontario, the transition between the Middle Woodland Period and the Late Woodland Period, often referred to as the Transitional Woodland, falls from approximately A.D. 500 to 1050 (Creese 2013:194) (Table 2). Both the date range for this time period (Ferris and Spence 1995:102) and the usefulness of the concept of a "Transitional Woodland" have been debated (Smith and Crawford 2002). Ferris and Spence (1995:102-103) argued that the few single-component sites from this period, as well as the difficulty in distinguishing between the Middle and Late Woodland periods, have resulted in disagreement among researchers in how to define this transitional time. Smith and Crawford (2002:108-110) have argued against elevating the status of the Transitional Woodland to a new period, given the overlap between Middle Woodland and "transitional" sites, as well as between Princess Point and Glen Meyer sites. They argued that the current chronology and cultural classifications in place need revision, but acknowledged the difficulty in redefining labels that have been used for many decades.

Two regionally distinct archaeological constructs have been defined to classify the indigenous occupations to the east and west of the study area. In the region bounded roughly by the western end of Lake Ontario, and the Grand River Valley to the east, a complex defined as Princess Point is known from the Transitional Woodland period (Smith and Crawford 1995:63) (Figure 3). This complex is believed to have given rise to later Glen Meyer groups, around A.D. 900-1000 (Smith and Crawford 2002:110). In southwestern Ontario, west of the Grand River Valley, groups from this time are usually included within the Rivière au Vase and Younge phases of the Western Basin Tradition, which are believed to have lasted from approximately A.D. 600 to 800 or 900 and A.D. 800 or 900 to 1200, respectively (Murphy and Ferris 1990:194).

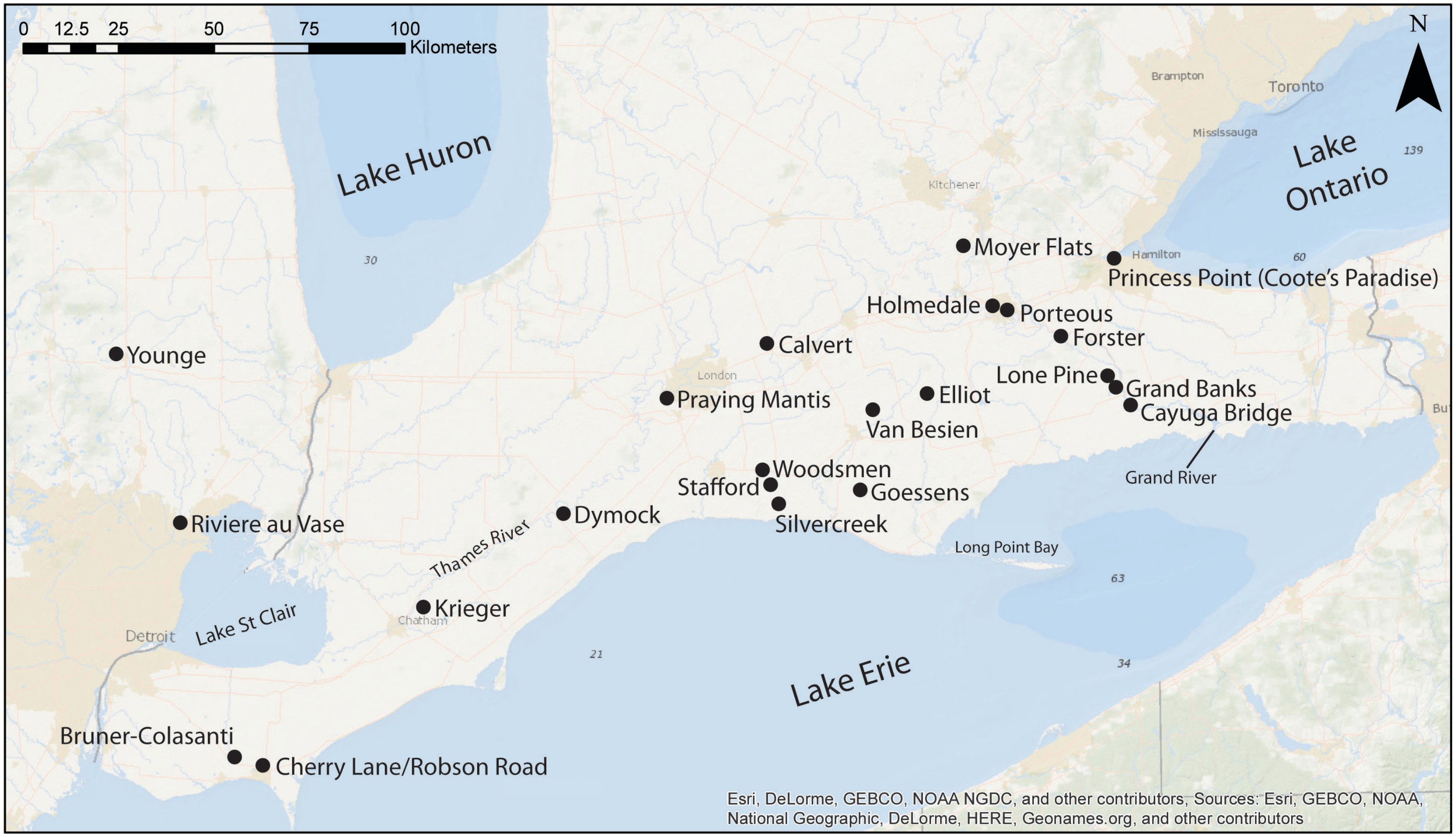


Figure 3: Approximate Locations of Key Sites Mentioned in Text

Table 2: Early Late Woodland Cultural Chronology of Southwestern Ontario (after Creese 2013; Murphy and Ferris 1990; Smith and Crawford 2002)

Subdivision I	**Subdivision II**	**Dates BC/AD**	**Years Before Present (B.P)**
Transitional Woodland	Princess Point	500 to 1050 A.D.	1500 to 950
	Western Basin: Rivière au Vase	600 to 800/900 A.D.	1400 to 1200/1100
Late Woodland			
Early Ontario Iroquois Tradition	Glen Meyer	800/900 to 1250/1300 A.D.	1200/1300 to 750/700
Western Basin Tradition	Younge Phase	800/900 to 1200 A.D.	1200/1100 to 800

2.3.1 Western Basin Tradition

Initial work was completed on the Western Basin Tradition by early Michigan archaeologist Emerson Greenman. Greenman excavated three sites in Michigan known as the Younge, the Wolf, and the Rivière au Vase sites, which later became the 'type' sites for the Younge, Wolf, and Rivière au Vase phases of the Western Basin Tradition (Greenman 1937, 1939, 1945) (Figure 3). Greenman (1953:177 as cited in Fitting 1965:142) noted a relationship between Late Woodland 'cultures' of the southeastern region of Michigan and the cultures of Ontario, seeing the Michigan region as an "extension of the province of Ontario in late pre-columbian [sic] times." It was James E. Fitting, a student of Greenman's, who first defined the "Wayne Tradition" and the "Younge Tradition", based on site data from Greenman and other Michigan archaeologists (Fitting 1965, 1975). In the years following Fitting's definition, several scholars refined these Late Woodland traditions (Stothers 1975, 1979; Stothers and

Graves 1983; Stothers et al. 1984), renaming them to reflect the area of Michigan, Ohio and Ontario where the archaeological complex first occurs: the Western Basin of Lake Erie (Prahl et al. 1976).

The Western Basin Tradition received minimal attention in Ontario until the seminal piece by Murphy and Ferris (1990), which summarized the work done in Ontario to date, described the material culture trends of the tradition, and provided an argument for the assignment of an Algonquian cultural affiliation for the Western Basin peoples. The first phase, Rivière au Vase, they argued, developed out of the Middle Woodland Couture Complex (Murphy and Ferris 1990:195). The ceramics from this time period are small, globular to elongated vessels with rounded or semi-conoidal bases, relatively thin-walled, with constricted necks and pronounced shoulders. Rims are vertical to everted, uncollared and uncastellated, with rounded to flat lip surfaces that are typically decorated with transverse or oblique dentate, suture, or cord-wrapped impressions. Bodies are typically plain with cord-roughened surfaces and interiors are smoothed or wiped. Paddle and anvil methods appear to have replaced coiling manufacturing techniques during this period (Murphy and Ferris 1990:195).

Toward the end of the Rivière au Vase Phase, vessels became more elaborately decorated (Murphy and Ferris 1990:196). Rims display oblique tool impressions over the roughened exterior surface, and dentate stamping, suture stamping, and cord-wrapped stick (CWS) impression increases. Exterior punctates with interior bossing often occurs below obliques on decorated vessels. Castellations also occur on some vessels. Vertical or horizontal tool-impressed plaits sometimes appear as decoration on neck zones.

As the Rivière au Vase Phase transitioned into the Younge Phase (A.D. 800 to 900), vessels began to display smoothed neck and rim zones, with bands of tool-impressed obliques on the rim exterior (Murphy and Ferris 1990:197). Plain cord-roughened pots disappear by the Younge Phase, and neck decoration, such as diamond-motifs or filled-triangles appear. A few Rivière au Vase-like vessels have been found to persist throughout the Younge Phase, and the transitional ceramics between these two phases are difficult to distinguish. Adding to the difficulty of distinguishing between these two phases, as of 1990 there were no reported southwestern Ontario sites with single Rivière au Vase components (Murphy and Ferris 1990:199).

Younge Phase ceramics are defined by the immense design heterogeneity displayed, as well as the range of vessel sizes and forms (Murphy and Ferris 1990:201; Watts 2006). Vessels became elongated, larger in size, featured flat or rounded lips, with flared or everted rims, long, slightly constricted necks, pronounced to rounded shoulders, and flattened or rounded bases. Tool impressed or incised decoration on the exterior of the vessel predominated, castellations appeared on some vessels, and while rims were typically collarless, some exhibited "incipient" collars in the form of folded-over or rolled portions of the rim (Murphy and Ferris 1990:203). According to Murphy and Ferris (1990:203), Younge Phase ceramics in southwestern Ontario are "characterized by the full use of the neck by the potter" with "elaborate and varied decorative motifs and styles…used." This extends to decoration on the rim, neck and shoulder zones of the vessel. Incised triangles and diamond motifs, often bordered by punctates or incised lines, were considered by Murphy and Ferris (1990:205) to be "hallmarks" of Younge Phase ceramics. Oblique stamped impressions or rows of plaits were also common.

Key Younge Phase sites include Cherry Lane, Bruner-Colasanti, Robson Road, Krieger, and the Dymock I and II sites (Figure 3). The Cherry Lane site was found in Mersea Township, Leamington, Essex County, Ontario (Reid 1981). Pottery from this site was collarless and grit-tempered, with grit particle size ranging from 0.5mm-6mm. Coil breaks were not observed, and the pots were hand-molded and paddled with a cord-wrapped instrument. A common technique on the pots was linear stamping along the inner and outer rim surface and lip surface, performed with what may have been the broken end of a flat twig or a bone. Incising was also common on the pots, and CWS impressions are absent from this collection, although they are common in the Bruner-Colasanti ceramic assemblage, which is another Younge Phase site located only about 3-4 km north of Cherry Lane (Lennox 1982). Based on the pottery, the Cherry Lane site dates between A.D. 900-1100 (Reid 1981).

Excavations at the Krieger site, found east of Cherry Lane in the Chatham area, Kent County, recovered pottery that displayed more 'complex' motifs, including the 'filled lozenge', closed opposed obliques, cross-hatched triangles, and herringbone (Reid 1981:23). The Dymock I and II sites, found in Elgin County just south of the Thames River, contained a ceramic assemblage with predominately CWS and simple tool impressed obliques on the rim, and geometric, often triangular, motifs made through incising, trailing and tool impressions on the neck (Fox 1982b). Vessel bodies were cord-malleated, and juvenile vessels were common on both sites. Fox (1982b) concluded a Younge Phase affiliation.

Murphy and Ferris (1990) described Western Basin Rivière au Vase Phase and Younge Phase settlement systems as representing a continuation of earlier patterns. Seasonal rounds were still in place, with riverine or lacustrine locations occupied during warm weather, followed by the use of inland single-family winter camps. They described site patterns at Younge Phase sites such as Cherry Lane and Robson Road, as characterized by large, often deep pits, believed to represent storage or cache pits. These features were often used to store ceramic vessels and other material goods, in addition to food resources, and were often bark-lined. Typically, these storage pits are the only features found on sites, and they occasionally overlap, suggesting multiple occupations. The Cherry Lane, Robson Road, and Bruner-Colasanti sites are thought to represent mainly fall occupations, due to the large quantities of nut remains recovered, the paucity of fish and migratory bird species in the faunal assemblage at Bruner-Colasanti, and presence of fall-spawning fish at Cherry Lane and Robson Road (Murphy and Ferris 1990).

At Cherry Lane, the post molds of one house, measuring seven by 13 metres, were found, along with several storage and refuse pits, ash pits, and hearths (Murphy and Ferris 1990:236). Within the house were three hearths, two small ash pits, and a slightly larger pit that Murphy and Ferris (1990:236) interpret as having functioned to hold a pot. Larger pits were found at the eastern end of the structure, and contained pottery, nut fragments, and limestone cobbles. Five clusters of storage pits were uncovered just beyond the structure, and to the west, a midden was identified based on soil staining and refuse.

While the feature clusters at Cherry Lane were interpreted as storage pits dug outside of the structure, at Bruner-Colasanti feature clusters were interpreted as within-house storage pits. Pits at Bruner-Colasanti appeared in defined clusters, and encircled an open area, interpreted as a plaza (Lennox 1982:9-12). Shallow post molds were uncovered during excavation, but their distribution across the site provided no patterns from which to identify structures. Instead, eight feature clusters, which each occupied approximately 100 to 150 m^2, were distributed in an oval pattern around a central open area. The pits found within these feature clusters tended to be large and deep, filled with refuse such as lithic debitage, pottery sherds, floral and faunal remains, while those pits found outside of clusters were comparatively shallower, with smaller quantities of artifacts. Lennox (1982:8) concluded these deep pits were likely within-house storage pits. Additionally, most clusters also contained hearths, evidenced by the presence of fire-cracked rock and/or charcoal in the upper strata of a pit, suggesting that heating or cooking activities occurred within feature clusters.

The Late Woodland Western Basin Tradition and Ontario Iroquoian Tradition are largely seen to be distinct ethnic groups in the archaeological record. Murphy and Ferris (1990) have argued that the Western Basin Tradition represents an “Algonkian” group, in contrast to groups of the Princess Point and the later Ontario Iroquoian Tradition, viewed to be of Iroquoian ancestry. A contradictory theory was proposed by Stothers and colleagues, who suggested that the Western Basin Tradition is essentially a branch of the Iroquoian Tradition, and that the Younge Phase of the Western Basin Tradition represents the same ethnic group as early Ontario Iroquoian groups (Stothers 1978; Stothers et al. 1994). In their synthesis of the Western Basin in southern Ontario, Murphy and Ferris (1990:273) acknowledged the difficulty of distinguishing between Western Basin and Iroquoian ceramics, due in part to a paucity of comparative studies that examine the differences between ceramic assemblages.

Watts (2006) set out to remedy this situation in his dissertation, where he looked at almost 800 vessels from seven sites dating to the Late Woodland period, from approximately A.D. 1100-1300. Watts was able to demonstrate differences in the morphology and decoration of vessels. He found that Iroquoian pots tended to have flat lip form, plain lip surfaces, cross-hatching on the lip and rim, a convex rim profile, and the presence of interior punctates with exterior bossing. In contrast, Western Basin pots had rounded lip forms, a low frequency of plain lip surfaces, concave rim profiles, a preference toward external punctates, and potters displayed an affinity for cord-wrapped instruments, as well as surface stamping, incising, and dentate techniques.

Watts (2006) acknowledged that ideas of ethnicity were tied up within his analysis, however, he attempted to move away from viewing pots as people by examining the agential practices of both humans and non-humans. Viewing pots as agents, he argued that differing actor-network nodes were at play, which resulted in internally homogeneous ceramic practices in Iroquoian communities, and pots with a great deal of design heterogeneity in Western Basin communities.

In some cases, researchers looking at sites from this time period have attempted to separate pottery assemblages that display intra-site variability into distinct occupations, such as Cunningham (1999, 2001), who looked at the Van Bree site, a mid-11th century site from Arkona, Ontario. Cunningham (2001) used ceramic cross-mends to identify discrete Younge Phase and Early Ontario Iroquoian occupations at the site, and argued that the minor differences seen between pottery relates more to differences in social context, scale, and frequency of ceramic production, rather than an attempts to symbolize distinct ethnic identities. Cunningham (1999) reached a similar conclusion to Watts, stating that Younge Phase potters were not producing single pottery ‘types’, but were using a large variety of attributes to decorate vessels.

2.3.2 Princess Point and Glen Meyer

To the east, sites from this period are typically categorized as late Princess Point to early Glen Meyer assemblages. David Stothers was the first to define the Princess Point Complex, which he outlined in his 1974 dissertation, published in 1977. Stothers was intrigued by the ceramics he found near the Coote’s Paradise area of Hamilton (Figure 3), and was told of similar cultural material reported from Hamilton and the Grand River Valley (Stothers 1977:25). Stothers (1977) based his definition of the complex on 48 sites and collections. He considered Princess Point to represent an early Late Woodland complex, transitioning from the Middle Woodland to the Glen Meyer branch of the Ontario Iroquois tradition. He outlined three regional foci for the complex: the Grand River valley; the Point Pelee region; and the Ausable River region.

Stothers defined the material culture as dominated by a distinct type of ceramics, made through the paddle and anvil technique, which were globular or elongated in form, had a cord-roughened body and neck, were decorated by CWS, and could be divided into two types: punctate and plain. He also noted the presence of ceramic pipes, and Levanna-type triangular points. Stothers (1977:123) saw the settlement patterns as a continuation from the Middle Woodland period. He argued that inland locations were used as small fall to early spring encampments by single families, in order to conduct hunting activities, and larger sites in riverine or lacustrine environments were occupied by macro-bands in order to take advantage of the many resources available at these locations during warmer months. Stothers (1977:115-116) also documented that the Princess Point Complex was connected to some of the earliest evidence of maize agriculture in Ontario.

While some aspects of Stothers' definition of the Princess Point complex have remained unchanged and have been confirmed by a larger database of material that has accumulated since the 1970s, several researchers have refined our understanding of the complex. One of the major contributors to the study of Princess Point, after Stothers' initial work, has been William Fox. In 1982 Fox presented a paper on "The Princess Point Concept", where he argued that many of the western sites assigned to the Princess Point Complex produced ceramics very similar to the Rivière Au Vase and Younge Sites of Michigan (Fox 1982a:22). These ceramics were tool impressed and/or dentate stamped, which are prominent features of Western Basin ceramics (Murphy and Ferris 1990:205). Fox subsequently reassigned the Point Pelee focus to the Rivière au Vase phase of the Younge Tradition (now the Western Basin Tradition). He also argued that the Ausable focus was too poorly known, as limited work had been done in that area, and suggested that it should be removed from the complex. Princess Point was now spatially restricted to an area extending from the Credit River on the east, to Long Point on the west, and the Niagara River to the southeast (Fox 1990:174).

David Smith and Gary Crawford were the next major contributors to our understanding of the complex. In 1993, Crawford and Smith (1995, 2002) initiated the Princess Point Project, with the goal of studying Princess Point material culture, paleoethnobotany, settlement patterns and chronology in the first phase of work; and focusing more on the interactions of Princess Point people with their environment, and the Grand River floodplain during the second phase. They focused on three regions: the Grand River drainage area; Long Point on Lake Erie; and the Coote's Paradise region of Hamilton (Figure 3). They disagreed with Fox that Princess Point extends as far east as the Credit River drainage, and confined the complex to the western end of Lake Ontario, the east end of Lake Erie and the Grand River Valley (Smith and Crawford 1995:63).

One of the goals of the project was to study the subsistence patterns of Princess Point groups, particularly the evidence for maize agriculture. Based on accelerator mass spectrometry (AMS) dates on carbonized corn kernels from the Princess Point component of the Grand Banks site, the first evidence for maize in the lower Great Lakes region was confirmed (Crawford et al. 1998). The dates ranged from cal. A.D. 540 to 1030, and the type of corn appeared to be of the Eastern Eight-Row variety. Crawford and colleagues (1998:117) concluded that, based on dates on corn from southern Ohio and Tennessee, maize diffused from the west and/or south into Ontario, in the span of about two or three centuries.

The results of their study of the floodplain of the Grand River proved to be a formative finding for Smith and Crawford. At the Grand Banks site, Smith and Crawford (1995) worked with geomorphologists from the University of Toronto, who collected stratigraphic and topographic data on the lateral bar of the Grand Banks floodplain (Crawford et al. 1998). Through this investigation, the researchers determined that the floodplain of the Grand River was relatively stable during Princess Point times, which led them to argue that the floodplain would have provided a favourable location for the first attempts at maize agriculture (Walker et al. 1997:885; Crawford et al. 1998).

Based on the contributions of these researchers, and others, Princess Point has become a well-defined archaeological complex in southern Ontario. Princess Point is characterized by a distinct type of ceramic ware, globular in form with a constricted neck, and distinguished from Middle Woodland pottery on the basis of a laminated appearance, external punctates and a finer temper (Bursey 1995:46-47). Vessels are decorated using CWS, typically with successive horizontal, oblique and/or vertical bands or lines, with deep external punctates and internal bossing (Smith and Crawford 1995:66-67). Pots typically exhibit collarless everted rims, they can feature castellations or crenellations, and they may resemble Glen Meyer and other later Iroquoian ceramics. Princess Point is also known for earthenware pipes, which although rare, make their first Ontario appearance at this time (Smith and Crawford 1995:67).

Haines and colleagues (2001:250) reported that approximately 90 Princess Point components had been identified in south-central Ontario as of 2001; no doubt this number has increased within the past decade. Despite the high number of known Princess Point sites, few detailed settlement studies have been conducted, and little is known about the house structures and community patterns of this time period (Bursey 2003). In his analysis of the settlement patterns at the Forster site, Bursey (2003:225) states, "despite the focus of research and CRM archaeology over the last two decades or more, few complete community plans have been published let alone analyzed to any extensive degree." The evidence from the Forster site supports a relatively sedentary lifestyle for the time period, due to the presence of possible house structures and a number of pits within one structure, interpreted as storage pits. The structures that have been uncovered from Princess Point sites tend to be square or circular in shape, and have been interpreted as incipient longhouses (Crawford and Smith 2002:123). More definite proto-longhouse structures and better settlement patterns have been recorded at the Porteous and Holmedale sites, however these sites are viewed more as transitional between Princess Point and Late Woodland, and are often reassigned to the Early Iroquoian Period (Warrick 2000:427) (Figure 3). The largest of the Princess Point sites – Grand Banks and Cayuga Bridge – have been estimated to have housed about 200 people total (Warrick 2000:431). Warrick (2000:431) estimates a population of 3,000 to 4,000 people for the 40 Grand River Princess Point sites, assuming that the sites were occupied contemporaneously, and that each site housed 75 to 100 people. Warrick (2000:431) admits that a population of 2,000 people is a more realistic estimate, based on the assumption that only 20 of the 40 sites would have been occupied at the same time.

Warrick (2000:426) argued that the adoption of maize agriculture by Princess Point groups is the primary difference between the Middle Woodland and Princess Point, and that subsistence patterns are otherwise fundamentally the same between these time periods. The issue of how maize was introduced into Ontario is connected to wider debates over the origins of Princess Point people. Stothers (1977:155) initially argued that Princess Point represented a cultural intrusion into the region, due to the fact that "southwestern Ontario presents no apparent predecessors for the Princess Point Complex, which suddenly and dramatically appears in a full-blown, and well-developed state." Stothers later abandoned his intrusion hypothesis, stating: "the Princess Point Complex is now believed to have developed out of a convergence of peoples of the Middle Woodland Saugeen focus, and the Niagara Peninsula focus of the Middle Woodland Point Peninsula" on the basis of skeletal evidence and ceramic affinities (Stothers and Graves 1983:113).

Fox (1990) postulated that maize diffused into southern Ontario, and was adopted by late Princess Points groups. Thompson and colleagues (2004:26) argued that the emphasis placed on the origins of maize agriculture in eastern North America is connected to the wider debate over Northern Iroquoian origins. Snow (1995) hypothesized that a northward migration of Clemson's Island culture after A.D. 900 was the origin of Northern Iroquoian groups, these groups bringing maize agriculture with them. Following the evidence for maize by Princess Point times in Ontario, presented by Crawford and Smith (1996), Snow (1996:792) revised his hypothesis, shifting the migration three centuries earlier, and placing Princess Point "at the beginning of the long continuum leading to the historic Ontario Iroquois", and as the progenitors of maize agriculture in the lower Great Lakes. Crawford and Smith (1996) do not altogether reject Snow's migration hypothesis, but in regards to the appearance of maize in Ontario suggest that migration is not the only explanation that should be considered. They present the idea that cultigens may be transferred between hunter-gatherers and farmers "across a frontier" (Crawford and Smith 1996:787).

Crawford and Smith (1996) have argued that spatial overlap and ceramic continuity exist between Princess Point and Glen Meyer. As noted above, proto-village sites such as Porteous, Lone Pine and Holmedale are often reassigned from late Princess Point to the Glen Meyer phase of the Early Ontario Iroquoian period, depending on the date used to mark the commencement of the Late Woodland Period (Noble and Kenyon 1972; Ferris and Spence 1995; Smith and Crawford 2002; Pihl et al. 2008). Settlement patterns are much more substantive on Glen Meyer sites, generally consisting of several longhouses, often surrounded by one or more rows of palisade, which may have served as a defensive structure but could have had other functions as well, such as village delineation (Ferris and Spence 1995:103). Longhouses were small during the beginning of this phase; they usually averaged 12.4 metres, contained two to three hearths, numerous storage pits, and often exhibited episodes of rebuilding (Timmins 1997; Warrick 2000:436). Maize agriculture likely began to be an important part of the subsistence strategy of this period.

Glen Meyer ceramics are sub-conoidal in early times, and globular in form with rounded bottoms in later times (Ferris and Spence 1995:106). Pots are formed through modeling, and walls are thinned using paddle and anvil techniques. Decoration on the interior and exterior rim, and often the necks and lips as well, consists largely of oblique tool impressed designs using linear stamps. CWS impressions give way to incising and interior punctates with exterior bossing also became common. However, there is considerable regional variation in these trends with some techniques persisting longer in some areas than others (Timmins 1997).

Glen Meyer sites are distributed throughout much of southwestern Ontario, from the Hamilton area to the Niagara River, and westward with many known sites in Oxford, Norfolk and Middlesex counties (Noble 1975:5). The sand plains north of Lake Erie contain numerous clusters of Glen Meyer village sites, many of which have been extensively documented, including Calvert (Timmins 1997), Van Besien (Noble 1975; Schumacher 2013), Elliot (Fox 1986) and Porteous (Stothers 1977) (Figure 3). Sites such as Stafford, Woodsmen and Goessens, which are in close proximity to the Silvercreek sites, have not been as well documented (Fox 1976) (Figure 3). In his summary of the archaeological record of the central north shore region of Lake Erie, Fox (1976) reported on numerous Glen Meyer sites within the major river drainages, including Silver Creek. Fox (1976:190) also suggested that the distribution of sites by A.D. 1400 indicated a shift away from the sandy, infertile soils of the Norfolk Sand Plain region, perhaps as a result of increased dependence on agriculture.

2.3.3 Problems and Debates of the Middle-to-Late Woodland Transition

As mentioned previously, many researchers have questioned the usefulness of the concept of a "Transitional Woodland" entirely, and have argued against bringing its status up to a period (Smith and Crawford 2002); others have highlighted the need for a consensus on the date ranges for the Middle, Transitional, and Late Woodland (Fox 1990; Ferris and Spence 1995). There is a considerable amount of overlap between the Middle Woodland and Transitional Woodland (Smith 1996; Smith and Crawford 2002; Ferris and Spence 1995). Stothers (1975, 1977), although he initially saw Princess Point as an intruding population into the region, argued that the seasonal-settlement patterns were essentially a continuation of Middle Woodland times. The Western Basin Tradition is thought to have arisen from the Middle Woodland Couture complex, although the transition to Rivière au Vase times was not abrupt (Murphy and Ferris 1990:195). Research has suggested that ceramic manufacture and decoration are the most distinctive changes between Couture and Rivière au Vase times. To the east, it is the material culture, mortuary practices, and site distributions that seem to be considerably different between the Middle Woodland and Late Woodland (Bursey 1995; Warrick 2000). Although subsistence patterns are otherwise fundamentally the same between these time periods, the adoption of maize agriculture by Princess Point groups is a significant change that could have occurred by as early as A.D. 500 (Crawford et al. 1998; Warrick 2000:426), although it may not have become a staple until Early Iroquoian times.

The start of the Late Woodland is also in need of a refined chronology. The concept of the Transitional Woodland arose from the variation in dates used to mark the beginning of the Late Woodland Period (Fox 1990; Ferris and Spence 1995). Fox (1990) acknowledged that the beginning of the Late Woodland Period varies from A.D. 700 to 1000, depending on if material culture is used to define the Late Woodland, or if traits such as large settlements and maize agriculture are favoured. For example, sites such as Lone Pine, Holmedale and Porteous will be classified as Transitional Woodland Princess Point or Late Woodland Glen Meyer depending on the definition used to mark the transition of these periods (Noble and Kenyon 1972; Smith and Crawford 2002; Pihl et al. 2008). Smith and Crawford (2002:109-110) acknowledged the need for a restructuring of the classification of Princess Point and the transitional period it is included in; however, they assert that this would be no easy task. They also emphasize that the shift from Princess Point to Glen Meyer was gradual, not abrupt, and that some Princess Point communities may have remained until at least A.D. 1000. Creese (2013:194) extends the Transitional Woodland to A.D. 1050. To the west, the Rivière au Vase phase, which marks the transition between the Middle and Late Woodland, is thought to begin around A.D. 600 and end by about A.D. 800 or 900 when the Younge Phase begins; however as previously mentioned, these two phases display considerable overlap as well (Murphy and Ferris 1990). In many ways, the early Late Woodland period, from around 900-1100 A.D., is also a transitional time in the archaeological record, with earlier material culture appearing on Younge Phase and Glen Meyer sites, perhaps suggesting the continual reoccupation of sites, or that preferences for older ceramic styles persisted among several generations of potters.

Another question of the Middle to Late Woodland transition pertains to the similarity in ceramics observed for this time period. The ceramics during the Transitional Woodland and early-Late Woodland have all been noted to bear considerable resemblance to other “neighbouring complexes”. While later pottery is fairly regionally distinctive, ceramics during the Transitional Woodland share similar characteristics. Traits such as CWS impressed decoration, decorated collarless everted rims, and splayed lips, circular exterior punctates and interior bosses, and cord-marked surface treatments, are all typical on vessels from various locations during this time (Curtis 2014:188). This includes: Blackduck pottery from northern Ontario and the Lake Superior region, Western Basin ceramics from Michigan, Ohio, and southwestern Ontario, Princess Point in the Grand River-Hamilton area, St. Lawrence River groups, Sandbanks Tradition in Eastern Ontario, Owasco in New York, and Clemson Island Culture of Pennsylvania (Stothers 1977:50, Ch.VII; Fox 1982a:20; Bursey 1995:47-48). It is these similarities that prompted Stothers (1977) to initially include pottery from the Point Pelee and Ausable River regions in his definition of Princess Point.

This raises several important questions: What do these similarities in ceramics across the Great Lakes tell us about this time period? Should ceramics be relied on to define complexes and traditions? What does the Transitional to early-Late Woodland look like in the region the Silvercreek sites are situated in? It my hope that the current study will shed light on these questions.

2.4 Conclusion

This chapter has presented a summary of key archaeological work conducted on the Transitional and early Late Woodland periods of southern Ontario, as well as a brief history of the methodological approach to studying pre-contact pottery in the Great Lakes region. The next chapter will outline my theoretical approach to the research, drawn from the performance-based life history approach and practice theory.

Chapter 3

3 Theoretical Approach

This chapter outlines the theoretical framework I will be using to understand pottery production and use, as well as the decorative and stylistic elements of the vessels, and how they differ or show similarities to pottery collections from nearby sites. In regard to ceramic style, notions on how to understand and explain these aspects of pottery have moved from more rigid ideas of group boundaries, to more fluid explanations of learning and identity. In the hope that this research may contribute to a movement away from using more traditional approaches that view material culture style as evidence of group boundaries, I adopt a 'communities of practice' approach. Additionally, it is a goal of this research to understand the life history of pots *and* the skills of the potter, and to view change in attributes over time as technological achievements on the part of the potter.

Pottery production requires an intimate knowledge of the landscape (to find clay sources and materials for tempering), climate (to know the best times and places for drying and firing vessels), as well as the properties of clay and the production of vessels themselves. This includes, but is not limited to: preparing the clay, preparing any organic or mineral inclusions to incorporate into the clay, working the clay and forming the vessel, decorating and drying the pot, and finally firing the finished product. This is a multi-step process, each step requiring a unique skill set and intimate understanding of the ways in which clay can be processed, formed, decorated, and fired, to best suit the needs and preferences of the wider community using the pots. A potter also has to consider vessel porosity, water permeability, thermal shock resistance, as well as aesthetic preferences. Thus, pottery production requires a particular skill and knowledge set, innovation, and creativity.

In the Great Lakes region, pot making has been conceived of archaeologically as a woman's craft, due to ethnographic analogies and historical writings by missionaries that speak of Huron-Wendat women and girls making household goods such as clay pots (Sagard 1939). In fact, women are believed to have been the main producers of pottery across North America prior to European contact, although men were likely involved in many of the stages, such as retrieving the raw materials, transporting, and firing vessels (Skibo 2013:8). Vessels were also entirely hand-made, and produced at the household level, and it is likely that multiple generations would have been involved in the production, including children and grandparents.

Researchers have also argued that a matrilocal post marital residence pattern can be extended into the Late Woodland Iroquoian archaeological record, due to evidence of longhouses and regional forms of ceramics (Hart 2001; Snow 1996; Trigger 1978), although this assertion is generally not as readily accepted by archaeologists (Birch 2008), and is not as easily extended into the early Late Woodland. The Western Basin Tradition in particular has typically not been associated with matrilocal patterns, and the heterogeneity in ceramics may indicate post-marital residence patterns that were informal and non-fixed (Murphy and Ferris 1990:201). It seems likely that the Silvercreek sites would conform to this latter pattern, given the settlement patterns and the design heterogeneity of the pottery.

3.1 Form and Function

Ceramics in Ontario archaeology have largely been used to signify particular groups or time periods in the archaeological record. For this reason, archaeologists have focused largely on the decorative and stylistic elements of vessels, with less consideration given to the functionality of the pots. While lithic tools tend to be seen as representing innovative technologies, pottery was typically not afforded the same status. This may have been due in part to the association of pottery as a women's domain, its manufacture and use at household level, or the everyday use of these objects.

Beginning with David Braun's seminal 1983 paper entitled "Pots as Tools", which finally brought pottery function to the forefront, new approaches have been taken to see aspects of pottery manufacture as innovative technological achievements (Skibo 2013:7). Braun (1983) argued that archaeologists should seek explanations of ceramic technical variation, and understand the ways in which potters modified the mechanical performance of the vessel. The "performance-based life history approach" by James

Skibo is one example of this type of perspective (Skibo 2013:7). This approach stems from the concept of *chaîne opératoire*, however it attempts to view technical choices as both social *and* utilitarian. It emphasizes the life history of a pot, including the entire manufacturing process, use, reuse and disposal of an artifact.

The performance-based life history approach also encompasses the technological choices and performance characteristics and compromises that a potter must assess during the operational sequence of production (Skibo 2013:7-9). All potters must assess a variety of options and choices at every stage of production, and how the vessel is made will depend on the knowledge, experiences, and resources of the potter. These decisions are made during the manufacturing and firing process, and relate to the functions of a vessel, be it utilitarian or symbolic (Skibo 2013:7-9). Lastly, the approach seeks to understand activities and interactions, particularly the connections "between people, people and artifacts, and artifacts themselves" (Skibo 2013:8).

3.2 Decoration and Style

While the performance-based life history approach provides a framework for exploring the functional and morphological variation of the vessels, it stops short of an explanation or understanding of why the decoration and stylistic elements of the vessels vary. Previously, style was conceptualized by researchers such as Binford (1962 as cited in Roe 1995) as the remaining attributes, after the techno-functional aspects of the artifacts were subtracted. Researchers were subsequently divided over whether to view style as a "byproduct of cultural systems" or as playing a part in cultural reproduction (Howie-Langs 1998:8). Stylistic attributes, Binford (1962) believed, were best studied when explanations on ethnic origins, interaction and migration were sought, and thus stylistic similarity was viewed predominately as indicating social interaction between communities, residence groups or villages (Hodder 1982). A debate emerged in the 1980s between Wiessner (1983, 1985) and Sackett (1985), in regards to Wiessner's work on San projectile points, and the role style played in conveying ethnic identity. Wiessner (1983:157-158) believed variation in material culture functions to send a clear message regarding ethnic affiliation, while Sackett (1985:158) argued that style is not restricted to material expressions, and could extend to technological choices, rooted in the variation in lifestyle and motor habits of artisans. Sackett's (1986:630) notion of iscochrestic variation attempted to explain material culture variation as the decisions made by producers, consciously or unconsciously, which are rooted in "the craft traditions in which they have been enculturated as members of social groups." Sackett's concept anticipated the use of practice theory to explain artifact variation, which is discussed in more detail below.

The idea of archaeological constructs such as these representing bounded cultural units has been consistently challenged (Hodder 1979; Starna and Funk 1994; Engelbrecht 1999). Fifty years ago, Binford (1965:203) raised initial concerns regarding the use of archaeological concepts (such as phase, complex, tradition) in terms of "human social units." Hodder (1979:452) has consistently argued for the fluidity of cultural and group identity, stating: "we cannot assume that all aspects of material culture were involved in symbolizing past identity groups." As Davis (1990:27) pointed out, "intense social interaction" among the producers of material culture "could also lead to stylistically divergent production by very closely related producers." Furthermore, cultural anthropologists have demonstrated that political, linguistic, and social boundaries rarely correspond with differences in the material culture of a group (Emberling 1997:297).

More recently, rather than viewing style from a top-down approach or as solely an expression of an individual, researchers have viewed it as a negotiated process, seeing pots as the expression of an interaction between knowledge of production, properties of the clay, individual intent, and the social context of the potter (Roe 1995:28). In other words "material styles are said to tell more about the contexts in which social groups are created and individual-to-group interrelations are worked out than about groups and group boundaries, per se" (Carr and Neitzel 1995:8).

While the performance-based life history approach is important for the significance it places on potters as the innovators behind technological improvements, it does not take into account the role of socio-cultural influences, such as social identity, group membership, or the social context of learning. Concepts such as *communities of practice* attempt to explain similarities or variation in ceramic styles by recognizing the fluid nature of group membership or individual influences. An example of the application of this concept from the American southwest is a comparison of the Classic Stallings pottery. Ceramics from three locales were examined, and although they were similar in design and use, pots were found to vary in vessel wall construction and paste (Sassaman and Rudolphi 2001). Sassaman and Rudolphi (2001:416) concluded that the potters were working within at least three communities of practice, pertaining to differences in vessel manufacture, and similarities in decoration and use. As the researchers argue, "potters will have multiple, varied affiliations that affect choices about pottery form, function, and decoration", and these variations are recognizable archaeologically from differential distributions of vessel attributes (Sassaman and Rudolphi 2001:417).

The concept of communities of practice is derived from the application of practice theory and situated learning approaches to archaeology (Lave and Wenger 1991). This approach highlights the dynamics of learning a craft, participating in a group, and how these processes can change and evolve throughout an individual's lifetime (Herbert 2010:15). A potter may initially learn their craft from a parent or grandparent, but may join a new community after marriage and adapt their pottery form or decoration to be more similar to that of their post marital community. In a sense, potters may relearn certain aspects of production in a new community, as part of a resocialization process (Eckert 2008:12). Potters may also continue to refine their abilities during middle age, or become the teacher themselves; and finally they could be politically motivated to alter their practices in the later years of their lives (Bowser and Patton 2008). A community of practice refers to a group of practitioners who share a sense of group identity; these groups can change throughout a potter's lifetime and a potter may belong to multiple communities at once. In much the same way that the life history approach to pots emphasizes the many stages involved in the production of a vessel, the concept of communities of practice considers the stages in an individual's life, and the social context of the potter as she/he learns, performs, and teaches the craft.

Communities of practice can also encompass different modes of cultural transmission: vertical or intergenerational transmission, the transfer of knowledge from parents to children; oblique transmission, intergenerational knowledge transfer between teachers and students, who are not necessarily related; and horizontal transmission, between members of the same peer-group (Stark et al. 2008:6-7).

This approach is important, since it sees variation in pottery form, function and style as social in nature, but not as indicating ethnic boundaries. Those features that demarcate ethnic boundaries can be viewed only as those deemed significant by the actors themselves (Barth 1969, as cited in Hegmon 1998), and are therefore unrecognizable archaeologically. However, as Hegmon (1998) argued, when differences in material culture are present, by examining how the differences in style or technical attributes change over space and time, it may be possible to gain insight on aspects of social boundaries. This is where practice theory, and the idea of *habitus* has been applied, which is the everyday actions of individuals at a subconscious level that is ultimately reflected in the material culture (Bourdieu 1977). Additionally, Hegmon (1998) presents the idea of networks of overlapping identities as an alternative to viewing bounded groups based on material culture, an idea similar to that of communities of practice.

Pottery provides an excellent form of material culture in which to explore situated learning and practice. Clay is highly plastic material that will often display evidence of learning (in the form of juvenile vessels), individual potters (fingerprint or fingernail impressions), and even handedness (based on angles of punctates and application of other forms of decoration). While some traces of novice attempts and learning on a finished vessel may be wiped away or altered by a more seasoned potter, other traces may remain and be visible on a fired vessel.

Juvenile vessels in particular are excellent examples of the process of craft learning. These vessels, which appear on Late Woodland sites, are believed to represent the work of children, based on the following lines of evidence: application of motif/design, socialization and craft learning, life skill required of children during this time, and the small size of the vessels (Smith 2005:68). These pots also show evidence of interactions and style transmission between three generations of potters. This included the influence on novice potter's design selections by mothers and grandmothers, who would have resided together as part of a matrilineal society, as well as innovation on the part of juvenile potters (Smith 1998:116). Not all small vessels in Late Woodland assemblages can be termed juvenile, however, and due to the technical skill exhibited and similarity in form and decoration as their larger counterparts, these pots would be better categorized as simply ‘miniature’ vessels (Martelle 2004:28). Miniature vessels were likely used to store small portions of pigments, seeds, and other goods, or could have been for ceremonial or story-telling purposes.

Oral histories, and ethnographic and archaeological examples of craft-making all emphasize that learning is situated within – and cannot be separated from – a social context, and it is this situated learning that imparts onto a potter a mental template or map – be it for the form, manufacture, paste recipe, or decoration of the vessel. This is not to say that innovation cannot occur – innovation is in fact what drives changes in material culture over time and space. Rather, situated learning emphasizes that practice is at the heart of material production. It is still possible for changes in practice, unintentional or planned, to occur (Pauketat 2001:8).

Practice can be conceptualized as the embodiment, enactment or representation of an individual’s dispositions, and what an individual is disposed to do will depend on their social experiences (Pauketat 2001:4). As Pauketat (2001:6) argued, this in turn is dependent on the historical context, and therefore, the place and time of the pot’s manufacture and use, and the context of the potters and users of the pot, is also important. This “social negotiation” between people’s social experiences and context can bring about changes in meanings, traditions, and identities, which will ultimately impact the production of material culture (Pauketat 2001:10).

When looking at material culture variation, several researchers have pointed out that there are hundreds of reasons why pottery may vary in its manufacture, form, or decoration (Carr and Neitzel 1995; Roe 1995). These include social and cultural factors on a micro- or macro-level scale, individual experiences and motor skills, and environmental factors such as access and availability of raw materials (Carr and Neitzel 1995:Table 1-1; Roe 1995:Table 1-2). The mobility patterns of a group will also have an effect on material culture, particularly pottery, since ceramics have typically been associated with increased sedentism in the archaeological record. Movement – or lack of movement – across the landscape will affect the raw materials, size, form, and use of pottery by a group. Increased sedentism may have brought about more consistency in raw materials, and larger, less portable pots for storage and community feasting. In contrast, we might expect to see more variation in ceramics produced by a mobile group, particularly those groups whose community size fluctuates throughout the year. As Rice (1984:51) argued:

> Some variability in preindustrial ceramic products exists for the same reasons variability exists in any other aspect of material: over time and space, replication of a 'mental template' is never perfect. There are discrete and numerous producers with different skills, multiple incidents of production, multiple raw materials, and multiple procedures.

Given that some variation will exist for pottery produced by groups that were mobile during certain times of the year, and due to a myriad of other factors, perhaps a focus more on similarities – and not variation – within assemblages, and between sites, should be emphasized in an investigation of ceramic styles. This paper seeks to view variations and similarities in ceramic manufacture, form, style, and use not as markers of ethnic boundaries, but as evidence of the multiple and fluid communities of practice that pottery producers took part in. I agree with Roddick (2009:1) who argued, "a 'communities of practice' approach is a useful tool for de-centering some of our assumptions towards prehistoric technological traditions." Additionally, the high number of juvenile vessels found at the Silvercreek sites suggests that a situated learning approach, and an emphasis on the social context of the potter, may provide an interesting lens for understanding the ceramics at these sites.

3.3 Conclusion

This chapter has outlined the theoretical approach I will be using to understand pottery form, function, and style at the Silvercreek sites, and to situate the sites within the broader context of the early Late Woodland Period of southern Ontario. The performance-based life history approach will be taken, to understand form and function of the vessels, and a communities of practice approach will be adopted to understand the stylistic elements of the vessels. In the next chapter, I will discuss my methodology for analyzing the ceramics and settlement patterns from each site.

Chapter 4

4 Methodology

This chapter outlines the sampling strategy and attribute analysis undertaken for the ceramic vessels, as well as the spatial analysis tools utilized in ArcGIS software to explore settlement patterns at the sites. I outline the rationale for recording each attribute, and provide information on statistical testing, and the use of a Dino-Lite hand-held microscope to explore the paste recipes of the ceramics.

4.1 Ceramic Analysis

The operational sequence of pottery production involves numerous steps, and many of these steps can be recognized on archaeologically recovered ceramics. Raw materials such as clay, rocks, mineral and organic resources must be located on the landscape and brought to the site of production. Rocks and minerals are crushed, and incorporated into the clay to achieve a desired or workable consistency. Once the paste is prepared, the process of forming a vessel consists of three main stages: primary forming, secondary forming, and surface modification (Rye 1981:62). Primary forming consists of the initial conversion from a ball or lump of clay into a nearly finished looking form, using techniques such as pinching, molding, coiling, and joining slabs. In secondary forming, vessels are further defined, and the shape of the vessel is established. Techniques during this stage include incising, scraping, beating, trimming, and joining. Lastly, surface modifications alter the texture and overall appearance of the vessel, using such techniques as smoothing, incising, impressing, carving, and polishing, among others.

The purpose of this study was to examine the Silvercreek vessels for traces of each stage of the forming process. Evidence of primary and secondary forming techniques are particularly difficult to ascertain, given how early they occur in the making of a vessel, and the fact that traces may be smoothed or wiped away during subsequent modification of the vessel. Even the exact nature of surface modification may be difficult to obtain on sherds where post-depositional processes may have removed significant portions of the exterior surface, or where entire portions of the vessel are missing (e.g. the body of the vessel).

Vessels can also exhibit evidence of their function and use during their life history. Fire sooting can inform researchers about the placement of pots either within or suspended over a fire, while carbon encrustation, or food charring, can demonstrate the nature of cooking (i.e., boiling or simmering) and type of food being cooked (Skibo 2013:63). Attrition on the vessel or sherds can suggest the types of activities that would cause abrasion to the interior or exterior of the pot, including stirring, cleaning, cooking or storing (Skibo 2013:120). It can also provide evidence for secondary functions of the vessel or sherds, as dry storage, scrapers or scoops.

4.1.1 Sampling

All artifacts had been previously catalogued by TMHC, and were grouped by feature. The ceramic sherds that were included in this study were all recovered from subsurface pit features at the site. All ceramic sherds were sorted based on context, and then grouped into vessels. This was done either through direct physical cross-mends, or through inferred mends, on the basis of:

- similarity in colour of exterior and/or interior surfaces,
- similarity in colour/firing evidence in profile,
- wall thickness,
- surface decoration/treatment,
- vessel fabric (i.e., inclusions type/size),
- use wear evidence, and
- proximity (within the same feature or feature cluster).

Attempts were made to match up rim and neck sherds from the same feature, as well as between features and between feature clusters. Attempts were also made to match rim and neck sherds to body sherds found in the same or neighbouring features.

Several vessels had already been identified during the report preparation process by TMHC. Location 9, with only six initial vessels identified, was first sorted by feature, and entirely examined prior to sorting the assemblage into individual vessels. Location 15, given its larger sample size, was first analyzed by the vessels that had been sorted and catalogued by TMHC; once these more-complete vessels were examined, the remainder of the sherds were examined, by feature, to determine: a) which sherds would be included in the analysis; b) if additional sherds could be included with previously sorted vessels; and c) how the remainder of sherds should be sorted (into vessels). Each vessel was assigned a vessel ID, based on the feature number and given a sequential vessel number beginning at one for each feature. The ID code thus has three components: 1) site location number; 2) feature number; and 3) vessel number.

The sampling strategy for the pottery analysis was to examine all sherds that could be connected to an identified vessel. No sherds smaller than the size of a quarter (<23.81 mm in diameter) were analyzed, unless the sherd could be connected (through direct cross-mend) to a vessel. Body sherds missing the interior or exterior surface were also excluded, as these sherds would not yield correct body thickness values. Rim and neck sherds were particularly difficult to match with body sherds, as surface techniques and even colour tended to vary between these two areas of the vessel. Body sherds that could not be matched with a vessel (rim or neck) were analyzed separately, and were excluded from the final vessel tally and results. This was done to avoid inflating vessel counts, by categorizing body sherds as separate vessels when in fact they may have formed the body of a vessel with separately identified rim/neck sherds. Body sherds were included in the analysis to examine manufacture-related and use-alteration attributes.

Twenty-five vessels were identified for Location 9, consisting of 168 sherds, however only ten of these vessels were identified from rim sherds; the remaining vessels were identified from neck sherds. Because of this small sample size, the investigation into Location 9 pottery was minimal, and the ceramics were not subjected to the same statistical testing as the Location 15 pottery. The Location 9 pottery, therefore, does not form a large component of my research. However, the vessels that were recovered displayed interesting diagnostic features, and will be discussed, although the analysis is more exploratory in nature. At Location 15, 56 vessels were identified, consisting of 919 sherds, with 44 vessels based on rim sherds, and another 12 identified based on neck sherds. Another 262 body sherds from Location 15 were examined, but were not able to be connected to an identified vessel.

4.1.2 Attributes

Given the exploratory nature of this study, to look at the production and use of ceramic vessels at the sites, a wide range of attributes was selected. Forty-four attributes were selected for the study, which can broadly be categorized as manufacture-related, morphological, decorative, and use-related. The large number of attributes was selected to determine which attributes yield the most complete datasets for fragmentary assemblages (i.e., collections that contain no or very few complete vessels). The goal of the attribute analysis was to understand how pottery was produced and used at the Silvercreek sites, as well as to explore the similarities or differences between the Silvercreek ceramics and those from other southwestern Ontario sites from the same time period. A glossary of some of the key terms mentioned in the text is presented within Appendix A. Diagrams for select attributes, including vessel form measurements, are provided within Appendix B. For a list of attributes that were examined in the study, see Table 3, or for a more detailed description see Appendix C. Attributes were selected and recorded based on several prior studies, including Latta (n.d.); Timmins (1992); Howie-Langs (1998); Watts (2006); and Schumacher (2013), as well as those discussed in the general ceramic literature, including Rye (1981), Rice (1987), Orton and Hughes (2013), and Skibo (2013).

Table 3: Attributes Included in the Study

Manufacture-Related	Morphological	Decorative	Use-Related
• Evidence of Manufacture • Surface Colour • Interior Colour • Profile (interior-core-exterior) • Temper Size • Temper Type • Temper Density • Temper Sorting	• Rim Form • Rim Orientation • Upper Rim Profile • Lip Form • Lip Thickness (mm) • Neck Length (mm) • Rim Diameter (cm) • Neck Diameter (cm) • Shoulder Diameter (cm) • Rim to Neck Height (mm) • Rim Wall Thickness (mm) • Body Wall Thickness (mm) • Internal Shape	• No. of Exterior Bands of Decoration • No. of Exterior Motifs • Rim Technique • Interior Rim Technique • Neck Technique • Shoulder Technique • Lip Technique • Rim Motif • Interior Rim Motif • Neck Motif • Shoulder Motif • Lip Motif • Punctate (presence/absence on interior or exterior) • Punctate Form • Castellation • Exterior Surface Treatment • Interior Surface Treatment • Tool (Rim, Interior Rim, Lip, Neck, Shoulder)	• Exterior Use Wear • Interior Use Wear • Residue

4.1.2.1 Manufacture-Related Attributes

4.1.2.1.1 Evidence of Manufacture

Manufacture or forming technique is often difficult to determine on potsherds. Primary forming techniques, such as coiling, molding or pinching, are especially difficult to discern, as any traces tend to be smoothed or wiped away. The coiling technique is generally recognized by evidence of coil breaks or unsmoothed coils, and is also evidenced by variation in the vertical thickness of the wall (Webb 1994). Pinch pots may show rhythmic, shallow, and closely shaped grooves, which correspond to fingerprints, particularly on the interior surface of the pot (Rye 1981:70). Molding can be inferred on vessels with evidence of impressions or reliefs of the mold on the interior surface, and pressing on the exterior (Rye 1981:81).

A typical secondary forming technique observed on pottery from the Great Lakes is beating, using paddle and anvil. The use of paddle and anvil techniques can be demonstrated by the presence of laminar fractures, a stepped breakage pattern, which Rye (1977:205) argued may result from the "strong compression of the fabric", and the presence of star-shaped cracks that form around large mineral inclusions during firing as a result of the compaction of the clay (Rye 1981:85). There may also be impressions of the anvil, which appear as repeated impressions on the interior of the vessel.

4.1.2.1.2 Colour

Colour was recorded for the main area of the sherd, if, as was often the case, the sherd was mottled. Profile and interior/exterior colour was recorded to understand how pots were fired at the sites. Variability in firing environment will cause inconsistencies in the colour of the same vessel, making the matching of sherds based strictly on colour unreliable (Gibson 2002:47). Fire clouding can also result from the direct contact of the pot to a flame.

In pottery that has been fired below 1000°C, the core is used as an indicator of the atmosphere and temperature of firing (Rye 1981:115). A homogeneous or uniform colour profile or a grey or black core distinct from the surfaces of the vessel, will result from a fully oxidizing atmosphere (Rye 1981:115). Pots with a black core in contrast to a lighter red or brown exterior and interior surfaces indicate a short-term firing, where organic materials in the clay were not completely burnt out of the pot (Gibson 2002:45-47). A dark or black surface colour results from firing the pot in an oxygen-starved or oxygen-reduced (anaerobic) environment, where carbon monoxide is produced, and absorbs oxygen from the ferrous oxides in the clay (Gibson 2002:47). A dark core *and* interior surface or a profile that is grey or black throughout suggests that the pots were subjected to an oxygen-reducing atmosphere, perhaps throughout the firing process (Rye 1981:115-116).

Essentially, these various profiles mean that vessels were either fired in a completely open environment, or they were covered in order to restrict access of air (Rye 1981:115). As Gibson (2002:47-48) pointed out, this reducing environment is very difficult to create in open fire situations, as the firing environment is challenging to control. A homogeneous profile is more likely to occur when pots are fired in an open-air pit situation, which is how vessels would typically be fired during the early Late Woodland Period. To achieve an oxygen-reducing environment, organic materials such as grass, ash or sawdust would have been used to prevent the access of air during firing (Rye 1981:115).

4.1.2.1.3 Temper Size and Types

Temper refers to materials that were added to the paste by the potter, in contrast to materials naturally occurring in the clay (often referred to as inclusions) (Prehistoric Ceramics Research Group 2010:25). Temper size, density, sorting, and type (colour and angularity) were all explored, in order to determine the presence of added tempers (Prehistoric Ceramics Research Group 2010). The Wentworth scale and the Prehistoric Ceramics Research Group (2010:48-52) inclusion density charts, diagrams of sorting of inclusions, inclusion roundedness classes, and categories of roundness for grains were used for paste assessments. Clays naturally contain many minerals and organic materials; however, added temper is generally determined by the presence of inclusions larger than 0.5mm (Stoltman 1991:109), the angularity of the rock or mineral (natural inclusions will be rounded, added temper will consist of highly angular minerals that were crushed prior to vessel production), and the presence of poorly sorted sediments (Linda Howie, personal communication 2014).

Due to glacial movement, determining the geographical sources of raw materials in Ontario is difficult. However, by examining temper, it is possible to explore paste recipes and technical choices made during the production of vessels. The use of rock and mineral inclusions to temper the clay improves the workability of the clay, reduces shrinkage during firing, and improves the performance of the vessel, making the vessel able to withstand rapid heating more effectively, without breaking due to thermal shock, depending on the type of temper selected (Skibo 2013:43).

Mineral inclusions were examined on Location 15 vessels using a hand-held Dino-Lite USB Digital Microscope AM413ZTA and stand to photograph vessel cross-sections/profiles. Profiles were examined on a fresh fracture whenever possible, achieved through breaking a small section of edge using needle-nose pliers. Only one rim sherd from each vessel was examined, and the fresh break was removed from various portions of the sherd, depending on the most appropriate edge for breakage. If a fresh break could not be made on a rim sherd, a neck sherd from the upper portion of the neck was used instead. Again, given the small size of the Location 9 collection and the fragmentary nature of the sherds, information about temper types and size were noted, but a full examination into paste recipes was not pursued.

Magnification was kept consistent at 45x to 50x for each profile photograph on a fresh fracture, while other features (e.g., vessel surfaces) were photographed at a magnification range of 20x to 50x. Given that the Dino-Lite was meant for exploratory purposes, to more closely examine the fabrics, a fresh fracture photo was not taken for each vessel, particularly when no appropriate area was available (i.e., vessels that were represented by only a few sherds, or where decorative information may have been lost). In these cases, profile photos were still taken, using a clean edge and following the same protocol as when photos were taken on a fresh break.

Sherds from each vessel were also examined macroscopically, often with the aid of a magnifying lamp and/or (10x) loop lens. Possible temper types were recorded, and inclusion sizes were measured using electronic calipers to determine approximate size range of inclusions. Inclusion density within the matrix of the fabric was also estimated and recorded as percentages. When no inclusions larger than 0.5mm were observed, vessels were recorded as having no added temper. Mica was particularly difficult to determine if it was an added temper, as sizes for mica granules tended to be under 1mm. Quartz and feldspar appeared to have been added, based on their large size (1mm to 8mm) and angularity. Descriptions for the hypothesized correspondence of colour, luster and fracture pattern to mineral type is provided in Table 4.

Table 4: Description of Mineral Inclusions (Bishop et al. 2005; Prehistoric Ceramics Research Group 2010)

Mineral	Colour	Luster	Fracture
Quartz	White	Semi-translucent, vitreous, glassy	Irregular
Feldspar	Pink or Grey	Opaque, vitreous, pearly	Parallagram
Muscovite/Mica	Gold	Submetallic, light reflective to vitreous, pearly	Platey
Hornblende	Black	Vitreous, translucent to opaque	Uneven/hackly, minute crystals
Biotite (Mica)	Black	Submetallic, light reflective to vitreous, pearly	Platey, minute crystals
Chert	Grey	Opaque	Conchoidal
Limestone	White/Grey	Dull	Irregular
Mudstone	Red-Brown	Dull; clay-like	Well-rounded

4.1.2.2 Morphological Attributes

Morphological attributes were examined in order to explore the variation or similarity of vessel form within the Silvercreek assemblages. After Howie-Langs (1998), I wanted to test whether or not Silvercreek potters were making vessels based on a mental template, or if vessel form was highly variable. To explore this question, I recorded the rim, neck and shoulder diameter using a diameter board, and using SPSS software, tested the relationships among these values using Spearman's non-parametric rank-order correlation and Pearson product-moment correlation (Howie-Langs 1998:69).

In this analysis, the null hypothesis (H^0) is that the variables being tested do not correlate, with the alternative hypothesis (H^A) stating that the variables do show correlation. The null hypothesis (H^0), $\rho=0$, is tested against the alternative hypothesis (H^A), $\rho\neq0$, where ρ is the population correlation coefficient. If the p-value is less than 0.05, H^0 can be rejected, and a correlation between the variables can be concluded. If the *p*-value is *greater* than 0.05, H^0 cannot be rejected, and it can be concluded that there is significant evidence that the variables do not correlate (Howie-Langs 1998:69). Howie-Langs (1998:69) concluded that the Spearman correlation was the most appropriate test to use, given that the metric data did not appear to be normally distributed, although in my analysis I found that both tests gave similar results.

Unfortunately, due to the fragmentary nature of the collection, most vessels yielded incomplete data sets. Morphological attributes, particularly neck length and rim, neck and shoulder diameter, were difficult if not impossible to measure on vessels represented by only a few sherds. Therefore, for each attribute there is a different sample size, which means that only general trends in the data can be interpreted.

The thickness of various zones of the vessel was also measured, and the relationship between rim thickness and diameter as well as neck thickness and diameter was tested. Attributes of the rim and lip were examined and recorded for comparison to Watts' (2006) findings on the morphological and decorative differences of Iroquoian and Western Basin pots. These attributes are typically included in Ontario ceramic studies (Howie-Langs 1998; Martelle 2002), and tend to show variation over space and time. These traits were also examined to explore inter-site variation in the morphology of the upper rim. Morphological traits such as rim orientation, orifice (rim) diameter, and neck diameter can also suggest how a ceramic vessel was used. For example, an outflaring, wide rim with an unrestricted neck would provide easy access to contents, and make stirring and serving easier (Rice 1987:238).

4.1.2.3 Decorative Attributes

Decorative attributes tend to feature most prominently in Ontario ceramic studies, since these traits also indicate variation over time and space. Decorative attributes were examined to explore whether the stylistic elements of the vessels conformed to the patterns outlined by Fox (1990) and Ferris and Spence (1995) for Princess Point/Glen Meyer ceramics, or Murphy and Ferris (1990) and Watts (2006) for Western Basin pottery. Much like morphological attributes, decorative or stylistic attributes were also difficult to measure on the fragmentary collections, particularly as vessels had elongated necks, and in many cases the entire length of the neck zone of the vessel was not preserved. Again, general trends could be explored in regards to the presence or absence of punctates, bossing, castellations, and the types of tools, techniques, and motifs on each zone of the vessels.

Motif, tool and technique were all recorded for the interior rim, lip, exterior rim, neck and shoulder zone. Diagrams by Watts (2006:121-122) provided examples for tool, technique and motif, with the exception of several motifs not observed by Watts, including filled-triangle, nested "L-shaped", and filled diamond motifs. The presence/absence of punctates was recorded, as well as the presence/absence of corresponding interior or exterior bossing. The presence of castellations was recorded, as well as the presence of continuous decoration on the castellation. The number of exterior bands of decoration, as well as number of exterior motifs, was also recorded.

In order to test whether a relationship existed between certain decorative traits, data was explored in SPSS, using the descriptive statistics option and the 'explore' command. Rim diameter as a proxy for vessel size was tested along with presence/absence of punctates, castellations, residue, and use-wear. The relationship between presence/absence of castellations and presence/absence of punctates was also tested.

The surface treatment on the exterior and interior of the vessel was also recorded, which could be viewed as both a stylistic *and* technical choice (Skibo 2013:47). Surface treatment is often cited as a distinguishing trait between ceramic traditions, for example, the earlier Rivière au Vase ceramics are defined by cord or fabric marked surface treatments from the lip to the base, while Younge Phase pottery feature heavily cord-malleated bodies, with smoothed-over and elaborately decorated neck zones (Murphy and Ferris 1990).

Differentiating between different variants of this attribute often requires considerable experience and expertise (Howie-Langs 1998:35). I recorded either "cord-malleated random/rounded", to describe the more varied type of cord-malleated surfaces, where impressions appeared more rounded, and "cord-malleated linear", to describe the surfaces that displayed malleation that was more uniform in nature, resembling linear impressions oriented in a top-to-bottom fashion in line with the vessel (Figure 4). Although this is not as detailed and descriptive as other studies, due to the time-constraints of the project, and the goals of studying this trait, it was determined to be sufficient. These attributes correspond roughly with two surface treatments described by Howie-Langs (1998:35): rounded and horizontal. I also recorded smoothed-over cord malleated surfaces, and smoothed surfaces decorated with cord-wrapped stick (CWS) impressed, linear stamped, combed, and incised techniques, although these four latter techniques appeared only on juvenile vessels.

Figure 4: Surface Treatments: Cord-Malleated Linear (left), Cord-Malleated Random/Rounded (right)

In terms of technical function, experiments have demonstrated that surface treatments, such as exterior cord roughening, can also influence the performance of the vessel, making the vessel easier to handle, and increasing the heating efficiency (Skibo 2013:47). Interior surface treatments, such as smudging, or blackening the interior of the vessel, have been shown to reduce water permeability, making the vessel efficient for boiling contents (Philpotts and Wilson 1994:617; Skibo 2013:50). This could also be viewed as manufacture-related trait, as the darkened interior may have been achieved during the firing process. Vessels also may have been sealed or seasoned: George (2004:40), in her experimental research conducted on replica Ontario pre-contact pottery, found that upon seasoning the pots with animal fat after firing, the pots had a darkened interior surface, which she concluded may have been due to the addition of fat or the burning of the fat once applied to the heated vessel.

4.1.2.4 Use-Related Attributes

4.1.2.4.1 Use-Alteration

The exterior and interior surface of each vessel was examined for traces of use-alteration, including scraping/attrition, abrasion/pitting, fire sooting (typically confined to the exterior) or a water-line (confined to the interior). These traits indicate the use of the vessel during its life history, and can help us to understand the role of the pot in food collection, transport, processing, consumption, and storage (Rice 1996a; Skibo 2013:3). Pottery can also assume a secondary function, whereby vessels are reused or recycled; the most common example of this is where cooking vessels become used as storage vessels after they are no longer useful for holding or boiling liquids (Skibo 2013:5).

Use-alteration attributes were recorded for each vessel, although fire sooting and abrasion was difficult to determine, since these qualities could have been acquired post-breakage or post-deposition. When fire sooting was confined to the edges of a sherd it was not recorded, as it is more likely that a sherd was exposed to fire post-breakage. Attrition was also difficult to distinguish from wiping, which is a technique performed on wet clay to smooth or mold vessel walls. Attrition was recorded when surface scratches appeared to have been acquired on a fired vessel, and not when it appeared as an impression on what was likely a pre-fired vessel. Attrition was also most typically noted on body or base sherds, and therefore was difficult to determine on vessels with no mending bodies or bases.

Lastly, the presence or absence of mending or repair holes was noted for all vessels. Their presence may indicate the need to repair essential vessels during winter months when new vessels would not have been likely to be produced, or when other seasonal tasks took precedence over pot-making (Howard 1981 as cited in Cleal 1988:140). Repair holes were drilled on either side of a crack in the wall of the vessel, and sinew or cordage would have been strung through in order to close the crack and prevent it from spreading

(Duddleson 2008:182). Repair holes would extend the life of a vessel, however they may have made the holding and cooking of liquids less efficient, suggesting a secondary function for these vessels, perhaps as dry storage for food resources.

4.1.2.4.2 Residue

Residues refer to the traces of plant or animal materials that can remain on the surface of a ceramic vessel. Recently, chemical residue analysis has gained popularity in ceramic studies, involving the extraction of lipids from vessels, and identification of the organic residues using various methods including stable isotope analysis, mass spectrometry and gas chromatography (Skibo 2013). For the purposes of this study, a macro-analysis of the vessel surface was used to determine the presence or absence of any organic residues. The Silvercreek ceramics were examined for carbon encrustation (usually black in colour), or traces of red, pink or orange material, which could possibly be hematite - red ochre (Howie-Langs 1998).

4.2 Spatial Analysis

This component of the research was intended to understand the context of the pottery recovered from the sites, as well as other spatial patterns, in order to determine the use of the sites and perhaps gain insight into the length of occupation. The sources of data for this project consisted of shapefiles provided by the GIS technicians at TMHC, and the artifact catalogue featuring records of all of the recovered artifacts from the sites. The shapefiles used consisted of polygons, which represented the subsurface features uncovered at the sites. All shapefiles had a defined coordinate system of NAD1983 UTM Zone 17N. The World Topographic Map was also used, which is a basemap available from ArcGIS Online.

The artifact catalogue was provided in an Excel table, and included the following information: catalogue number, context, layer/depth, artifact type, artifact count, and comments. The comments included: a description of the artifact material for lithics, the surface treatment or decoration of ceramic sherds, or a determination of fish, bird or mammal for recovered faunal remains. A column was created in this catalogue (“ID” or “ObjectID”) in order to be able to join the table to the existing shapefiles for subsurface features. However, due to the nature of the artifact catalogue, which contained multiple entries for each feature, a ‘one-to-many’ join was not possible. This means that because the artifact catalogue contained multiple rows of data for each feature (depending on the number of artifacts found in that feature), it could not be joined with the attribute table for the feature shapefiles, which only contained one row of data for each feature. Using a ‘one-to-many’ join would have resulted in only the first matching record being joined to the feature shapefile. Instead, a separate table was created, and using the pivot table function of Excel, artifact types were tallied for each feature. This information was then joined to the feature shapefile.

In order to explore the spatial patterning of artifact types found within the subsurface features, as previously mentioned, artifact type frequencies were tallied for each feature. Ceramics, such as neck/shoulder, juvenile vessel, body and rim sherds, were grouped, as were lithics, consisting of chipping detritus, utilized flakes, gravers, bifaces, cores, drills, projectile points, knives, notched flakes, retouched flakes, and spokeshaves. Pipes were also grouped, as were scrapers and perforators, faunal remains, and ground stone tools, such as adzes, celts, and hammerstones. Juvenile vessels were also separated later in order to explore clustering of this artifact type at the site. Due to the limitations on floral data, which was collected through the sampling of soil from subsurface features, and not systematically from each feature, it was not included in the investigation.

Once this data was compiled in an Excel spreadsheet, it was added to ArcMap and joined with the feature shapefiles. Due to differences in the sizes of features and the total counts for each feature, the data was normalized by calculating percentages, instead of relying on the total count for each artifact type. The artifact total (including all artifact types) was calculated for each feature, and then the percentage of each artifact type was calculated by dividing the count of a specific artifact type (e.g., ceramics) by the total artifact count for that feature, multiplied by 100. This information was calculated using the field calculator in a new column for each artifact type.

Following the calculation of percentages for each artifact type, the mapping cluster toolset was used to explore patterns in artifact types at both sites. The mapping cluster toolset displays cluster locations, extent of clustering, and spatial outliers. Within this toolset, a Hot Spot Analysis and Cluster and Outlier Analysis were performed for the artifact percentages within the features. The Hot Spot analysis tool works by examining each feature within the context of any neighbouring features. The Cluster/Outlier analysis tool works by taking the inputted set of features and an analysis field, and identifying clusters of features with high or low values for the given analysis field. These tests were performed in order to determine if any statistically significant differences in artifact types existed between the subsurface features, by examining if any clusters/outliers or hot/cold spots existed.

The tests were performed for the percentages of ceramics (juvenile vessels were both tested separately and included within the 'ceramics' category), lithics, ground stone tools, faunal remains, pipes, and scrapers/perforators. For the Cluster and Outlier Analysis, "Inverse Distance" was selected for the Conceptualization of Spatial Relationships. This was selected in order to consider all features as neighbours of the other features being analyzed; this selection ensures that the analysis does not exclude any features (Lentz 2009:9). These tests were performed in order to determine if any statistically significant differences in artifact types existed between the subsurface features, by examining if any clusters/outliers or hot/cold spots existed. The attribute table, containing the data on artifact types and percentages, was also exported in order to explore the numerical data through Microsoft Excel.

4.3 Conclusion

In this chapter, I have outlined the methodological approach undertaken to study the ceramic vessels and settlement patterns at the Silvercreek sites. Using attribute analysis, I examined a variety of manufacture-related, morphological, decorative, and use-related vessel traits. Using ArcGIS software, I analyzed patterns of artifact types at the sites, with the aim of discerning settlement information. In the next chapter, I present the results of these analyses, incorporating some interpretations of the data.

Chapter 5

5 Results and Interpretations

This chapter presents the results of the ceramic attribute analysis and spatial analysis through ArcGIS, as well interpretations of these results. Additionally, I will summarize some of the methodological challenges I encountered during the research process.

5.1 Ceramic Attributes

For all ceramic analyses, juvenile vessels were included along with adult vessels. Although this had the potential to skew the data (e.g. increasing or decreasing trait frequencies), juvenile vessels were included in order to view these smaller pots as part of the larger community of pottery production and use at the sites. Many vessels initially categorized as juvenile demonstrated a level of skill suggesting that these vessels may have been made by more advanced students or even skilled potters, and showed use-wear evidence that suggested smaller vessels were used not only as playthings, but also may have been used for food-related activities. These findings will be discussed in more detail in Chapter 6.

5.1.1 Manufacture-Related

5.1.1.1 Evidence of Manufacture

Manufacture or forming technique is difficult to determine for the majority of potsherds, although some evidence remains (Figure 5). Many archaeologists speak of paddle and anvil techniques as ‘replacing’ the coiling method during this time period (Bursey 1995:46), however both techniques could have been used on the same pots. Conversely, the techniques employed may have depended on the preferences of the potter. Spence and Ferris (1995:106) describe the manufacturing technique of early Late Woodland pottery as modeling or working a ball of clay by paddling the exterior of the pot to stretch the clay and achieve relatively thin-walled vessels. This is also how potters achieved the cord-malleated or smoothed over-cord marked appearance on the exterior of the vessel, due to the cord-wrapped paddle used in this method.

Figure 5: Evidence of Manufacture

At Location 15, unsmoothed coils appeared on two vessels (Figure 5), suggesting that coiling may have been the primary forming technique on some occasions at that site.

There is also evidence of variation in the thickness of the wall (Webb 1994), further evidence that some vessels may have been built through coiling. There are two clues that paddle and anvil may have been the dominant secondary forming technique at Location 15: the presence of laminar fractures on 15 vessels; and star-shaped cracks, which appear on 11 vessels (Figure 5).

Lastly, six juvenile vessels found at Location 15 were pinch pots, formed by shaping a ball of clay by hand by drawing or pinching the clay into form (Figure 5). This was determined based on the small size of the vessel, the 'lumpy' appearance of the pot, and the impressions of fingerprint and fingernails on the interior and exterior of the vessels.

The Location 9 vessels displayed three cases of laminar fractures, six instances of pinch pots (all juvenile vessels), and one vessel that was possibly made using a basket mold (Linda Howie, personal communication 2014). This vessel had uniform ridges on the interior of the vessel from the base to the shoulder, then a smooth interior from the neck to the rim. The interior was darkened along the ridges, but not along the interior of the neck, suggesting a basket was used to form the body of the vessel, which burned during the firing process, while the neck and rim was formed by different means.

5.1.1.2 Colour

One of the noteworthy attributes about the Silvercreek Location 15 pots is the darkened interior of the majority of vessels (Appendix D, Table D1). A total of 66 percent (n=37) of vessels were recorded as having dark interiors (i.e., black, dark grey or dark brown). Blackened interiors can be achieved through firing pots upside down, and burning vegetation within the overturned vessel (Philpotts and Wilson 1994:617). This technique is often referred to as "smudging". The vessels at Location 15 may have been fired upside down in order to achieve this blackened surface interior; one vessel (Figure 6) provided evidence of this, displaying an open punctate that may have prevented the entirety of the interior surface from darkening during firing (Linda Howie, personal communication 2014).

Figure 6: Vessel 3, Evidence of Firing Atmosphere

Blackened interiors are routinely noted in the archaeological literature, found on pots from around the world (Wendorf et al. 2002; Riggs and Rodning 2002). Darkened or blackened interior surfaces would have been a technological choice that affected the performance of the vessel, serving an important function: reducing water permeability. Philpotts and Wilson (1994:616-617), in their analysis of a Late Woodland vessel from Connecticut, found that a blackened interior is a "non-wetting" or water-proof property, determined by performing a simple test in which the absorbency of the red exterior of the vessel was compared with the black interior surface. Water was found to wet the surface of the red ceramic, and remained as a bead of water on the black surface. This same result was observed on the Silvercreek Location 15 ceramics, with water soaking into the light brown interior, and remaining as a droplet of water on the blackened interior surface (Figure 7).

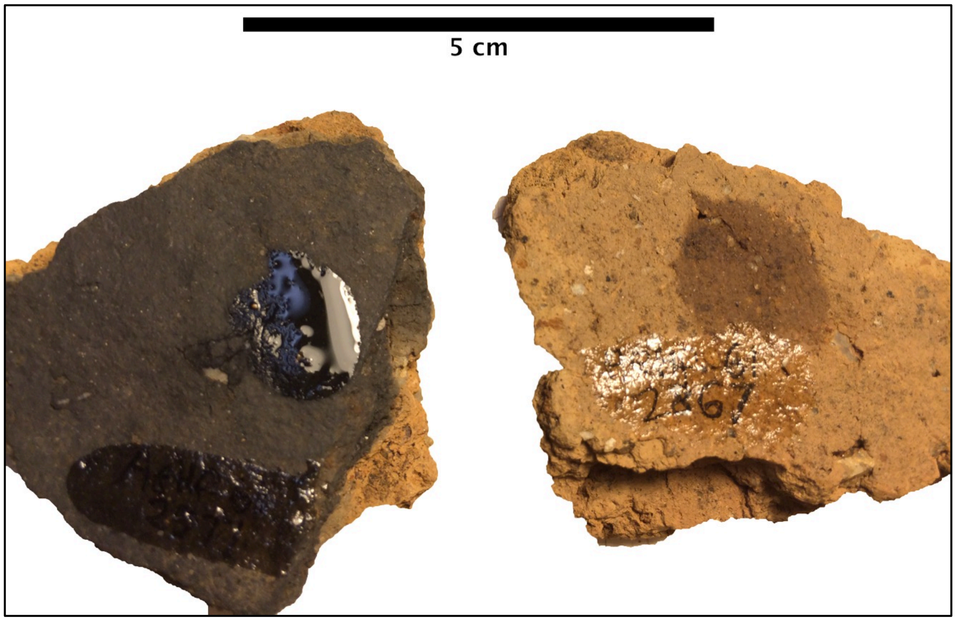


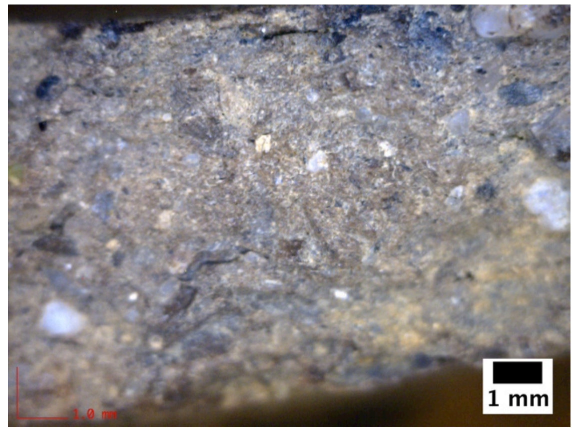
Figure 7: Water Permeability on a Black (left) versus Light Brown (right) Interior

Not only would a vessel with low water permeability be ideal for holding liquid contents, but it would also have been more efficient for boiling contents. The water evaporation rates of vessels with high water permeability have been demonstrated to keep vessels from heating rapidly and even boiling (Skibo 2013:50). Therefore, this innovation of blackened interiors would have made the process of boiling contents easier and more efficient. Vessels may also have been resistant to abrasion, or may have been strengthened by any interior surface treatment (Skibo 2013:52). This has been demonstrated in experimental studies as well, which have shown that blackened or "smudged" surfaces would have been resistant to abrasion as well as having reduced permeability (Longacre et al. 2000; Skibo et al.1997).

The colour profile of the vessels showed two trends: 54 percent (n=30) of vessels displayed light exteriors, with dark cores and dark interiors, suggesting the pots were fired in an oxygen-reducing atmosphere; and 29 percent (n=16) displayed a homogeneous brown profile, suggesting a fully oxidizing firing environment (Table 5; Appendix D, Table D2). Given that the Silvercreek potters would have been firing vessels in open-air pit situations, the homogeneous colour profile of some pots is not surprising. In contrast, the dark core and dark interior may have been more purposefully selected using a more closed-air method, as previously discussed. This would have been more challenging to achieve, and suggests that potters were purposefully selecting this trait, likely as a result of the functional advantages that a dark interior produces.

Table 5: Colour Profiles

Example of a profile with light exterior, dark core and dark interior



Example of a homogeneous brown colour profile

The Location 9 vessels showed similar trends, however, most pots had a homogeneous brown profile (58 percent, n=14), while only 17 percent (n=4) had a light exterior, dark core, and dark interior (Table D3). The interior colour of pots was markedly different at Location 9: the majority had a light interior colour (light grey, light brown, or light reddish) (67 percent, n=14), and the remainder had a medium (24 percent, n=5) or dark (10 percent, n=2) interior colour (Table D4). This suggests that at Location 9, potters were more consistently firing in open-air environments, and were not achieving, either deliberately or unintentionally, darkened vessel interiors.

5.1.1.3 Temper Type and Sizes

The results from the Dino-Lite and macroscopic examinations suggest that there were about 10 paste recipes that potters at Location 15 used. Only one of these pastes did not appear to include added tempers, and this paste was used only to make juvenile/miniature vessels. It is possible that younger potters were given clay prior to any mineral or organic tempers being added, perhaps because the vessels would not require the same kind of thermal shock properties, or added strength, since vessels were small and not going to be used for cooking. The remainder of vessels appear to have had at least some rock and mineral temper added, based on the size and angularity of the inclusions and sorting. The common minerals were pink, white, black and gold in colour (Table 6; Table 7). Only one vessel had grey coloured chert inclusions. I did not attempt to identify minerals since I felt I did not have the expertise or access to resources to make a proper identification. Given the goal of my project, to understand paste recipes, I followed similar studies (e.g. Schumacher 2013), and focused on a descriptive approach to the minerals.

Although some of these minerals may have been naturally occurring, those that were added may have helped to reduce the plasticity of the clay (Shepard 1956), to reduce shrinkage or cracking during firing (Skibo 2013:124), or for their thermal properties when the vessel was heated post-firing.

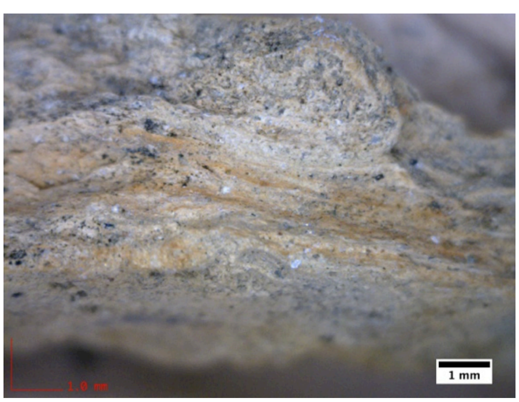
Table 6: Temper and Paste Types at Location 15

Paste No.	Minerals present (colour)	Paste Description	Number	Percentage
1	None	Contains no added temper	5	9.3
2	White (Semi-translucent); occasionally dull white is present	Temper is poorly sorted to moderately sorted with percentages ranging from about 5-10 percent, inclusion shapes are angular to rounded, size ranging from 0.5mm to 6.0mm	8	14.8
3	Pink	Temper is poorly sorted with percentages ranging from about 15-20 percent, inclusion shapes are angular to sub-angular, size ranging from 0.5mm to 2.0mm	2	3.7

Paste No.	Minerals present (colour)	Paste Description	Number	Percentage
4	White and black	Temper is poorly sorted with percentages ranging from about 5-10 percent, inclusion shapes are angular to sub-angular, size ranging from 0.5mm to 2.0mm	1	1.9
5	White and gold	Temper is poorly sorted with percentages ranging from about 15-20 percent, inclusion shapes are angular to sub-angular, size ranging from 0.5mm to 5.0mm	7	13.0
6	White and pink	Temper is poorly sorted to moderately sorted with percentages ranging from about 5-20 percent, inclusion shapes are angular to rounded, size ranging from 0.5mm to 8.0mm	11	20.4
7	White and grey rounded pebbles	Temper is poorly sorted to moderately sorted with percentages ranging from about 10-25 percent, inclusion shapes are angular to rounded, size ranging from 0.5mm to 12.0mm	2	3.7

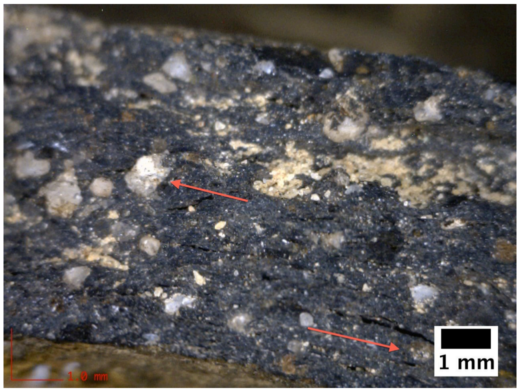
Paste No.	Minerals present (colour)	Paste Description	Number	Percentage
8	White, pink and gold	Temper is poorly sorted to moderately sorted with percentages ranging from about 2-15 percent, inclusion shapes are angular to sub-rounded, size ranging from 0.5mm to 6.0mm	8	14.8
9	White, gold and black (sometimes red-brown is present)	Temper is poorly sorted with percentages ranging from about 5-15 percent, inclusion shapes are angular to sub-rounded, size ranging from 0.5mm to 5.0mm	6	11.1
10	White, gold, pink and black	Temper is poorly sorted with percentages ranging from about 5-10 percent, inclusion shapes are angular to sub-angular, size ranging from 0.5mm to 5.0mm	4	7.4

Table 7: Examples of Temper Types



Paste Recipe No. 1 (no added temper)

Paste Recipe No. 2 (white minerals)

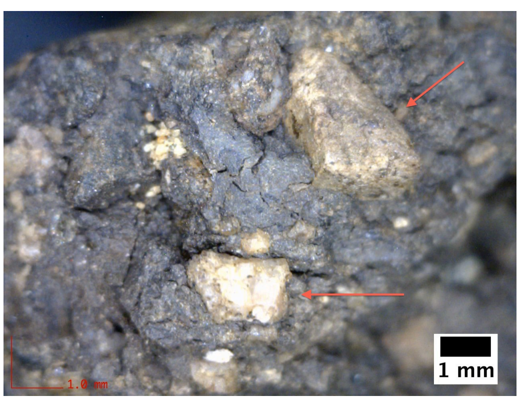


Paste Recipe No. 3 (white and gold minerals)

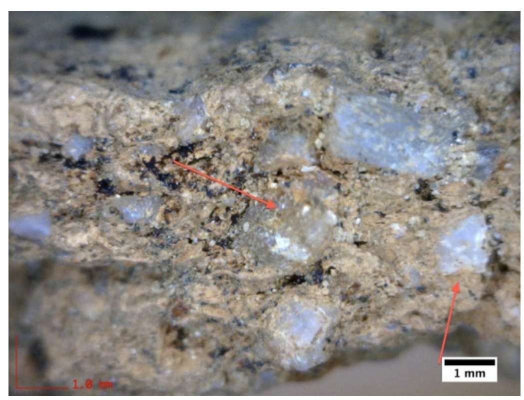
Paste Recipe No. 4 (white and black minerals)

Paste Recipe No. 5 (white minerals)

Paste Recipe No. 6 (white [not pictured] and pink minerals)



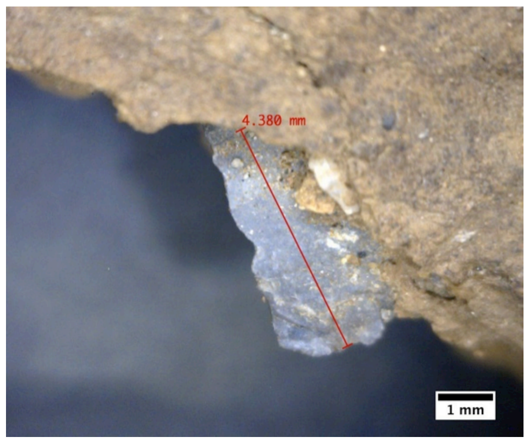
Paste Recipe No. 7 (white minerals and rounded pebbles)



Paste Recipe No. 8 (white, pink and gold [not pictured] minerals)

Paste Recipe No. 9 (white, gold [not pictured] and black minerals)

Paste Recipe No. 10 (white, gold, pink and black minerals)



Example of chert inclusion

5.1.2 Morphology Analysis

The Silvercreek Location 15 vessels were found to be very similar morphologically. Rim, neck and shoulder diameters, and vessel thickness, showed statistically significant correlation: using the Spearman's non-parametric rank-order correlation and Pearson product-moment correlation, the *p*-value for each test (comparing rim, neck and shoulder diameters, as well as rim diameter with neck thickness) was determined to be less than 0.05, meaning the H^0 can be rejected, and a correlation between the variables can be concluded. In other words, as rim diameter increased, so did neck and shoulder diameter; and as the vessel size increased, the thickness increased at standard intervals as well (Appendix E). This suggests the potters were following a mental template while forming vessels, which demonstrates that despite size differences, vessels tended to resemble the same form.

In terms of rim and lip morphology, potters were also forming these zones of the vessels in consistent ways. Concave rim profiles accounted for 86 percent (n=38) of vessels, lips are predominantly flat in form (64 percent, n=28), and rims are typically outflaring (89 percent, n=39) (Tables D5-D8). Vessels are typically collarless, with only three displaying "incipient" collars in the form of folded-over rims (Table D7). This further supports the assertion that potters were following a mental template while forming the vessels.

Neck length was only able to be determined on seven adult vessels, and the length averaged 10.24 cm (Table D9). This is in stark contrast to other vessels from this region and time period, such as the Glen Meyer Praying Mantis site near London, Ontario. Most vessels from this site had a neck length of 0 cm, with this area of vessel appearing as simply one inflection point, as opposed to two inflection points separated by a vertical area (Howie-Langs 1998:68). This area was measured using electronic calipers.

Vessels from Location 15 could be sorted into three categories based on rim diameter: small vessels (2 cm to 10 cm) accounted for 12 vessels, 13 vessels were medium sized (11 cm to 19 cm), and only three vessels were large (over 20 cm) (Table D10). Twenty-eight vessels were indeterminate. Small vessels were typically categorized as juvenile vessels, although not all of the small vessels fit entirely in this 'juvenile' category. These better-made vessels might instead represent the work of more advanced students, and many appear to have been made for use as cooking/serving pots as discussed in Chapter 6.

With a very small sample size of rims, Location 9 was not subjected to the same statistical tests as Location 15. However, some morphological trends can be noted. Lip form was also predominately flat, with 70 percent (n=7) of vessels displaying this trait; rim orientation was typically outflaring (60 percent, n=6) or straight (30 percent, n=3); rim profiles were concave (56 percent, n=5) or convex (33 percent, n=3); and rims were typically collarless, with only one vessel displaying evidence of an incipient collar

(Tables D11-D14). Neck length was only able to be determined on two vessels, and these pots were consistent with Location 15, with one vessel displaying a neck length of 7.67 cm, and another a length of 10.9 cm.

Although the majority of vessels were highly fragmentary, and therefore it was not possible to reconstruct the form, the intact basal sherds from both sites suggest that the vessels were sub-conoidal in shape. Vessel 02-01 from Location 9 was the most complete vessel recovered from either of the sites, with over 50 percent of the vessel represented, including portions of the rim, neck, shoulder and base (Figure 8). This vessel had an outflaring rim, which narrowed at the neck, a straight elongated neck that bulged only slightly at the shoulders (which were angular in form), and a sub-conoidal base. Pots with sub-conoidal basal form, unrestricted, outflaring orifice, tempered with materials that can reduce thermal shock, displaying roughened surface treatments, and relatively thin walls, were probably used as cooking vessels (Rice 1987:237). More specifically, vessels were likely used for boiling, given the vessel form, which features a relatively open orifice for accessing contents, with a slightly constricted neck that could have prevented contents from boiling over and reduced evaporation (Rice 1987:239-240). This is further supported by carbon encrustation on interior and exterior surfaces of the upper portion of several vessels, fire sooting on many of the sherds, and the blackened interior surfaces on many pots, which provided functional advantages for use as cooking vessels.

Figure 8: Vessel 09-02-01 (TMHC 2013a)

It is not clear if the elongated neck of the vessel was functional in nature, or if it was a stylistic preference. It has been suggested that long necks indicate the use of the vessel for storing liquids (Pratt 1999:76), however, in this case vessels also tend to have restricted orifices to contain the liquid. As previously mentioned, Western Basin ceramics were noted for their elongated neck zones, which provided the potter with a ‘canvas’ in which to display a variety of motifs and decorative techniques. Necks may have served more of a decorative purpose rather than being a functional choice. Unfortunately, secondary functions or episodes of re-use are not clear from the morphology of the vessel, although they can sometimes be determined based on use-wear attributes, such as repair holes (see below).

5.1.3 Decorative Motif, Tool and Technique

While vessel morphology was fairly consistent across the pots at Location 15, decorative attributes showed slightly more variability. In terms of motif (Tables D17-D21), the lip displayed two predominant motifs: obliques (41 percent, n=18), and horizontals (27 percent, n=12). The rims also typically displayed obliques (73 percent, n=32), while plain with cord-malleated surface treatment accounted for 14 percent (n=6) of rim decoration. Oblique motifs were also common on interior rim surfaces, accounting for 73 percent (n=32), while plain surfaces were also common (21 percent, n=9). Neck zones displayed the most amount of variation in terms of motif: 26 different motifs/motif combinations were recorded for the neck zones of the pots. Motifs included horizontals (39 percent, n=26), obliques (14 percent, n=9), plain with cord-malleated surface treatment (12 percent, n=8), verticals (nine percent, n=6), filled-triangles (eight percent, n=5), plaits (six percent, n=4), and plain smoothed over cord-malleated (six percent, n=4), while diamonds/filled-diamonds (n=1), punctates (n=1), opposed (n=1), and hatched (n=1) motifs each occurred on two percent of vessels. The shoulder zone of vessels was typically plain with cord-malleated surface treatment (67 percent, n=16), although many vessels also displayed horizontals (21 percent, n=5).

In terms of decorative technique (Tables D22-D26), cord-wrapped stick (CWS) impressions were predominant on nearly all zones of the vessel. For the lip, CWS impressions accounted for 45 percent (n=20) of surfaces, while linear stamped (16 percent, n=7), incising (16 percent, n=7) and plain with cord-malleated surface treatment (14 percent, n=6) were also common. The rim zone showed similar trends: CWS impressions (41 percent, n=18), linear stamped (18 percent, n=8), incising (16 percent, n=7) and plain with cord-malleated surface treatment (14 percent, n=6) were all common. The techniques applied to the interior rim were typically CWS impressions (41 percent, n=18), plain (23 percent, n=10), or linear stamped (18 percent, n=8). The neck zone again showed a great deal of variation: 19 techniques or technique combinations were recorded, although CWS impressions once again were predominant (37 percent, n=19), and plain with cord-malleated surface treatment was also common (16 percent, n=8). Shoulders were typically plain with cord-malleated surface treatment (58 percent, n=14), or CWS impressed (25 percent, n=6).

Not surprisingly, a cord-wrapped instrument was the predominant tool used for all zones of the vessel (Tables D27-D31), including the lip (59 percent, n=26), rim (57 percent, n=25), interior rim (41 percent, n=18), neck (59 percent, n=30), and shoulder (92 percent, n=22). Linear (straight) tools accounted for the second predominant tool used on all zones of the vessel, accounting for 32 percent of rims (n=14), 30 percent of interior rims (n=13), 32 percent of lip zones (n=14), 18 percent of neck zones (n=9), and eight percent of shoulder zones (n=2). Once again, the neck zone of the vessels featured the widest array of tools being implemented to decorate this area of vessel, with cord, annular, dentate, pointed (polygonal), and linear (curved) tools also being used on a few vessels (Table D30).

The presence of castellations and punctates was consistent across the Location 15 vessels. Sixty-five percent (n=22) of pots displayed castellations with continuous decoration, while 35 percent (n=12) had no castellations (Table D32). Unfortunately, the presence or absence of castellations was not able to be determined on 22 vessels. Punctates were present on 61 percent (n=34) of vessels, absent on 23 percent (n=13) of vessels, and indeterminate on 16 percent (n=9) of vessels (Table D33). Of those with punctates, 53 percent (n=18) displayed exterior punctates with interior bossing, 21 percent (n=7) had interior punctates with exterior bossing, 12 percent (n=4) had exterior punctates with no corresponding interior bossing, and three percent (n=1) had interior punctates, but no corresponding exterior bossing.

Using SPSS, it was determined that no relationship existed between rim diameter, and presence/absence of punctates, castellations, residue, or use-wear. Juvenile and adult vessels were both included in the testing. Since the data from juvenile vessels was included when the tests were performed, this lends support to the idea that many of the juvenile vessels might be better categorized as miniature vessels, since many had evidence of use-wear (in the form of fire sooting), residue (carbon encrustation) and sophisticated decorative elements such as castellations and punctates. Had juvenile vessels been made and used by children as playthings, it could be expected that there would be a relationship between rim diameter and the presence or absence of these attributes, corresponding with the difference in skill level and function of juvenile vessels. There *was* a significant relationship between the presence/absence of castellations and the presence/absence of punctates, specifically when there was an absence of punctates there was also an absence of castellations. This might indicate that there was a preference among Silvercreek Location 15 potters to include/exclude those attributes together on a vessel, or it may be an indication of the inclusion of juvenile vessels in the sample. Since punctates and castellations would have both taken a great deal of skill to execute, perhaps these features would not always have been in a novice potter's skill set.

At Location 9, for the majority of vessels, presence of castellations and punctates was indeterminate. Of those vessels with complete rims intact, the majority (83 percent, n=5) had no castellations, and punctates were present on only half (n=4) of vessel rims (Tables D34-D35). Due to the small sample size, however, it is not possible to comment on whether this is an accurate indication of decorative trends at the site. In terms of other decorative trends, the dominant tool on Location 9 vessels was once again a cord-wrapped instrument (58 percent, n=14), with CWS impressions the dominant technique on all zones, including the lip (70 percent, n=7), rim (33 percent, n=3), interior rim (50 percent, n=4), neck (35 percent, n=6), and shoulder (50 percent, n=3) (Table D36-D41). Each zone of the vessel was also dominated by one or more motifs (Tables D42-D46): the lip featured mainly horizontals (40 percent, n=4) or obliques (40 percent, n=4); the rim also displayed horizontals (33 percent, n=3) or obliques (22 percent, n=2); the interior rim was either plain (50 percent, n=4) or displayed obliques (50 percent, n=4); the shoulder was either plain with cord-malleated surface treatment (43 percent, n=3), or displayed obliques (29 percent, n=2); and once again the neck zone showed the most variation, with horizontals (41 percent, n=7), horizontals over obliques (24 percent, n=4) and nested L-shaped (12 percent, n=2) motifs the most common.

In terms of surface treatments, the majority of vessels at both sites featured either smoothed (79 percent [n=44] at Location 15; 74 percent [n=14] at Location 9) or wiped (18 percent [n=10] at Location 15; 26 percent [n=5] at Location 9) interiors (Tables D47-D50). At Location 9, very few vessel rims/necks could be connected to body sherds, making the sample size for this attribute very small. The majority of vessels featured cord-malleated-random/rounded exterior surface treatments (40 percent, n=2), smoothed with incised lines (40 percent, n=2, all juvenile vessels), or cord-malleated-linear (20 percent, n=1). At Location 15, the majority of exterior surfaces were cord-malleated-random/rounded (48 percent, n=14), while the remainder were cord-malleated-linear (21 percent, n=6), smoothed-over cord-malleated (21 percent, n=6), and smoothed with CWS impressed (n=1), linear stamped (n=1), and combed exterior surfaces (n=1) each accounted for three percent of vessels, all displayed on juvenile vessels.

While the number of exterior bands of decoration, as well as number of exterior motifs, was recorded, since the majority of the vessels did not yield complete neck zones, this value was determined to be a poor indicator of design complexity for these collections.

5.1.4 Use-Related Attributes

Although the majority of vessels did not appear to display any evidence of use-related attributes, a few vessels did contain some indication of their use at the Silvercreek sites, and the activities in which the pots may have played a role (Figure 9). On the exterior of Location 15 vessels, 36 vessels displayed some evidence of fire sooting, although as previously mentioned, it was sometimes difficult to determine if soot had been deposited prior to breakage/deposition or after. Soot deposits are expected on cooking vessels that would have been placed within a hearth. The interior of 21 vessels also displayed evidence of fire sooting, perhaps an indication of vessels being fired upside down, or broken sherds being deposited into a hearth, while three vessels contained evidence of attrition in the form of scraping/scratches, and two contained evidence of both sooting and attrition. In terms of residue, 25 percent (n=14) of vessels showed carbon encrustation (on the interior and/or on the upper-exterior surfaces of vessels), and one vessel displayed the presence of red/orange residue on the exterior, which may have been an ochre-wash (Holly Martelle, personal communication 2014).

At Location 9, five vessels displayed carbon encrustation, fire sooting was recorded for the exterior of six vessels, and abrasion or pitting was found on one vessel exterior. On the interior surfaces, five vessels showed evidence of fire sooting, abrasion or pitting was found on one vessel, scraping was recorded on one vessel, one vessel displayed a combination of abrasion and sooting, and on one a combination of sooting and scraping occurred.

Carbon Encrustation (Exterior)

Carbon Encrustation (Interior)

Red Ochre (Exterior)

Attrition (Interior)

Figure 9: Evidence of Use-Wear

Finally, Location 15 had at least five vessels that display repair holes, and Location 9 had one vessel with repair holes, suggesting there must have been a secondary use or function for these vessels, since inhabitants were drilling repair holes to prevent cracks from getting larger (Figure 10). This suggests that pots were likely reused after they were no longer useful as cooking vessels, perhaps to store food resources, such as nuts or maize, which were found in small quantities at both sites. Although repair holes would have extended the life of a vessel, it could have made the holding, preparing, or cooking/boiling of liquids less efficient – particularly as mend holes at Location 15 were found almost exclusively on the body of vessels. This also indicates the high value that the vessels may have had, considering the attempts made to increase the functional life of the pot as long as possible, a trait recognizable on ceramics throughout the world, such as Neolithic pottery in southern Britain (Cleal 1988), the pottery of nomadic groups from Egypt (Barnard 2008), and Plains Woodland pottery in North America (Duddleson 2008).

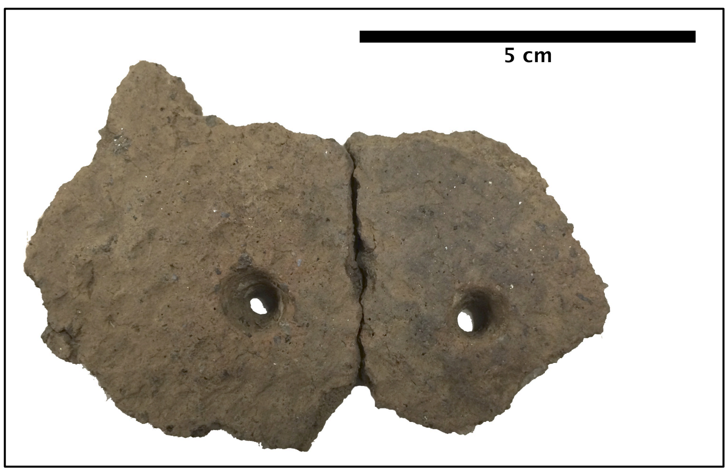


Figure 10: Mend Holes

5.2 Spatial Analysis

Spatial analysis for the two sites examined the densities of artifact types deposited within the subsurface pits. Differences in the clustering of certain artifact types indicate some variation in the use of space at the sites.

5.2.1 Location 9

The results of the Hot Spot Analysis for the ground stone tools, pipes, and scrapers at Location 9 did not produce significant clustering, however the exercise identified feature Cluster 4 as statistically significant for the high percentage of ceramic sherds within the five features (Figure 11). Despite this cluster containing a lower density of artifacts overall, compared to the other feature clusters, Cluster 4 contained proportionally the highest percentage of ceramic sherds at the site.

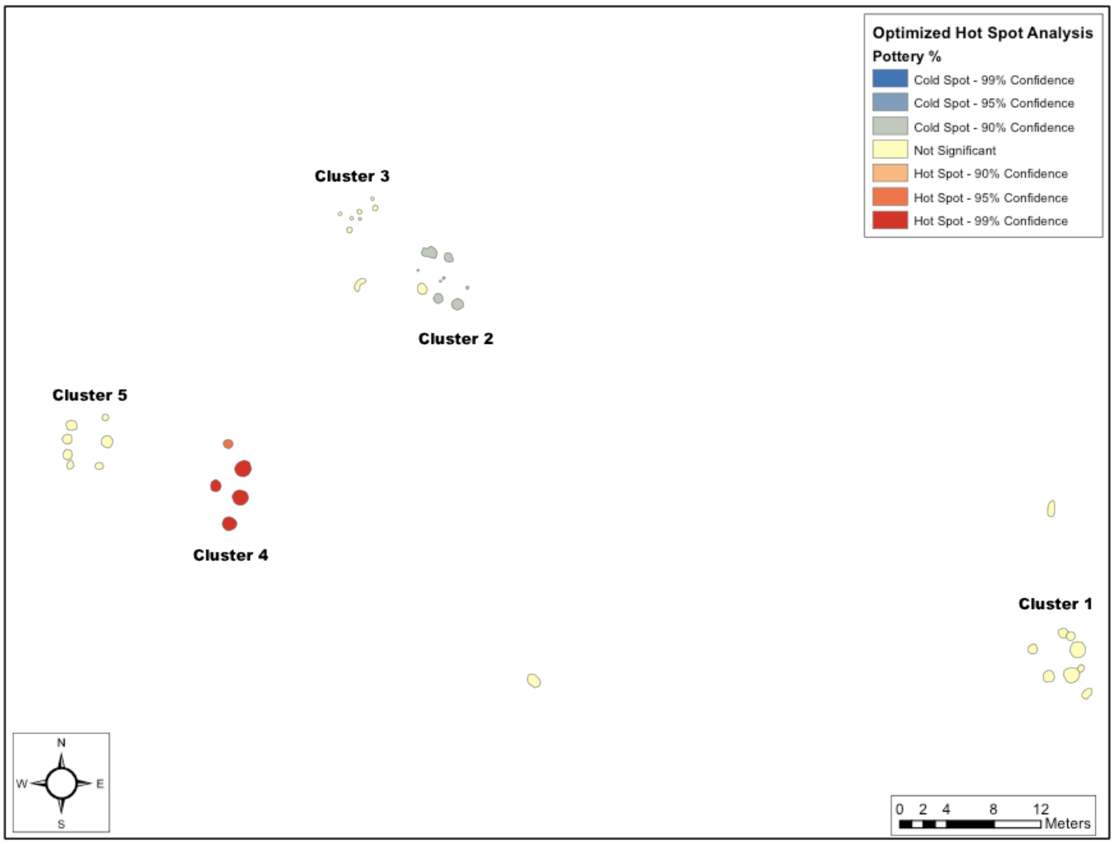


Figure 11: Location 9, Hot-Spot Analysis for Ceramics

In contrast, the same cluster of features identified as a hot spot for ceramics was identified as a cold spot for lithics, when a Hot Spot Analysis for lithic artifact percentages was performed (Figure 12). The Cluster and Outlier analyses performed on ceramic and lithic data demonstrated similar patterns, indicating that Cluster 4 showed high-high clustering of ceramics (high values in a high value neighborhood), and low-low clustering of lithics (low values in a low value neighborhood). The pit features in this cluster also included very low counts of faunal remains.

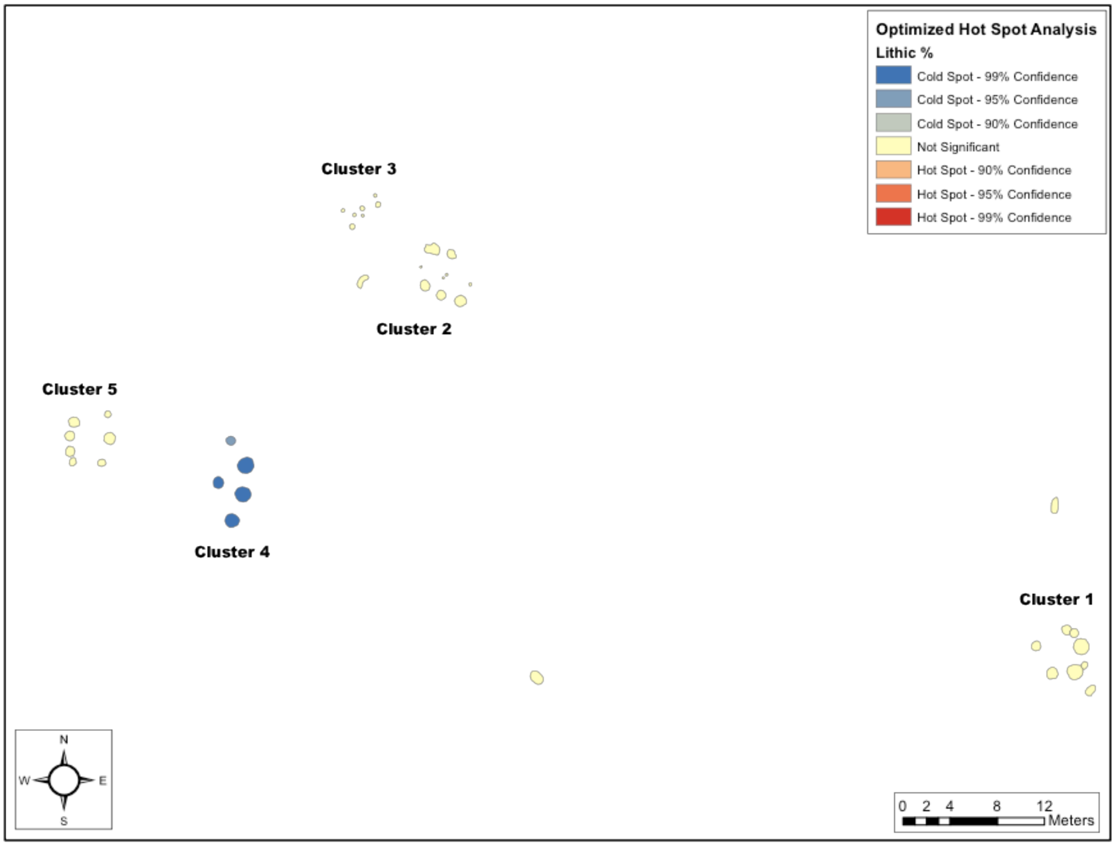


Figure 12: Location 9, Hot Spot Analysis for Lithics

Feature Cluster 4 may represent the best evidence for storage pits at the site. Younge Phase settlements typically consist of these large storage pits, which often contain pottery (Watts et al. 2011:449). Murphy and Ferris (1990:236) argued that pits such as these might have been used to cache resources collected during a seasonal round, instead of as refuse pits. These pits would have served as cold storage for food, perhaps during leaner times of the year, as well as to store material goods such as ceramic vessels. Feature Cluster 4, which contained a significantly high portion of the ceramic sherds found at the site, might be evidence of these types of storage pits discussed by Murphy and Ferris (1990). Additionally, two associated pit features in this cluster were void of artifacts. These could represent storage pits that were emptied of their food or ceramic contents, and not filled with refuse following this removal of stored items. The mend holes present on at least one vessel at Location 9 could also suggest that ceramic vessels were being used to store dry goods once they were no longer useful as cooking vessels.

Storage facilities can be challenging to identify as food resources tend to be used, and not discarded in the same location they were stored in (Bursey 2001:181). Furthermore, not only do inhabitants usually consume food resources, but food may also be more likely to decay, or be eaten by animals. Storage pits have been recognized in the archaeological record due to their shape: straight-walled, flat-bottomed, and relatively large (Bursey 2001). This shape is consistent with many of the features found at Location 9 and Location 15. As Bursey (2001:182) acknowledged, “since their contents generally have been used and the pits refilled with trash, often the only significant remaining attribute of their original function is their shape.”

Storage pits have also been identified in the record because their lining was preserved. Lining generally consists of bark or woven grass, however fire-cracked rock, potsherds, and cobbles have also been reported from sites in the Northeast (Bursey 2001). For sites on sandier soils, such as the Silvercreek sites, pits were not always lined, as air circulation and drainage may not have been as much of a concern. Maize was likely the most common resource stored on sites in the Northeast, however, other harvested items such as nuts, or dried fish or meat could have been stored. Possible storage pits tend to appear within houses, and they tend to be filled with refuse when they were no longer needed for storage, perhaps in the event of site abandonment (Kapches 1990:51; Bursey 2001:183-184).

Feature clusters 1, 2 and 5 at Location 9 could also represent areas of storage pits, however, these may have become refuse pits when they were no longer needed for storage, or prior to the abandonment of the site, suggested by the large quantity of lithic debitage, faunal remains, and other material culture deposited in these feature clusters.

5.2.2 Location 15

The use of the mapping cluster tools for the spatial data at Location 15 indicated significant differences between two areas of the site: Cluster 2 toward the northwestern portion of site, and Cluster 1 in the southeast. Cluster 2 was found to be a hot spot for numerous artifact types, including juvenile vessels, which were all identified from this feature cluster (Figure 13). All ten identified juvenile vessels were recovered from Cluster 2, as well as another five vessels that were identified as possible juvenile vessels based on body sherds. This was confirmed to be a statistically significant clustering using Hot Spot Analysis and Cluster and Outlier Analysis. These tools indicated Cluster 2 as being a hot spot/high-high cluster for juvenile ceramic vessels. In addition, Cluster 2 was found to be a hot spot for ceramics in general, as well as faunal remains and scrapers/perforators (Appendix F, Figures 31-33). In contrast, lithics were not found to cluster significantly anywhere across the site.

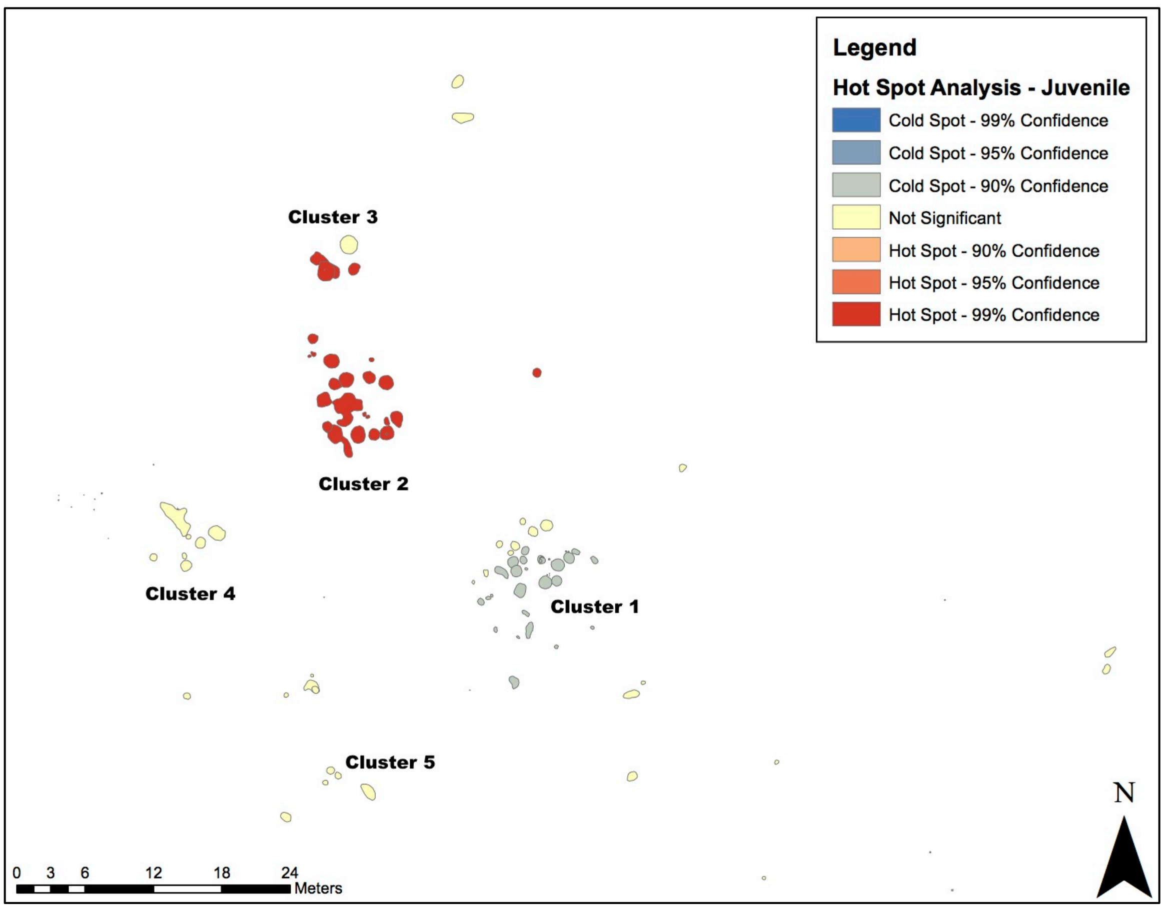


Figure 13: Location 15, Hot Spot Analysis for Juvenile Vessels

In comparison, Cluster 1 was found to be a cold spot for ceramics, but also appeared to be a hot spot for pipe fragments (Figure 14). Out of 68 total pipe fragments, 64 fragments where recovered from Cluster 1. This may represent only a few complete pipes, however, the fact that nearly all pipes were found in this cluster, which was also a cold spot for ceramics and juvenile vessels, suggests that there were significant differences in the uses of space at Location 15.

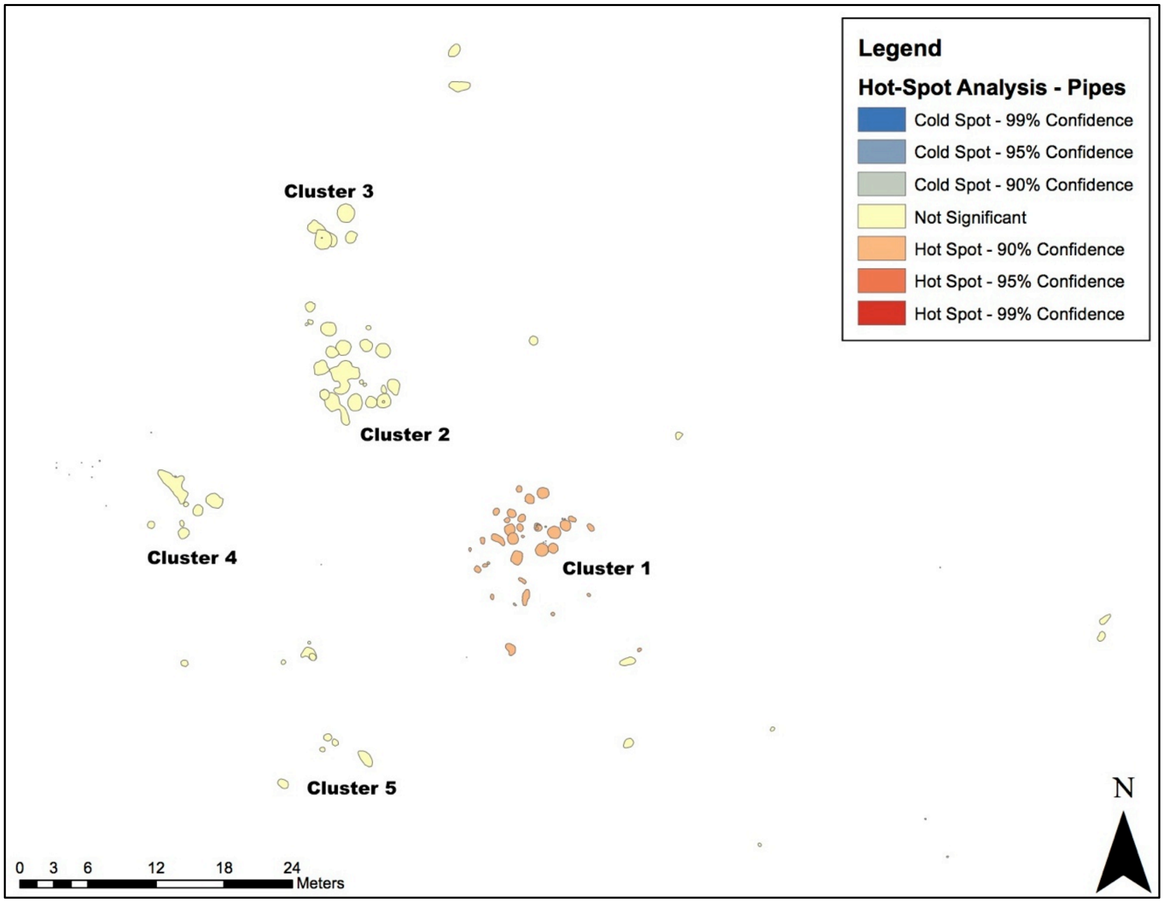


Figure 14: Location 15, Hot Spot Analysis for Pipes

In sum, while pottery, faunal remains, scrapers, and juvenile vessels all cluster in the northwestern portion of the site (Cluster 2), pipes cluster in the southeastern portion (Cluster 1). This could indicate a gendered use of the space, if we want to consider the use of pipes as predominately an activity of men, and activities such as food processing, cooking, and storage; hide-working; and children's pottery as indicating women's space. More broadly, and to avoid conflating notions of gender from the present onto the past, the differences between the two areas of the site could represent the differing uses of space at the site: the use of Cluster 2 as a domestic space (for food-related activities, child's play, and hide-processing), and Cluster 1 for more political or ritual purposes.

5.3 Methodological Challenges

It is worth mentioning a few methodological observations or challenges in regards to my research. As previously noted, fragmentary collections present a challenge, particularly if morphological attributes are emphasized as part of the research. Aspects of pottery such as rim, neck and shoulder diameter, neck length, and vessel form are often impossible to determine for the majority of vessels, particularly those represented by only a rim sherd. Decorative traits are also difficult to ascertain on vessels that yield fragmentary rim or neck zones. That being said, attribute studies can provide insight into pottery production and use, even when assemblages yield few rim sherds or complete vessels. For example, studies of vessel colour/profile and temper/paste are possible even on highly fragmentary collections, since these attributes do not necessarily require complete vessels or even rim sherds.

Further studies that take into account a wide array of attributes will provide comparative datasets for future ceramics studies in Ontario. Many of the past studies on pottery provide anecdotal remarks on aspects such as paste recipes, temper, firing environment, use-related evidence, and manufacturing technique, however raw data (totals, frequencies, percentages, etc.) on these traits is not provided. Once comparative datasets are available for pre-contact ceramic assemblages in the Great Lakes region, it may be possible to determine if differences in time and space appear in regards to these manufacturing and use-related attributes.

This research was challenged by a paucity of comparative studies for early Late Woodland ceramics in this region. Decorative motifs and techniques could be compared to several other studies, while manufacturing, morphological, and use-wear attributes could not be compared, making it difficult to determine if the Silvercreek potters made and used their vessels in similar or different ways from other communities. Although morphological data may not be possible for small, fragmentary assemblages, researchers could include attributes such as vessel colour, temper types and sizes, and residue/use-wear, in order to reconstruct the manufacturing, firing, and functional practices of other Great Lakes potters from this time.

5.4 Conclusion

This chapter has presented the results and interpretations of ceramic analysis, settlement pattern analysis, as well as a summary of some methodological challenges encountered during research. Ceramic analysis has demonstrated that the construction of vessels was fairly consistent across vessels from Location 15, and that vessels from both sites were typically used as cooking vessels, perhaps being used for food storage later in their use-lives. Spatial analysis also suggested that storage would have been important at the sites, and the patterning at Location 15 demonstrated that two feature clusters at the site might have been used for two different purposes. In the next chapter, I will attempt to situate these sites, particularly the pottery and settlement patterns, into the wider context of southern Ontario during the Late Woodland Period. As well, I will look closer into the juvenile vessels found at the site, and discuss the implications for the presence and number of these vessels at the sites.

Chapter 6

“Pottery is a complicated and multifaceted technology, whether past or present, and efforts to oversimplify this complexity and reduce it to a few meager dimensions of variability are a disservice to the field as a whole” Rice (1996b:191)

6 Conclusions

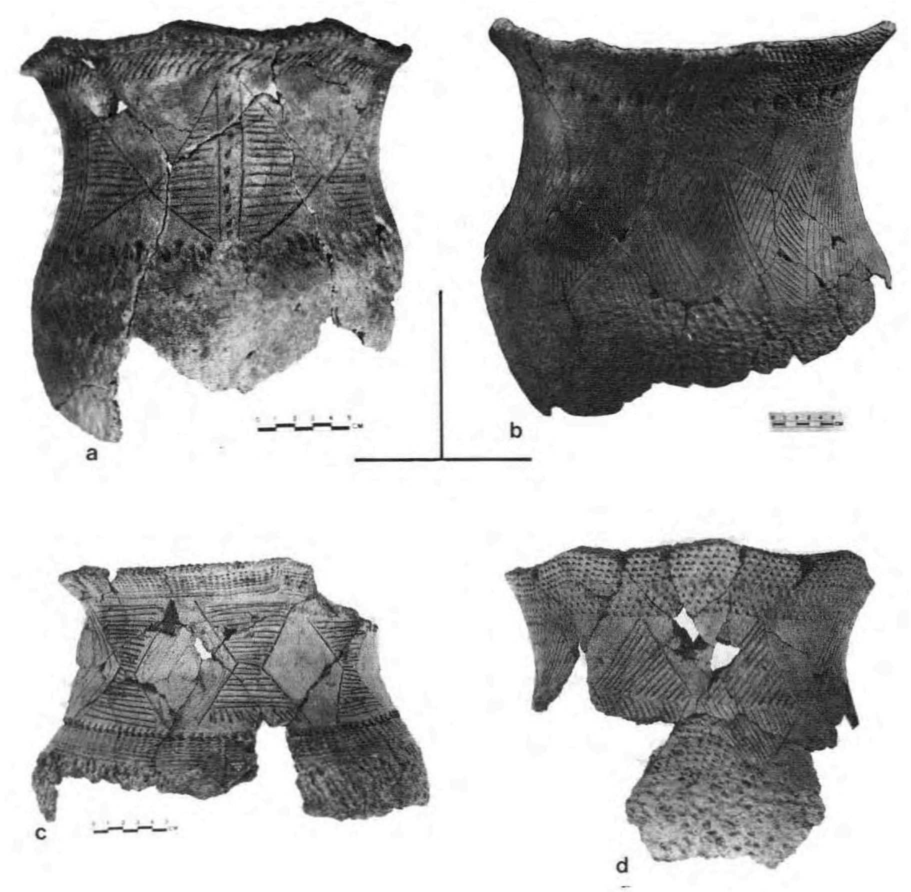
In this chapter I will summarize the major findings from my research, drawing on a communities of practice approach to understand the placement of the Silvercreek sites within the broader landscape of the time. I will incorporate some general observations about pottery and settlement patterns from other southern Ontario sites in order to contextualize the findings of my study and my interpretations of the results. I also discuss the implications for the high number of juvenile vessels at both Location 9 and Location 15.

6.1 Ceramics

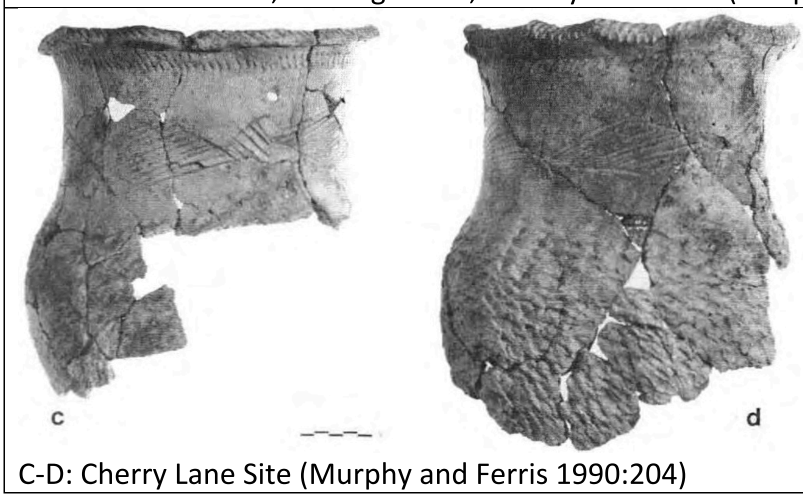
At first glance, the Silvercreek pottery assemblage exhibits a great deal of variation, particularly in the decorative and stylistic elements of the vessels. The variation in pottery is visible from a cursory glance at the ceramics, given the elongated neck zone of the vessels that was decorated in a variety of motifs, using a number of tools and techniques. In many ways, however, the potters of Location 15 were following a mental template for how vessels should be formed and decorated, which resulted in the production of fairly standardized vessels. The relationship between the rim, neck and shoulder diameters of the vessels demonstrated that potters adhered to a particular form when shaping vessels, regardless of the size of the vessel. These findings are similar to Howie-Lang’s (1998) results from the Praying Mantis Site.

Additionally, at these sites, the lip of the vessel was typically flat, while the rim was concave, outflaring, and collarless. Decorative motifs, tools, and techniques were generally consistent across the lip, rim, and interior rim zones of the vessel. Potters demonstrated a strong preference for CWS impressions and oblique motifs for these areas of the pot. The bodies of vessels were either cord-malleated, or smoothed-over cord-malleated. As previously mentioned, where the vessels demonstrated a great deal of variation was in the neck zone of the pot. The elongated neck did indeed serve as a 'canvas' for the potters, who chose a variety of motifs and decorative techniques and tools to embellish this area of the vessel.

Location 9, despite the small sample of pottery recovered, demonstrated similar results. The rim and lip zones of the vessels from Location 9 showed a great deal of consistency, while the elongated neck zone displayed more variation. It seems as though potters of this time considered the neck of the vessel to be an outlet for creativity and variability, while the remainder of the vessel perhaps had to adhere to more standard guidelines, which may have been due to community preferences, or function. The neck zone of the vessel could also represent an area of the pot that was given to novice potters to decorate – hence the variation in motifs. Bowser and Patton (2008:110-111) found that in a community of potters from the Ecuadorian Amazon, girls learn how to decorate pots and bowls by painting those made by their mother, and although the girls have not formed the vessel, it becomes 'hers' because she decorated it. In this community, girls first become skilled at the painting/decorating of vessels before they are required to make and fire pottery on their own. This represents the idea of scaffolding, when a skilled potter will work alongside a novice potter, providing a 'scaffold' for the learner, and extending their skill level (Minar and Crown 2001). The variation in the decoration of the elongated neck could therefore represent the work of multiple individuals collaborating on the same vessel, with skilled potters forming and firing the pot, and novice potters trying out their skills by decorating the 'canvas' of the pot.



A: Bruner-Colasanti; B: Krieger Site; C-D: Dymock Sites (Murphy and Ferris 1990:206)



C-D: Cherry Lane Site (Murphy and Ferris 1990:204)

Figure 15: Examples of Western Basin Younge Phase Pottery

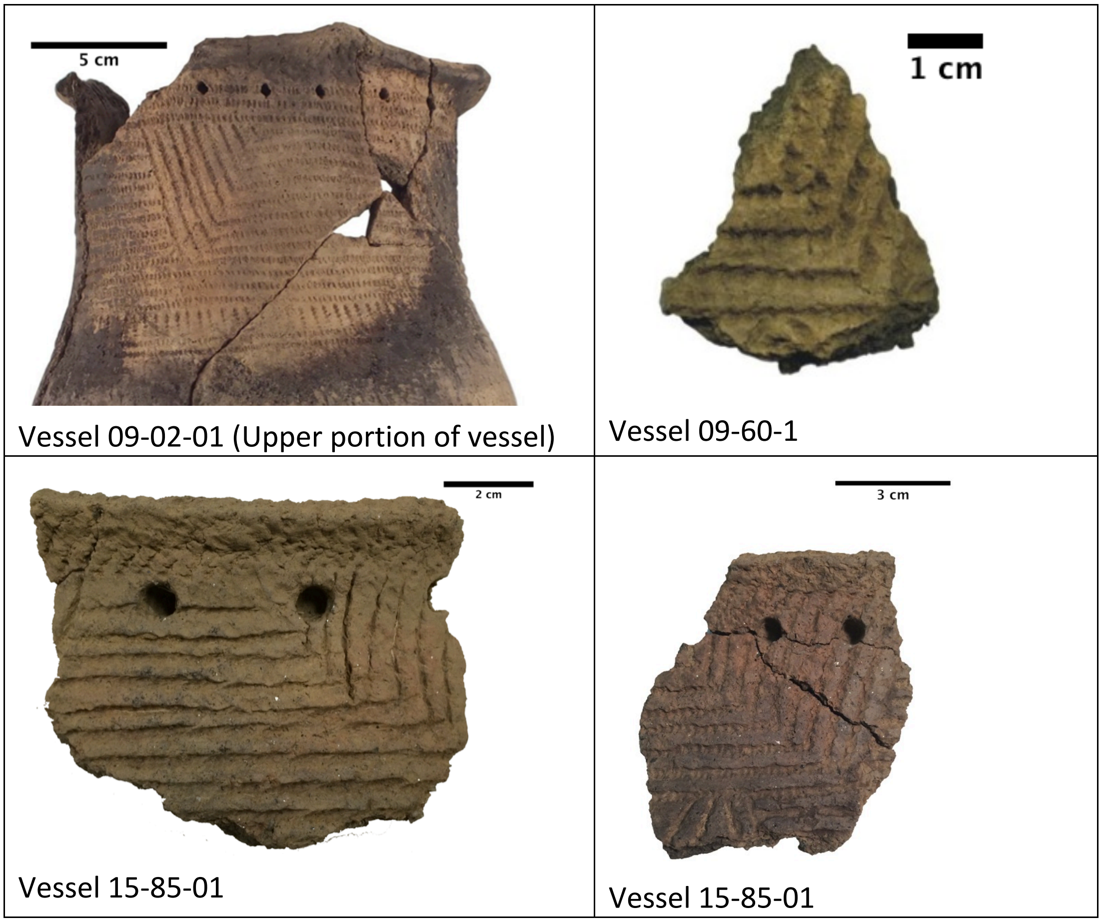
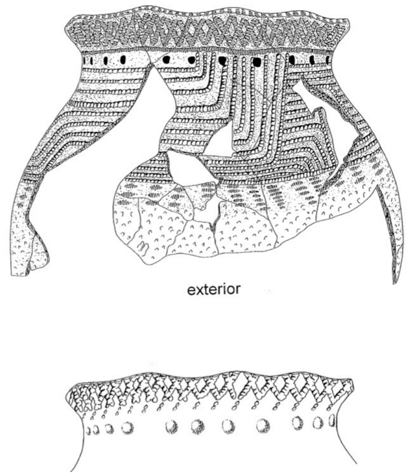
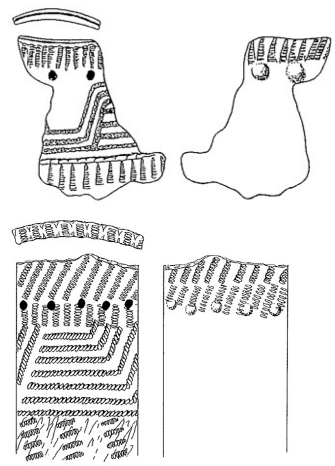


Figure 16: Examples of the Nested-L Motif from the Silvercreek Sites

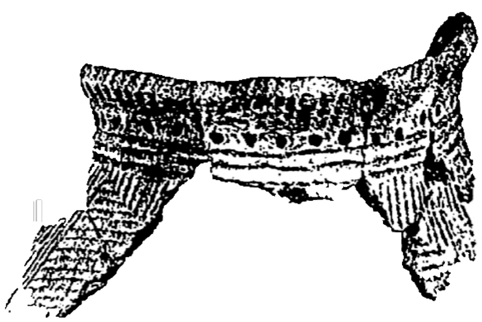
Due to their morphological and decorative characteristics, the Silvercreek Location 15 vessels show similarities to Younge Phase sites to the west, such as Bruner-Colasanti, Krieger, Cherry Lane and the Dymock sites (Figure 15). Additionally, several vessels resemble the earlier Rivière au Vase phase ceramics, with cord-marked exteriors and decoration restricted to the upper rim, in the form of the linear tool-impressed obliques (Murphy and Ferris 1990:196). This finding is consistent with the observation by Murphy and Ferris (1990:199) that Rivière au Vase-like vessels continue to be found on Younge Phase sites, and that perhaps isolated pots of this older style and form persist into the Younge Phase. Other vessels feature the characteristic elongated necks with a variety of motifs, including triangles, plaits, and filled-diamonds, all typical of ceramics from the Younge Phase. In line with Watts' (2006) description of Younge Phase pottery, the Silvercreek pots also had a low frequency of plain lip surfaces, concave rim profiles, a preference toward external punctates, and an affinity for cord-wrapped instruments, as well as linear stamping, and incising techniques.



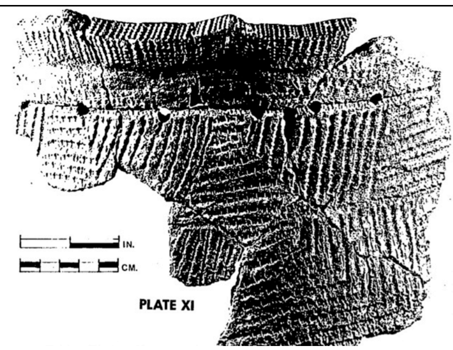
Holmedale Site (Pihl 1999:Fig.A3.4)



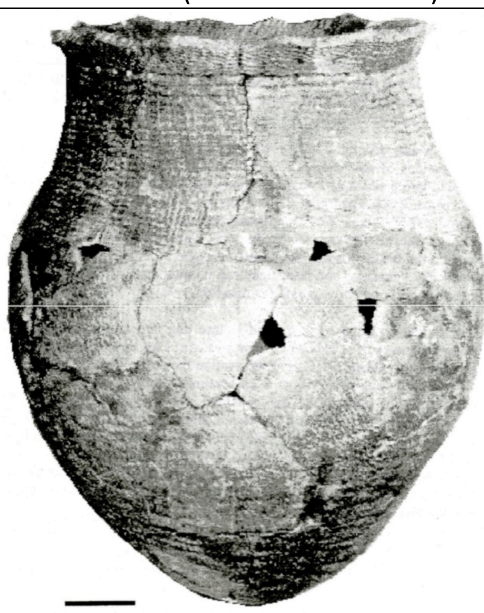
Holmedale Site (Pihl 1999:Fig.A3.3)



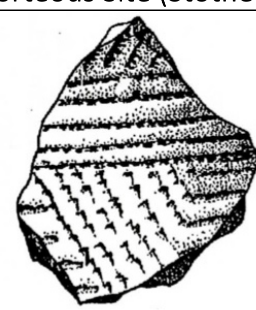
Porteous Site (Stothers 1977:336)



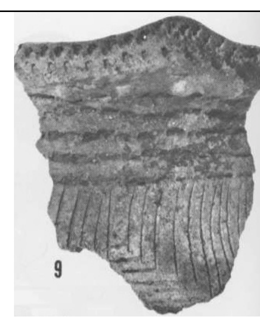
Porteous Site (Stothers 1977:334)



Moyer Flats Site (Fox 2000:3)



Moyer Flats (Fox 2000:10)



Van Besien Site (Noble 1975:72)

Figure 17: Examples of Princess Point and Early Late Woodland Pottery

Many of the vessels from the Silvercreek Location 9, and several from Location 15, display traits that more closely resemble Princess Point-Glen Meyer pottery from sites to the east of Silvercreek, particularly from the Grand River drainage. In particular, there is similarity in the form of a unique motif that could be described as a nested L-shaped or right-angled line design, which is applied through CWS impression or incising (Figure 16). Stothers (1977:79) classified this motif under the category “filled rhombi and opposed open or filled triangles” and recognized these motifs as terminal Princess Point characteristics. This design is noted on vessels from the Holmedale site (Pihl 1999), the Porteous site (Stothers 1977), the Moyer Flats site (Fox 2000), all located in the Grand River drainage, and the Van Besien site (Noble 1975), which is west of the Grand River area, closer to the Silvercreek sites (Figure 17). This motif was noted on three vessels from Location 9 and one vessel from Location 15.

In addition, Silvercreek vessels had predominately flat lip surfaces, typical of Princess Point and Iroquoian vessels (Pihl 1999:40; Watts 2006). For example, Watts (2006:280) found that nearly 96 percent of vessels at the Iroquoian Dewaele site had flat lips, while at the Younge Phase Krieger site only 53 percent had flat lips; the remainder were rounded or pointed. Other ‘Iroquoian’ traits that the Silvercreek vessels often displayed included the presence of interior punctates with exterior bossing, found on 21 percent of Location 15 vessels, and 12.5 percent of Location 9 vessels. Furthermore, the predominance of CWS impressed designs on all zones of the Location 9 and Location 15 pots is also typical of Princess Point ceramics (Stothers 1977:81). Stothers (1977:81) remarked that CWS impression is an important diagnostic of Princess Point wares, which decreases from a 90 percent occurrence in early times to 30 percent during later times (transitioning into the Glen Meyer period). However, it is worth noting that this technique appears to be characteristic of Western Basin *and* Princess Point pottery, which diminishes the temporal and regional significance of this trait. Other motifs, such as tool-impressed obliques on the exterior and interior rims, and even the neck and lip zones, are also not particularly diagnostic, as this trait is noted on Rivière au Vase, Younge, Princess Point and Glen Meyer ceramics.

How can we conceptualize the variation in the Silvercreek assemblages, showing similarities to sites from both the east and the west? I argue that a communities of practice approach, rooted in the notion that people can belong to multiple and overlapping groups of practitioners, provides framework for understanding why clear boundaries do not exist in the archaeological record of this time.

6.1.1 Communities of Practice

In terms of the ceramic variation seen at the Silvercreek sites, both 'Western Basin'-like and 'Princess Point'/'Glen Meyer'-like pots appear across the sites and neither appears to cluster significantly. Therefore, it does not appear that these were necessarily separate occupations at the sites. Moreover, the pottery that has been classified as 'Princess Point'-like, with traits in common with pottery from sites to the east such as flat lips, sub-conoidal base, punctates, nested right-angled line motifs and a preference for CWS impressions appear to be morphologically "Western Basin" in vessel form, given their elongated necks, and concave rim profiles.

Many researchers have suggested that the similarities in pottery seen during this period are indicative of the high levels of social contact that groups maintained during this time, and have conceptualized this period of transition between the Middle and Late Woodland as a time of high levels of social interaction, with exchange and communication between distant groups a common occurrence (Cappella 2005; Curtis 2004). Crawford and Smith (1996:787) have postulated that maize may have entered the Great Lakes during this transitional period, as cultigens were transferred "across a frontier" between hunter-gatherers and farmers. Perhaps the ceramics from this time period support this idea, and demonstrate that at the same time as cultigens were exchanging hands, so too were ideas on how to decorate a pot. The Transitional Woodland and early Late Woodland in this region could be conceived of as a time of the rapid sharing of ideas, cultigens and material culture, not altogether distinct from the Middle Woodland Period that preceded it; which has been characterized by the highly mobile lifestyle of Great Lakes hunter-gatherer groups.

As Curtis (2014:154) explains, making and decorating a pot is a learned skill that involves social interaction, and the sharing of knowledge. Potters may only need a single exposure to a motif or technique in order to add this to their repertoire, and could easily change their style through imitation or experimentation (Curtis 2014:154). Western Basin potters, who may have been more mobile throughout the year than Princess Point/Glen Meyer groups, would have been exposed to a wider variety of styles and forms of pots, which may have influenced their own pottery production.

As previously mentioned, however, social interaction can often result in *differences* in material culture (Davis 1990), and material culture should be viewed not just as carrying information about a social group (Hodder 1991) but as carrying information about the individual potters themselves. There exists infinite options for decorating a pot, therefore we can assume that when certain styles are repeated across time and space, this can indicate the preferences of a potter or community.

The distribution of ceramic attributes at both Location 9 and Location 15 suggests that multiple communities of practice may be at play, with potters forming and decorating vessels that reflect both eastern and western patterns. This might be a reflection of informal and non-fixed post-marital patterns, with potters learning the form or decorative preferences of one community and continuing some of these traditions after they relocate to other communities later in life. Potters may have continued to use motifs and techniques from their natal communities in the Grand River region to the east, while forming the vessel in a manner more in line with western practices. The vessel form, with its elongated neck as a distinguishing characteristic, may represent one community of practice, while CWS impression, interior punctates with exterior bossing, and flat lips all hint at another community of practice. Given the immense variation exhibited on the neck zone, the neck may have provided potters with an area of the vessel where they had creative freedom to choose based on their own preference – perhaps that of the community of practice in which they had learned potting. This is an alternative explanation to the previously proposed idea that novice potters may have decorated the necks of pots as a form of scaffolding during the learning process.

Forming the vessel to determine its shape may have been one step in the operational sequence of pottery production where community practices were more standard, with an outflaring, concave rim, tall neck, and sub-conoidal base preferred for the functional benefits these attributes provide. Vessel form, in particular, would be important for a community since cooking vessels would need to suit the needs of the inhabitants depending on the season, subsistence patterns, and mobility. The variation in neck decoration could also be the result of multiple generations of potters working on the same vessel, with vessel form staying more consistent, while decorative and stylistic choices changed depending on the age of potters, or the community that they learned their craft in.

6.1.2 Juvenile and Miniature Vessels

Juvenile vessels, as previously discussed, were recognized on the basis of several traits, including their small size, application of motif/design, poorly made or ‘lumpy’ appearance, and a lack of more challenging decorative features (e.g., castellations) or use-wear (Table 8). Miniature vessels were also recognized on the basis of their small size, however were generally more skillfully made and decorated, with a wall thickness that was thinner and more even, exhibited more challenging decorative techniques and features, and often showed evidence of use-wear. The remainder of vessels, labeled ‘adult’ vessels for the purposes of this discussion, were similar to miniature vessels in form, decorative techniques and elements, and evidence of use-wear, but were much larger, with rim diameters ranging from 6 cm to 40 cm (Appendix D, Table D51).

The high number of juvenile and miniature vessels at the Silvercreek sites provides an opportunity to gain insight into learning and practice at an early Late Woodland site in southern Ontario. As previously mentioned, many of the vessels that were originally categorized as ‘juvenile’ might be more appropriately labeled ‘miniature’ vessels, since although they are small in size, they are either well-made (e.g., consistent wall thickness), demonstrate sophisticated decorative techniques (such as punctates with corresponding boss, or castellations), and/or feature evidence of use as cooking vessels, such as fire sooting or carbon encrustation (Table 8). These miniature vessels therefore appeared to be intermediate between juvenile and adult vessels, perhaps representing the work of more advanced student potters or even skilled potters. They may represent vessels that functioned for other purposes (e.g., storage of small quantities of goods) or could have been used as serving vessels, as they would have been easier to handle than the large adult vessels, which were likely used for cooking and serving. For a comparison between the attributes of juvenile, miniature and adult vessels from Location 15, see Appendix D, Tables D51-D60.

Table 8: Criteria for Juvenile vs. Miniature Classification

Attribute	Juvenile	Miniature
Rim Diameter	<6cm	>6cm (sometimes smaller)
Neck Diameter	<5cm	>5cm (sometimes smaller)
Body Wall Thickness	>6.5mm	<6.5mm
Temper	No temper or very small mineral inclusions	Evidence of added temper (minerals 0.5 mm to as large as 6.0 mm)
Manufacture	Clear evidence of pinching as manufacturing technique	Manufacturing technique difficult to determine (pinching or other)
Rim Profile	Outflaring	Out-Flaring or Straight
Surface Treatment	Cord-malleated	Cord-malleated or smoothed
Decorative Techniques	Plain, Incised, Linear Stamping, Corded, CWS	Plain, Incised, Linear Stamping, Corded, CWS
Motifs	Plain, Horizontals, Obliques	Plain, Horizontals, Obliques, Hatched
Punctates	Absent	Sometimes present with corresponding bossing
Castellations	Sometimes present	Sometimes present
Use-Wear Evidence	Exterior Fire Sooting, Carbon Encrustation common	Exterior Fire Sooting, Carbon Encrustation common

When body sherd data (i.e., vessels with no corresponding rim or neck sherds) are included, 11 juvenile vessels and 11 miniature vessels were identified from Location 15. All of the juvenile vessels and one miniature vessel appear to be pinch pots, based on their size, uneven wall thickness and/or evidence of 'pinch' marks in clay. All of these vessels were recovered from Cluster 2 at the site, with the exception of one juvenile vessel from Cluster 3 and one miniature vessel from Cluster 1. This means that 20 juvenile/miniature vessels were recovered from Cluster 2, which is consistent with the spatial analysis of Location 15, which identified this area as a 'hot spot' for juvenile vessels.

These juvenile and miniature vessels indicate that despite the relatively small size of the pots, importance was still placed on the decorative and stylistic elements of pottery. Novice potters were still decorating their vessels with a variety of motifs and techniques, with juvenile vessels displaying minor decoration and surface treatment, such as incised lines or cord-malleated surfaces, and miniature vessels more sophisticated techniques, such as stamped horizontals, incised obliques, and circular or oval punctates.

The differences in clay pastes between juvenile and adult vessels suggest that in some aspects of pot-making, children were not being included within the same community of practice. At Location 15, a total of five juvenile vessels (when body sherd data is included) and four miniature vessels were formed using a paste that included no added tempers, a recipe not observed for any of the adult vessels. The remainder of juvenile and miniature vessels were formed with pastes that included small sized minerals of black, gold, white and pink colour, which may have been naturally occurring in the clay, or may have been added. Untempered or poorly tempered clays were commonly used for juvenile vessels during the Late Woodland Period of Ontario (Braun 2012:2). Novice potters may have been given clay prior to mineral tempers being added since pots would either have not been used or not used regularly for cooking (and thus would not require the same functional properties), or perhaps because it was easier for children to work with clay that did not have crushed minerals added. The youngest pottery apprentices may have been excluded from the main group of practitioners, and perhaps were only given clay to keep busy while their caregivers were making vessels for the community to use.

Braun (2012:4) found that untempered clay was exclusive to juvenile vessels in his petrographic analysis of the Antrex site ceramics, and he suggested that experimentation with paste recipes might have been part of the learning process. Ethnographic examples from the American Southwest indicate that girls began experimenting with clay and pottery as young as five years old, with children first being given a lump of clay for play purposes, and over time, by watching and imitating elders, volunteering to grind temper, and being corrected on their attempts, students would become experienced potters (Kamp 2001:430). Kamp (2001:430) suggested that craft learning would have been sequential, and beginners may have started out by taking part in the easier aspects of pot making, such as the collection and preparation of raw materials (i.e., clay, temper) before moving on to the more technical aspects of pot manufacture. Kamp (2001:433) also pointed out that novice potters might have had less access to raw materials, particularly those of high quality. These ethnographic examples suggest that novices would not consistently have had access to tempering materials, or perhaps would have had to refine their skills before taking on another step in the manufacturing process. Alternatively, smaller pots may not have required added temper, as the paste would have been easy to work into a small vessel, or because the pots would not have required the same thermal properties as a larger cooking vessel. Small pots could also represent trial attempts at certain paste recipes, which also could account for differences in the temper between small and large vessels.

Claassen (2002) has argued based on her work on the archaeology of the Woodland Period of the Midwestern United States that a ‘time-management crisis’ resulted from the addition of new activities that women were responsible for, including horticulture and pottery production. She argued that the work involved with pottery manufacture, cultivating and harvesting crops, food processing, and child rearing, created increased labour demands for women during the Woodland Period (2,600-1,100 years ago in the Midwest) of this region (which corresponds roughly to the Transitional to early Late Woodland Period in southern Ontario in terms of plant domestication and cultivation activities [Crawford et al. 1998]). One of the ways in which women may have attempted to lessen their workload, she argued, is to incorporate children into these activities, and increase their responsibilities. Claassen (2002:228-230) argued that this may have involved children caring for younger siblings or becoming involved in the cultivation, gathering, and processing of food resources, however, it also may have been the case that children were now required to learn the craft of pot-making much earlier in life. It is possible that this transitional time for women that Claassen described, with their workloads increased, and children needing to learn a craft earlier in order to help women manage these new demands, is reflected in the early Late Woodland Period of southern Ontario.

The high number of juvenile vessels found at both Silvercreek sites could speak to this incorporation of children into the community of pottery production at an earlier age, particularly as the cultivation of plants and the manufacture of pottery increased. At Location 15, 11 juvenile vessels and 11 miniature vessels were recovered, which is a high number relative to the overall number of vessels identified. Assuming that the pots were made at this site, Location 15 appears to represent an important place for pottery learning and practice. At Location 9, eight juvenile vessels were recovered, meaning juvenile vessels accounted for one-third of all identified vessels at that site.

Interestingly, there may in fact have been important contributions to the Silvercreek communities from these novice potters. Although the majority of juvenile and miniature vessels at Location 15 did not display evidence of use-alteration, a total of five juvenile and three miniature vessels did display black encrustation on the interior and/or exterior of the vessels. It would be expected that if the juvenile/miniature vessels were produced as playthings, or even serving vessels, they would display no evidence of carbon encrustation. However, finding evidence of encrustation on vessel surfaces suggests that the work of these novice potters was being utilized for cooking/boiling foods. It appears that the pots made by learners were not just for practice, but also they were being incorporated into daily life at the Silvercreek sites. Ethnographic evidence supports the idea that small pots made by novice potters are also used while children learn how to cook (Kamp 2001:429). Therefore, it is possible that these vessels not only represent the work of novice potters learning how to make pots, but also learning and practicing to cook with these vessels. This again could indicate the changing roles of children as they began to take on more responsibilities at the site, perhaps to alleviate the workload of women. Many of the well-made miniature vessels could also have been constructed by more seasoned potters to function as smaller cooking pots.

6.2 Settlement Patterns

The large pit features, which comprise the settlement patterns at the site, most likely represent storage pits that were dug inside of structures, perhaps housing structures. This is suggested by the circular/oval pattern of several of the feature clusters, and as the reports by TMHC concluded, the fact that storage facilities would have been safer and drier within structures. At Location 9, it is likely that clusters 1, 2, 4 and 5 represented house structures, as these clusters all consisted of several pit features of roughly the same size, organized in an oval pattern (Figures 11-12). Cluster 3 was likely outside of the structures, and may have been an activity area, although none of the artifact types were found to significantly cluster there. At Location 15, clusters 1 and 2 are the best evidence for structures due to their overall shapes and sizes, and as determined by the spatial analysis of artifact types, they might represent two different types of structures (Figures 13-14). Cluster 2 was likely used for more domestic activities, such as cooking, food storage, children's activities, and hide-working, while Cluster 1 could have been used for more spiritual or political purposes, as indicated by the clustering of pipe fragments. Clusters 3, 4 and 5 were likely external activity areas, as concluded in the TMHC report, or smaller structures. The majority of pit features could have been originally used for the storage of dry food resources and then filled with refuse prior to the site being abandoned.

Unfortunately, while direct cross-mends were possible within feature clusters at Location 15, only inferred cross mends could be made *between* feature clusters. Two vessels from Location 15 had inferred mends between clusters 2 and 3 (V15-86-1 and V15-53-1), and another vessel between clusters 1 and 2 (V15-57-1). The remainder of vessels had sherds recovered exclusively from the same feature cluster. At Location 9, no vessels mends were found between feature clusters. Therefore, it is entirely possible the feature clusters represent separate episodes of occupation, with some vessels simply showing similarities to vessels from other occupations at the site. However, at Location 15 a total of 30 identified vessels, out of a total of 56 from the entire site, were recovered from Cluster 2. In this case it is possible that the feature clusters *do* represent the same occupation, with little evidence of simultaneous occupation (i.e. ceramic mends) due simply to the differing use of space across the site.

The settlement patterns, largely ephemeral in nature with very little evidence for post molds perhaps due to preservation issues or the temporary nature of structures, do seem to indicate that the groups visiting these sites did so during a seasonal round. This is very much in line with the settlement patterns described by Murphy and Ferris (1990) for Western Basin groups (discussed in Chapter 2), and the sites are very similar to other recorded sites to the west, particularly Bruner-Colasanti in Essex County. The Bruner-Colasanti site was also defined by large pit features clustered in circular or oval patterns, with very little evidence of post molds. Although the possible house structure feature clusters at Bruner-Colasanti each occupied approximately 100 to 150 m^2 at the Silvercreek sites the clusters were much smaller, only measuring roughly 30 to 40 m^2 for Location 9 and between 40 to 80 m^2 for Location 15. The Silvercreek sites may have been occupied by smaller groups, for shorter durations, or do not represent multiple occupations in the same way that larger sites such as Bruner-Colasanti might. Location 15 provides the best evidence for multiple occupations, since it is the larger of the two sites, and has over five times the number of artifacts recovered (Table 1). Although Location 15 was entirely excavated, unlike Location 9, this is still a large discrepancy in artifact density, given that the same number of features (n=49) was found on each site. Location 15 also appears to have several overlapping pit features, further evidence that the location received more continued use over a longer period of time.

Despite the mobile lifestyle of the groups that resided here, pottery was still a large part of the community structure, and in many ways was manufactured in a standardized manner. A mobile lifestyle, heterogeneous ceramics, and informal post-marital patterns have typically been seen as traits that co-vary. The Silvercreek sites indicate that the practice of pot-making, including ideas about how to make a pot, was in fact firmly rooted in these communities. Particularly at Location 15, the morphology of vessels, and the decorative techniques, tools, and motifs chosen by potters were consistent across vessels, with some variation in the decoration of the neck zone. In terms of paste, potters used about 10 different recipes. This is on par with other sites dated to this time period, such as the Van Besien site, a Glen Meyer village with a large assemblage of pottery. Schumacher (2013:67-68) found that potters at Van Besien used 10 paste recipes, with various pink, white, gold, black and red inclusions, as well as one recipe that contained no temper, similar to the Silvercreek sites. It appears that pottery played a large role in the lives of the Silvercreek inhabitants, despite their mobile lifestyle, which likely still involved a seasonal round based on the somewhat ephemeral nature of the settlement patterns.

6.3 Future Directions

Archaeologists have created useful, albeit problematic constructs to define social boundaries in the archaeological record, and have often viewed similarities in material culture solely as evidence of interaction between groups. Although ethnicity has been discussed at length in the archaeological literature, and the existence of historically known ethnic groups have been argued to extend into the Late Woodland period, sites such as the Silvercreek locations remind us to be cautious when equating material culture with group boundaries and ethnicity.

The fact that the Silvercreek vessels display similarities to sites both to the west and east is perhaps not surprising given the geographic location of the two sites, situated between two archaeologically defined ‘groups’. This pattern illustrates an important point. As previously discussed, many archaeologists have advised against relying on the cultural-historical approach to ceramics to identify past cultural/ethnic groups, given that these categories are often arbitrary distinctions, and that equating attributes such as rim sherd decoration to cultural or ethnic identity is problematic. The emphasis on culture-histories during ceramic analysis has also meant that other aspects of pottery are overlooked, such as the role it played in past people’s lives, and the manufacturing, social, technological and ritual systems involved (Martelle 2002:11-12).

The communities of practice approach is important because it considers that potters (likely women) were maintaining stylistic or manufacturing traditions of their craft, even as they moved between communities, and across the landscape. It reminds us that people move across the land and carry with them both conscious and unconscious dispositions that were formed through situated learning. Suzanne Eckert (2008:2) outlines the following definition for communities of practice in her research on 14th century Pueblo potters in New Mexico, however I believe it can be applied here:

> Communities of practice are social networks in which… potters learn their craft from other women in the community… these communities are defined by a shared history of practice and not by spatial constraints. Due to migration, marriage, and other forms of social movement, multiple communities of practice can exist within a given village, while a single community of practice can crosscut multiple villages.

Rather than viewing pottery as representing one group over another, the similarities in ceramics throughout the Great Lakes during this time period can be seen as indicating high levels of social interaction, as well as overlapping communities of practice, in which potters moved across the landscape and continued their craft traditions in a new community. By focusing on attribute analysis, and those traits that change over time and space, archaeologists can understand changes in subsistence, social organization, and how pottery production was organized. By examining where ceramic attributes cluster on the landscape, we can reconstruct those practices and traditions that were firmly rooted in a community, and trace where these appear in other regions. In this way, we can understand the variation and similarities in pottery during this time, and begin to recognize the more fluid nature of group boundaries in the archaeological record.

In this region of southern Ontario, there appears to be no clear boundary between the Transitional and early Late Woodland Period. It may be that groups were re-occupying these sites throughout several generations, which is reflected in the presence of the earlier vessels at the sites. The Silvercreek sites showed a range of temporal and regional traits in their material culture and settlement patterns. Groups appeared to be living seasonally at the sites, and based on faunal and floral evidence, may have been at the sites to harvest nuts in the fall. Evidence of maize kernels indicates that the occupants were practicing cultivation, or were trading with nearby agriculturists. Juvenile potters were active participants in pot-making, perhaps an indication of the changing roles of women as pottery production and plant cultivation demanded more of their time, requiring them to incorporate children into the community of practice. Pots were being used for boiling and cooking activities, and potters were constructing the vessels to perform optimally for these tasks. Even after a pot was no longer useful for cooking activities, it may have been utilized to store dry food resources, perhaps maize or nuts. Large pits at the sites further suggest that storage was a concern of the Silvercreek inhabitants.

Given the important role that pottery plays in reconstructing the past landscape of southern Ontario, it is important that archaeologists move beyond questions of rigid group boundaries when looking at variability and similarities in ceramics. While decorative and stylistic elements *are* important in demonstrating changes over space and time, there are numerous other attributes that should not be overlooked, and Ontario archaeologists should look to ceramicists elsewhere to understand aspects of pottery such as manufacture, firing, primary and secondary functions, and disposal. In particular, by examining the technological decisions of potters, ceramic studies will highlight the dynamic and innovative roles of past potters. Pottery played a key role in the lives of people in the past, and as archaeologists, it is important that further studies in southern Ontario address a wide range of attributes, in order to expand our knowledge on both pots *and* potters.

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Appendices

Appendix A: Glossary

Band – Refers to a line of decoration on the rim, neck or sometimes shoulder of the vessel.

Bosses – Raised bumps on the interior or exterior of the vessel rim; usually lie opposite of punctates.

Castellation – "[A] raised projection that extends upwards from the rim of a ceramic vessel" (Curtis 2004:45).

Coiling – Building up prepared clay coils to form the walls of a vessel, smoothed over by hand or through the use of a tool (Sinopoli 1991:17).

Collar – "[A] thickened band of clay that encircles the vessel orifice… found just below the lip on the external surface of a vessel" (Martelle 2002:531).

Cord-Malleated – The surface of the vessel has been beaten with stick or paddle wrapped with a cord. Also referred to as cord-roughened or cord-marked.

Cord-Wrapped Stick (CWS) Impressed – A decorative technique where the surface of the vessel is impressed using a stick that has been wrapped with a cord.

Dentate – The use of a toothed tool to mark the surface of a vessel (Howie-Langs 1998:32).

Incised – The use of a sharp tool to draw across the surface of a vessel (Howie-Langs 1998:32).

Laminar Fracture – A stepped breakage pattern, which Rye (1997:205) argued may result from the "strong compression of the fabric."

Linear stamped – The use of linear object to impress the surface of a vessel.

Molding – A forming technique that involves firming pressing clay into/over a mold, e.g., a fired clay vessel or basket (Rye 1981:81).

Motif – A repeated pattern or design, usually found on the inner rim, outer rim, lip, neck or occasionally the shoulder of a vessel.

Paddle and Anvil – A finishing technique involving the use of a stone or ceramic anvil inside the vessel and a paddle applied directly opposite to anvil, on the exterior surface (Sinopoli 1991:23).

Pinch-Pot – "Made by holding a ball of clay in one hand and shaping it with the other by making a hole in the center and then thinning the vessel walls by drawing the clay out from the base with thumb and forefingers" (Sinopoli 1991:17).

Plaits/Plats – "A series of short parallel lines usually running down the vessel neck at an angle oblique to the upper rim of the vessel and interrupted by intervening undecorated spaces" (Timmins 1992:270). For a visual depiction see Watts (2006;Figure 7).

Punctates – Fairly deep circular or crescent shaped impressions in the vessel, usually on the exterior of the rim. Usually lie opposite to bosses.

Push-Pull – The use of a blunted or pointed instrument in a "push-pull" motion across the surface of a vessel (Howie-Langs 1998:32).

Repair (or Mending) Holes – Holes drilled on either side of a crack that formed in the wall of the vessel; a fibre would have been pulled through these holes to close the crack.

Scalloped – Continuous modification of the lip (Curtis 2004:47), appearing as a series of rounded projections.

Slab – Forming a vessel by pressing flat slabs of clay together and joining together by hand or through the use of a tool.

Stamping – Pressing a tool into the clay to create a design.

Trailing – Use of a flat tipped tool, dragged across surface (Howie-Langs 1998:32).

Appendix B: Ceramic Diagrams

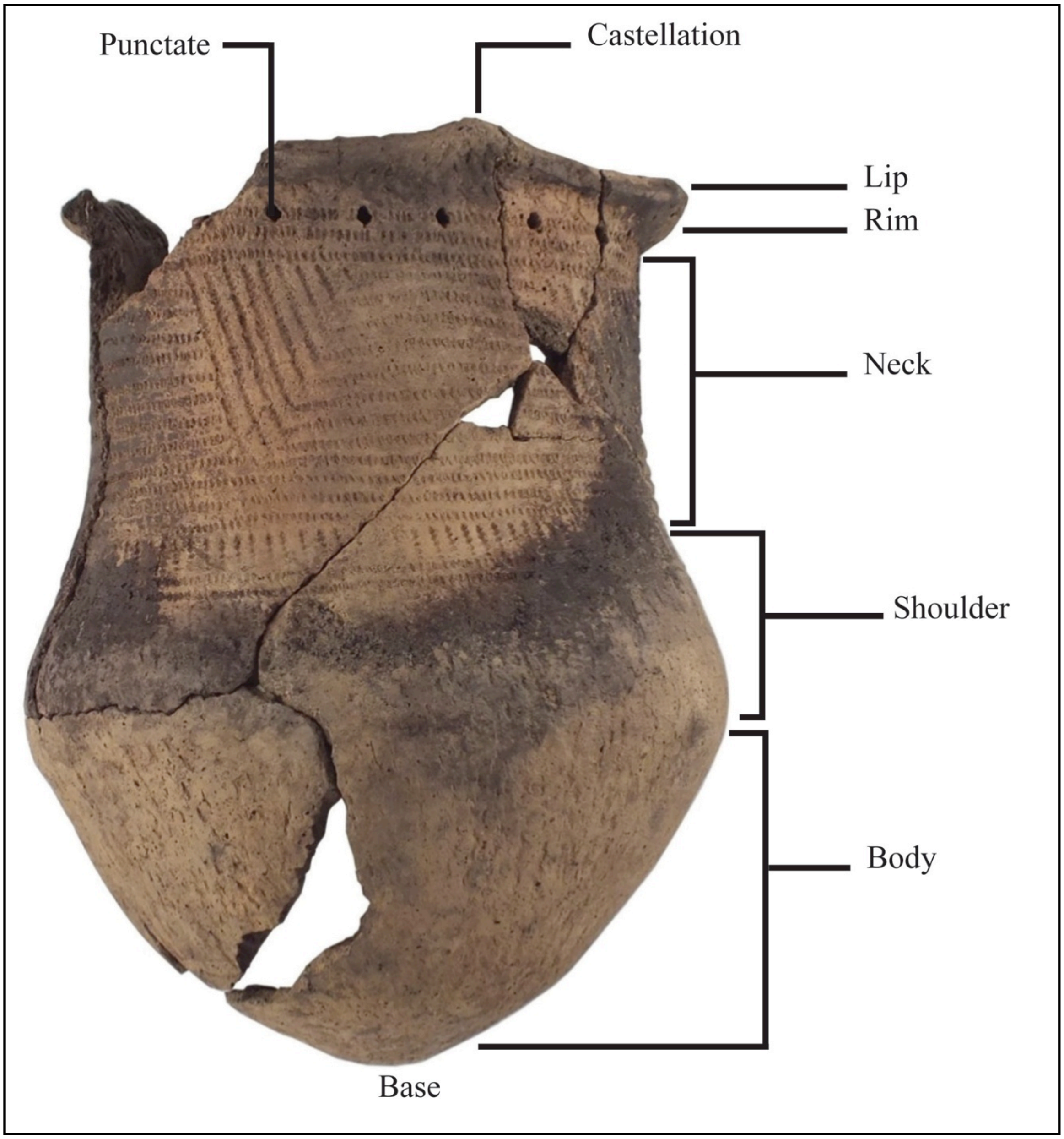

Figure 18: Vessel Form (Vessel Photograph: TMHC 2013a)

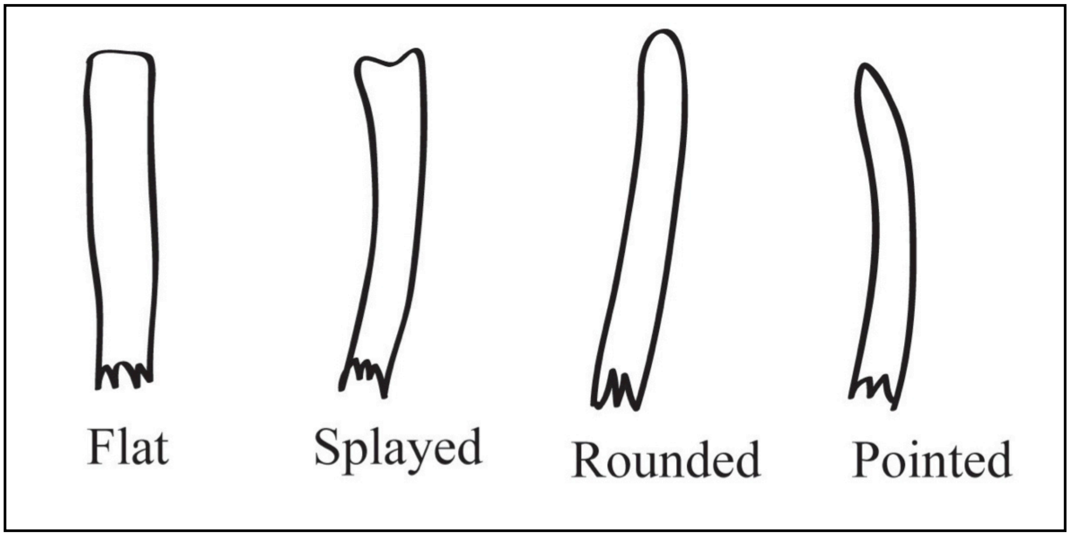

Figure 19: Lip Form

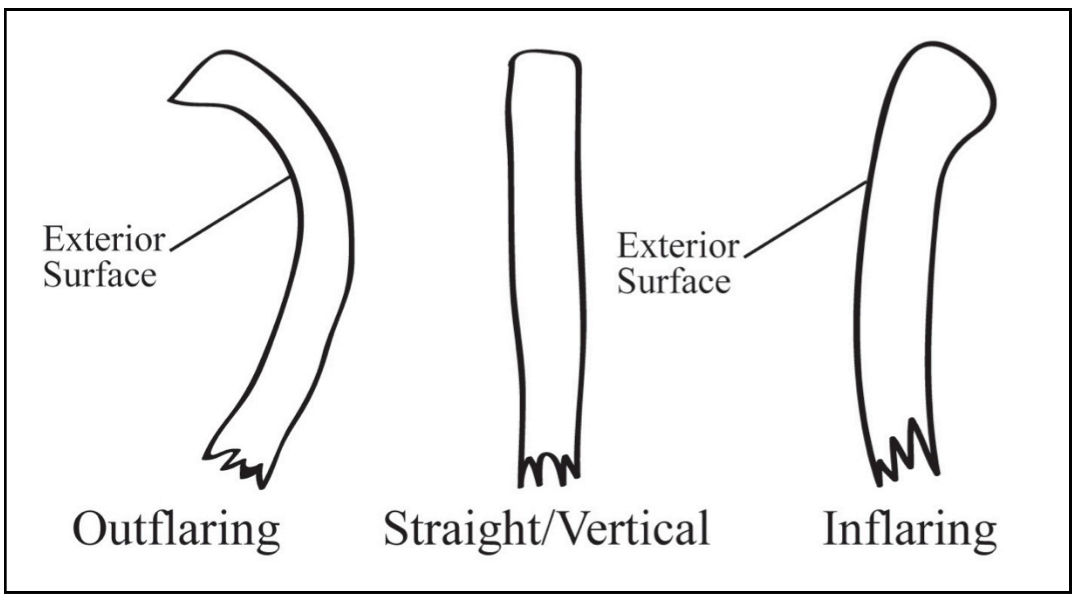

Figure 20: Rim Orientation

Appendix C: Detailed Attribute Tables

Manufacture-Related										
Surface Colour	1=Black	2=Dark, Grey	3=Dark, Brown	4=Dark, Reddish	5=Medium, Grey	6=Medium, Brown	7=Medium, Reddish	8=Light, Grey	9=Light, Brown	10=Light, Reddish
Interior Colour	1=Black	2=Dark, Grey	3=Dark, Brown	4=Dark, Reddish	5=Medium, Grey	6=Medium, Brown	7=Medium, Reddish	8=Light, Grey	9=Light, Brown	10=Light, Reddish
Colour, Profile (interior-core-exterior)	1=Homogenous Black	2=Homogenous Grey	3=Homogenous Brown	4=Homogenous Red	5=Light Exterior, Dark Core, Dark interior	6=Light Exterior, Light Core, Dark Interior	7=Light Exterior, Dark Core, Light Interior	8=Dark Exterior, Light Core, Dark Interior	9=Dark Exterior, Dark Core, Light Interior	
Temper Size (Figure A.4 Orton & Hughes)	0.5 to 1.0	0.5 to 2.0	0.5 to 3.0	0.5 to 4.0	0.5 to 5.0	0.5 to 6.0	0.5 to 8.0	0.5 to 12.0		
Temper Type	White (Semi-translucent)	White (dull)	Pink	Gold	Black	Grey	Red-Brown			
Temper Notes	Angularity	Density	Sorting							
Manufacture	Coil Break (Flat/Smooth Appearance)	Unsmoothed Coils	Laminated Break/Laminar Fracture							

Morphological								
Rim Form/Shape	Collar	Collarless	Incipient Collar	Indeterminate				
If yes (collar), collar profile	Straight	Triangular	Square	Expanded	Wedge	Hourglass	Bulging	Indeterminate
If yes (collar), collar height (mm)	Length of the collar from the lip to the inflection point (or neck), measured with electronic calipers							
Rim Orientation	Out-Flaring	In-Flaring	Straight/Vertical	Indeterminate				
Upper Rim Profile	Convex	Concave	Straight	Indeterminate				
Lip Form	Flat	Rounded	Pointed	Toothed	Deep Notches	Scalloped	Splayed	Indeterminate
Lip Thickness (mm)	Thickness of the vessel lip, measured with electronic calipers							
Neck Length (mm)	Length of the neck zone (point of maximum constriction where the contour of the vessel changes direction), measured with electronic calipers (Howie-Langs 1998)							
Rim Diameter (Orifice Diameter) (cm)	Diameter of the vessel where the lip intersects a horizontal plan, measured using a diameter board, taken from the interior wall (Howie-Langs 1998)							
Neck Diameter (cm)	Diameter of the vessel where the inflection point intersects a horizontal plane, measured using a diameter board, taken from the interior wall (Howie-Langs 1998)							
Shoulder Diameter (cm)	Diameter of the vessel where the shoulder (point of maximum diameter on the body) intersects a horizontal plane, measured using a diameter board, taken from the exterior wall (Howie-Langs 1998)							
Rim to Neck Height (mm)	Length of the exterior rim zone, from the lips to inflection point of the neck, measured with electronic calipers. If castellation present, uncastellated portion of rim was measured.							
Rim Wall Thickness (mm)	Thickness of the rim, measured with electronic calipers, taken about 10mm below the lip.							
Neck Thickness (mm)	Thickness of the neck, measured with electronic calipers							
Body Wall Thickness (mm)	Thickness of the body zone (portion of the vessel between the shoulder and base), measured using electronic calipers, taken from sherds or an area of the vessel where thickness appeared consistent							
Internal Shape	Convex	Straight	Concave	Sinuous				
Additional Notes	Includes other attributes such as base form, if surface is porous, if exterior or interior surface is missing, if mending hole/open punctates present, etc.							

Use-Related							
Exterior Use Wear	Fire Sooting	Abrasion or Pitting	Attrition - Pedestaled Temper	Absent	Combination	Indeterminate	
Interior Use Wear	Fire Sooting	Abrasion or Pitting	Water Line	Attrition - Scraping/Scratc hes	Absent	Combination	Indeterminate
Residue	Light Grey	Red, Pink or Orange (possibly from hematite - red ochre)	Black Resinous	Black Encrustation (Carbon Encrustation)	Combination	Indeterminate	Absent
Mend Hole	Presence	Absence					

Decorative	
Decorative Complexity	
# Exterior Bands of Decoration	Number of bands on the exterior of the vessel (rim, neck and shoulder zones)
# Exterior Motifs	Number of motifs on the exterior of the vessel (rim, neck and shoulder zones)

Decorative Tool - See Watts 2006:Figure 5: Record for Lip, Interior Rim, Exterior Rim, Neck, and Shoulder Zones

Tool	Plain	Linear (Straight)	Linear (Curved)	Linear (Wavy)	Linear (Suture)	Pointed (Round)	Pointed (Elliptical)	Pointed (Polygonal)	Pointed (Annular)	Cord	Cord Wrapped Instrument	Dentate (Polygonal)	Dentate (Round)	Combinati on

Decorative Technique - See Watts 2006:Figure 6: Record for Lip, Interior Rim, Exterior Rim, Neck, and Shoulder Zones

Technique	Plain	Linear or Annular Stamped	Cord-Wrap-Stick Impressed	Corded	Push-Pull	Incised	Fingernail-Impressed	Indeterminate

Decorative Motif/Design - See Watts 2006:Figure 7: Record for Lip, Interior Rim, Exterior Rim, Neck, and Shoulder Zones

Motif	Plain	Simple	Opposed	Horizontal	Hatched	Punctate	Notched	Oblique	Vertical	Intersecting Obliques	Filled-Triangles	Plaits	Filled-Diamonds	Right Angle or 'Nested L-Shapes"
Punctate	Absence	Partial	Presence without corresponding exterior boss	Presence without corresponding interior boss	Presence with corresponding interior boss	Presence with corresponding exterior boss								
Punctate Form	Oval	C-Shaped	Circular	Square										
Castellation (rounded or pointed)	Absence	Presence with continuous decoration	Presence with a punctate face or inverted face	Indeterminate										
Exterior Surface Treatment/Modification	Smooth	Wiped	Textured corded or fabric impressed	Fabric Impressed	Cord	Cord-Malleated - Random/Rounded	Cord-Malleated - Linear	Smoothed over Cord-Malleated	Combing	Scratched/Incised	Stamped	Cord Wrapped Stick	Indeterminate	
Interior Surface Treatment/Modification	Smooth	Wiped	Textured (corded or fabric impressed)	Geometric (basket impressed)	Combing	Indeterminate								

Appendix D: Ceramic Data

Note: Tables D1-D50 provide data on complete sample (including juvenile, miniature and adult vessels).

Manufacture-Related

Table D1: Interior Colour (Location 15)

Location 15	N	%
Black	12	21.43
Dark Grey	4	7.14
Dark Brown	21	37.50
Dark Reddish	0	0.00
Medium Grey	2	3.57
Medium Brown	4	7.14
Medium Reddish	4	7.14
Light Grey	0	0.00
Light Brown	8	14.29
Light Reddish	1	1.79
Total	56	100.00
Dark (includes black)	37	66.07
Medium	10	17.86
Light	9	16.07
Total	56	100.00

Table D2: Colour Profile (Location 15)

Location 15	N	%
Homogenous Black	4	7.14
Homogenous Grey	1	1.79
Homogenous Brown	16	28.57
Homogenous Red	1	1.79
Light Exterior, Dark Core, Dark interior	30	53.57
Light Exterior, Light Core, Dark Interior	1	1.79
Light Exterior, Dark Core, Light Interior	3	5.36
Dark Exterior, Light Core, Dark Interior	0	0
Dark Exterior, Dark Core, Light Interior	0	0
Total	56	100.00

Table D3: Colour Profile (Location 9)

Location 9	N	%
Homogenous Black	0	0.00
Homogenous Grey	0	0.00
Homogenous Brown	14	58.33
Homogenous Red	1	4.17
Light Exterior, Dark Core, Dark interior	4	16.67
Light Exterior, Light Core, Dark Interior	1	4.17
Light Exterior, Dark Core, Light Interior	1	4.17
Dark Exterior, Light Core, Dark Interior	0	0.00

Location 9	N	%
Dark Exterior, Dark Core, Light Interior	1	4.17
Indeterminate	2	8.33
Total	24	100.00

Table D4: Interior Colour (Location 9)

Location 9	N	%
Black	0	0.00
Dark Grey	0	0.00
Dark Brown	2	8.33
Dark Reddish	0	0.00
Medium Grey	0	0.00
Medium Brown	5	20.83
Medium Reddish	0	0.00
Light Grey	1	4.17%
Light Brown	9	37.50
Light Reddish	4	16.67
Indeterminate	3	12.50
Total	24	100.00
Dark (includes black)	2	9.52
Medium	5	23.81
Light	14	66.67
Total	21	100.00

Morphological

Table D5: Lip Form (Location 15)

Location 15	N	%
Flat	28	50.00
Splayed	9	16.07
Rounded (Scalloped)	4	7.14
Rounded	3	5.36
Indeterminate	12	21.43
Total	56	100.00
	N	%
Flat	28	64
Splayed	9	20
Rounded (Including scalloped)	7	16
Total	44	100

Table D6: Rim Profile (Location 15)

Location 15	N	% (Of determinate)	% (Of total)
Concave	38	86.36	67.86
Straight	5	11.36	8.93
Convex	1	2.27	1.79
Indeterminate	12	-	21.43
Total (Determinate)	44	-	100.00
Total	56	100.00	-

Table D7: Rim Form (Location 15)

Location 15	N	% (Of determinate)	% (Of total)
Collarless	41	93.18	73.21
Incipient Collar	3	6.82	5.36
Indeterminate	12	-	21.43
Total (Determinate)	44	100.00	-
Total	56	-	100.00

Table D8: Rim Orientation (Location 15)

Location 15	N	% (Of determinate)	% (Of total)
Out-Flaring	39	88.64	69.64
Straight/Vertical	5	11.36	8.93
Indeterminate	12	-	21.43
Total (Determinate)	44	100.00	-
Total	56	-	100.00

Table D9: Neck Length (Location 15)

Vessel ID	Neck Length (cm)
V15-14-1	13.2
V15-76-1	9.5
V15-49-1	8.7

V15-60-1	14.1
V15-51-1	7.0
V15-85-1	8.2
V15-76-2	11.0
JV15-80-2	38.3

Table D10: Rim Diameter (Location 15)

2cm-10cm	11cm-19cm	20cm-40cm	Indeterminate	Total
12	13	3	28	56

Table D11: Lip Form (Location 9)

Location 9	N	% (Of determinate)	% (Of total)
Flat	7	70.00	29.17
Rounded	2	20.00	8.33
Pointed	1	10.00	4.17
Indeterminate	14	-	58.33
Total (Determinate)	10	100.00	-
Total	24	-	100.00

Table D12: Rim Profile (Location 9)

Location 9	N	% (Of determinate)	% (Of total)
Concave	5	55.56	20.83
Straight	1	11.11	4.17
Convex	3	33.33	12.50
Indeterminate	15	-	62.50
Total (Determinate)	9	100.00	-
Total	24	-	100.00

Table D13: Rim Form (Location 9)

Location 9	N	% (Of determinate)	% (Of total)
Collarless	9	90.00	37.50
Incipient Collar	1	10.00	4.17
Indeterminate	14	-	58.33
Total (Determinate)	10	100.00	-
Total	24	-	100.00

Table D14: Rim Orientation (Location 9)

Location 9	N	% (Of determinate)	% (Of total)
Out-Flaring	6	60.00	25.00
Straight/Vertical	3	30.00	12.50
In-Flaring	1	10.00	4.17
Indeterminate	14	-	58.33

Location 9	N	% (Of determinate)	% (Of total)
Total (Determinate)	10	100.00	-
Total	24	-	100.00

Table D15: Thickness Averages (Location 15)

Location 15	Adult (mm)	Juvenile (mm)
Lip	10.82	6.41
Rim	9.5	5.6
Neck	8.52	6.09
Body	9.71	6.73

Table D16: Thickness Averages (Location 9)

Location 9	Adult (mm)	Juvenile (mm)
Lip	9.06	7.63
Rim	8.92	5.96
Body	7.47	5.1

Decorative

Decorative Motif - Location 15

Table D17: Lip Motif

Lip Motif	N	% (Of determinate)	% (Of Total)
Obliques	18	40.91	32.14
Horizontals	12	27.27	21.43

Lip Motif	N	% (Of determinate)	% (Of Total)
Plain Cord-Malleated	6	13.64	10.71
Hatched	4	9.09	7.14
Plain	3	6.82	5.36
Verticals	1	2.27	1.79
Indeterminate	12	-	21.43
Total	56	-	100.00
Total (Determinate)	44	100.00	-

Table D18: Rim Motif

Rim Motif	N	% (Of determinate)	% (Of total)
Obliques	32	72.73	57.14
Horizontals	1	2.27	1.79
Plain Cord-Malleated	6	13.64	10.71
Plain	4	9.09	7.14
Intersecting Obliques	1	2.27	1.79
Indeterminate	12	-	21.43
Total	56	-	100.00
Total (Determinate)	44	100.00	-

Table D19: Interior Rim Motif

Interior Rim Motif	N	% (Of determinate)	% (Of total)
Obliques	32	72.73	57.14
Horizontals	1	2.27	1.79
Plain Cord-Malleated	1	2.27	1.79
Hatched	0	0.00	0.00
Plain	9	20.45	16.07
Intersecting Obliques	1	2.27	1.79
Indeterminate	12	-	21.43
Total	56	-	100.00
Total (Determinate)	44	100.00	-

Table D20: Neck Motif

Neck Motif	N	%
Horizontals	9	16.07
Plain Cord-Malleated	6	10.71
Obliques	4	7.14
Plain Smoothed-over-CM	3	5.36
Vertical/Horizontal	3	5.36
Filled-Triangles/Plaits	2	3.57
Vertical/Horizontal	2	3.57
Horizontals/Plain	2	3.57
Plain/Horizontals	2	3.57

Neck Motif	**N**	**%**
Filled-Triangles/Punctate	1	1.79
Horizontal/Oblique/Plain	1	1.79
Plaits	1	1.79
Opposed	1	1.79
Nested L-Shape/Filled-Triangles	1	1.79
Horizontals/Verticals/Horizontals	1	1.79
Horizontals/Plaits	1	1.79
Intersecting Obliques/Plain Smoothed-Over-Cord-Malleated	1	1.79
Verticals/Plaits	1	1.79
Obliques/Horizontals/Plain	1	1.79
Hatched	1	1.79
Horizontal/Oblique	1	1.79
Horizontals/Diamonds	1	1.79
Horizontals/Triangles	1	1.79
Obliques/ Plain Cord-Malleated	1	1.79
Filled-Triangles	1	1.79
Horizontals/ Plain Cord-Malleated	1	1.79
Indeterminate	6	10.71
Total	56	100.00

Table D21: Shoulder Motif

Shoulder Motif	N	% (Of determinate)	% (Of total)
Plain Cord-Malleated	16	66.67	28.57
Horizontals	5	20.83	8.93
Obliques	1	4.17	1.79
Plain	1	4.17	1.79
Triangles	1	4.17	1.79
Indeterminate	32	-	57.14
Total (Determinate)	24	100.00	-
Total	56	-	100.00

Decorative Technique - Location 15

Table D22: Lip Technique

Lip Technique	N	% (Of determinate)	% (Of total)
Cord Wrapped Stick Impressed	20	45.45	35.71
Linear Stamped	7	15.91	12.50
Incised	7	15.91	12.50
Plain Cord Malleated	6	13.64	10.71
Plain	3	6.82	5.36
Corded	1	2.27	1.79
Indeterminate	12	-	21.43
Total (Determinate)	44	100.00	-
Total	56	-	100.00

Table D23: Rim Technique

Rim Technique	N	% (Of determinate)	% (Of total)
Cord Wrapped Stick Impressed	18	40.91	32.14
Linear Stamped	8	18.18	14.29
Incised	7	15.91	12.50
Plain Cord-Malleated	6	13.64	10.71
Plain	4	9.09	7.14
Corded	1	2.27	1.79
Indeterminate	12	-	21.43
Total (Determinate)	44	100.00	-
Total	56	-	100.00

Table D24: Interior Rim Technique

Interior Rim Technique	N	% (Of determinate)	% (Of total)
Cord Wrapped Stick Impressed	18	40.91	32.14
Plain	10	22.73	17.86
Linear Stamped	8	18.18	14.29
Incised	5	11.36	8.93
Corded	3	6.82	5.36
Indeterminate	12	-	21.43
Total (Determinate)	44	100.00	-
Total	56	-	100.00

Table D25: Neck Technique

Neck Technique	N	% (Of determinate)	% (Of total)
Cord Wrapped Stick Impressed	19	37.25	33.93
Plain Cord-Malleated	8	15.69	14.29
Corded	4	7.84	7.14
Incised	3	5.88	5.36
Linear Stamped	2	3.92	3.57
Surface Stamp/Plain Smoothed-Over-Cord-Malleated	2	3.92	3.57
Incised/Annular Stamp	1	1.96	1.79
Plain/Incised	1	1.96	1.79
Cord Wrapped Stick Impressed/Push Pull	1	1.96	1.79
Incised/Push-Pull/Cord Wrapped Stick Impressed	1	1.96	1.79
Push Pull/Incised	1	1.96	1.79
Linear Stamped/Incised	1	1.96	1.79
Linear Stamp/ Cord Wrapped Stick Impressed	1	1.96	1.79
Corded/Plain	1	1.96	1.79
Cord Wrapped Stick Impressed /Incised	1	1.96	1.79
Fingernail Impressed	1	1.96	1.79
Incised/Push Pull	1	1.96	1.79
Cord Wrapped Stick Impressed/ Plain Cord-Malleated	1	1.96	1.79
Plain/Cord Wrapped Stick Impressed	1	1.96	1.79

Neck Technique	N	% (Of determinate)	% (Of total)
Indeterminate	5		8.93
Total (Determinate)	51	100.00	-
Total	56	-	100.00

Table D26: Shoulder Technique

Shoulder Technique	N	% (Of determinate)	% (Of total)
Plain Cord Malleated	14	58.33	25.00
Cord Wrapped Stick Impressed	6	25.00	10.71
Plain Smoothed-Over-Cord-Malleated	2	8.33	3.57
Linear Stamped	1	4.17	1.79
Push-Pull	1	4.17	1.79
Indeterminate	32	-	57.14
Total (Determinate)	24	100.00	-
Total	56	-	100.00

Decorative Tool - Location 15

Table D27: Rim Tool

Rim Tool	N	% (Of determinate)	% (Of total)
Cord Wrapped Instrument	25	56.82	44.64
Linear (Straight)	14	31.82	25
Plain	4	9.09	7.14

Rim Tool	N	% (Of determinate)	% (Of total)
Cord	1	2.27	1.79
Total (Determinate)	44	100.00	-
Total	56	-	100.00
Indeterminate	12	-	21.43

Table D28: Interior Rim Tool

Interior Rim Tool	N	% (Of determinate)	% (Of total)
Cord Wrapped Instrument	18	40.91	32.14
Linear (Straight)	13	29.54	23.22
Plain	10	22.73	17.86
Cord	3	6.82	5.36
Indeterminate	12	-	21.43
Total (Determinate)	44	100.00	-
Total	56	-	100.00

Table D29: Lip Tool

Lip Tool	N	% (Of determinate)	% (Of total)
Cord Wrapped Instrument	26	59.09	46.43
Linear (Straight)	14	31.82	25
Plain	3	6.82	5.36
Cord	1	2.27	1.79
Indeterminate	12	-	21.43

Lip Tool	N	% (Of determinate)	% (Of total)
Total (Determinate)	44	100.00	-
Total	56	-	100.00

Table D30: Neck Tool

Neck Tool	N	% (Of determinate)	% (Of total)
Cord Wrapped Instrument	30	58.82	53.57
Linear (Straight)	9	17.65	16.07
Cord	5	9.80	8.93
Combination - CWS and Linear	2	3.92	3.57
Combination - Annular and Linear	1	1.96	1.79
Combination - CWS, Pointed (Polygonal), Linear (Straight)	1	1.96	1.79
Combination - Linear (Curved) and CWS	1	1.96	1.79
Dentate (Polygonal)	1	1.96	1.79
Linear (Curved)	1	1.96	1.79
Indeterminate	5	-	8.93
Total (Determinate)	51	100.00	-
Total	56	-	100.00

Table D31: Shoulder Tool

Shoulder Tool	N	% (Of determinate)	% (Of total)
Cord Wrapped Instrument	22	91.67	39.29
Linear (Straight)	2	8.33	3.57
Indeterminate	32	-	57.14
Total (Determinate)	24	100.00	-
Total	56	-	100.00

Table D32: Castellations (Location 15)

Location 15	Total	% (Of total)	% (Of determinate)
Presence with continuous decoration	22	39.29	64.71
Indeterminate	22	39.29	-
Absence	12	21.43	35.29
Total (Determinate)	34	-	100.00
Total	56	100.00	-

Table D33: Punctates (Location 15)

Location 15	N	% (Of total)	% (Of total presence)
Absence	13	23.00	-
Indeterminate	9	16.00	-
Partial	4	7.00	-

Location 15	N	% (Of total)	% (Of total presence)
Presence with corresponding exterior boss	7	13.00	21.00
Presence with corresponding interior boss	18	32.00	53.00
Presence without corresponding exterior boss	1	2.00	3.00
Presence without corresponding interior boss	4	7.00	12.00
Total	56	100.00	100.00
Presence	34	61.00	72.00
Absence	13	23.00	28.00
Indeterminate	9	16.00	-
Total	56	100.00	100.00

Table D34: Castellations (Location 9)

Location 9	N	% (Of determinate)	% (Of total)
Presence with continuous decoration	1	16.67	4.17
Absence	5	83.33	20.83
Indeterminate	18	-	75.00
Total (Determinate)	6	100.00	-
Total	24	-	100.00

Table D35: Punctates (Location 9)

Location 9	N	% (Of determinate)	% (Of total)
Partial	2	25.00	8.33
Presence with corresponding interior boss	1	12.50	4.17
Presence with corresponding exterior boss	1	12.50	4.17
Absence	4	50.00	16.67
Indeterminate	16	-	66.67
Total (Determinate)	8	100.00	-
Total	24	-	100.00
Presence	4	50.00	16.67
Absence	4	50.00	16.67
Indeterminate	16	-	66.67
Total (Determinate)	8	100.00	-
Total	24	-	100.00

Decorative Tool - Location 9

Table D36: Dominant Tool

Dominant Tool	N	% (Of total)
Cord Wrapped Instrument	14	58.33
Linear (Straight)	9	37.50
Dentate (Polygonal)	1	4.17
Total	24	100.00

Decorative Technique - Location 9

Table D37: Lip Technique

Lip Technique	N	% (Of determinate)	% (Of total)
Cord Wrapped Stick Impressed	7	70.00	29.17
Incised	2	20.00	8.33
Plain	1	10.00	4.17
Indeterminate	14	-	58.33
Total (Determinate)	10	100.00	-
Total	24	-	100.00

Table D38: Rim Technique

Rim Technique	N	% (Of determinate)	% (Of total)
Cord Wrapped Stick Impressed	3	33.33	12.50
Incised	3	33.33	12.50
Linear Stamp	1	11.11	4.17
Cord Wrapped Stick Impressed /Incised	1	11.11	4.17
Plain	1	11.11	4.17
Indeterminate	15	-	62.50
Total (Determinate)	9	100.00	-
Total	24	-	100.00

Table D39: Interior Rim Technique

Interior Rim Technique	N	% (Of determinate)	% (Of total)
Cord Wrapped Stick Impressed	4	50.00	16.67
Plain	4	50.00	16.67
Indeterminate	16	-	66.67
Total (Determinate)	8	100.00	-
Total	24	-	100.00

Table D40: Neck Technique

Neck Technique	N	% (Of determinate)	% (Of total)
Cord Wrapped Stick Impressed	6	35.29	25.00
Incised	4	23.53	16.67
Push-Pull	3	17.65	12.50
Cord Wrapped Stick Impressed/Incised	2	11.76	8.33
Cord Wrapped Stick Impressed/Plain	1	5.88	4.1
Corded	1	5.88	4.17
Indeterminate	7	-	29.17
Total (Determinate)	17	100.00	-
Total	24	-	100.00

Table D41: Shoulder Technique

Shoulder Technique	N	% (Of determinate)	% (Of total)
Cord Wrapped Stick Impressed	3	50.00	12.50
Incised	1	16.67	4.17
Corded	1	16.67	4.17
Plain Cord-Malleated	1	16.67	4.17
Indeterminate	18	-	75.00
Total (Determinate)	6	100.00	-
Total	24	-	100.00

Decorative Motif - Location 9

Table D42: Lip Motif

Lip Motif	N	% (Of determinate)	% (Of total)
Horizontals	4	40.00	16.67
Obliques	4	40.00	16.67
Plain	1	10.00	4.17
Hatched	1	10.00	4.17
Indeterminate	14	-	58.33
Total (Determinate)	10	100.00	-
Total	24	-	100.00

Table D43: Rim Motif

Rim Motif	N	% (Of determinate)	% (Of total)
Horizontals	3	33.33	12.50
Obliques	2	22.22	8.33
Plain Smoothed-Over-Cord-Malleated	1	11.11	4.17
Plain	1	11.11	4.17
Verticals/Obliques	1	11.11	4.17
Hatched	1	11.11	4.17
Indeterminate	15	-	62.50
Total (Determinate)	9	100.00	-
Total	24	-	100.00

Table D44: Interior Rim Motif

Interior Rim Motif	N	% (Of determinate)	% (Of total)
Obliques	4	50.00	16.67
Plain	4	50.00	16.67
Indeterminate	16	-	66.67
Total (Determinate)	8	100.00	-
Total	24	-	100.00

Table D45: Neck Motif

Neck Motif	N	% (Of determinate)	% (Of total)
Horizontals	7	41.18	29.17
Horizontals/Obliques	4	23.53	16.67
Nested L-Shaped	2	11.76	8.33
Obliques	1	5.88	4.17
Horizontals/Nested L-Shaped/Horizontals/Obliques	1	5.88	4.17
Horizontals/Plaits	1	5.88	4.17
Horizontals/Plain/Horizontals	1	5.88	4.17
Indeterminate	7	-	29.17
Total (Determinate)	17	100.00	-
Total	24	-	100.00

Table D46: Shoulder Motif

Shoulder Motif	N	% (Of determinate)	% (Of total)
Plain Cord-Malleated	3	42.86	12.00
Obliques	2	28.57	8.00
Verticals	1	14.29	4.00
Plain	1	14.29	4.00
Indeterminate	18	-	72.00
Total (Determinate)	7	100.00	-
Total	25	-	100.00

Table D47: Interior Surface Treatment (Location 15)

Location 15	N	%
Smooth	44	78.57
Wiped	10	17.86
Indeterminate	2	3.57
Total	56	100.00

Table D48: Interior Surface Treatment (Location 9)

Location 9	N	% (Of determinate)	% (Of total)
Smooth	14	73.68	58.33
Wiped	5	26.32	20.83
Indeterminate	5	-	20.83
Total (Determinate)	19	100.00	-
Total	24	-	100.00

Table D49: Exterior Surface Treatment (Location 15)

Location 15	N	% (Of determinate)	% (Of total)
Cord-Malleated - Random/Rounded	14	48.28	25.00
Cord-Malleated - Linear	6	20.69	10.71
Smoothed-Over-Cord-Malleated	6	20.69	10.71
Cord Wrapped Stick	1	3.45	1.79
Stamped	1	3.45	1.79

Location 15	N	% (Of determinate)	% (Of total)
Combing	1	3.45	1.79
Indeterminate	27	-	48.21
Total	56	-	100.00
Total (Determinate)	29	100.00	-

Table D50: Exterior Surface Treatment (Location 9)

Location 9	N	% (Of determinate)	% (Of total)
Cord-Malleated – Rounded/Random	2	40.00	8.70
Scratched/Incised	2	40.00	8.70
Cord-Malleated - Linear	1	20.00	4.35
Indeterminate	18	-	78.26
Total (Determinate)	5	100.00	-
Total	23	-	100.00

Table D51: Comparison of Selected Attributes Between Juvenile, Miniature, and Adult Vessels (Location 15)

Attribute	Juvenile	Miniature	Adult
Rim Diameter	Range: 5.5cm-6cm, Indeterminate (n=9)	Range: 2cm-5.5cm, Indeterminate (n=6)	Range: 6cm-40cm, Indeterminate (n=24)
Neck Diameter	Range: 4cm-5cm, Indeterminate (n=9)	Range: 2cm-7cm, Indeterminate (n=6)	Range: 5cm-26cm, Indeterminate (n=27)
Body Wall Thickness (Average)	6.5mm	6.4mm	9.7mm
Use-Wear Evidence	Exterior Fire Sooting (n=4), Carbon Encrustation (n=5)	Exterior Fire Sooting (n=3), Carbon Encrustation (n=2)	Exterior Fire Sooting (n=30), Carbon Encrustation (n=12)

Table D52: Comparison of Temper Mineral Size, Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
No Temper	5	45.5	4	36.4	0	0
Minerals 0.5 mm to 2.0 mm	6	54.5	3	27.2	7	15.2
Minerals 0.5 mm to 6.0 mm	0	0	4	36.4	37	80.4
Minerals 0.5 mm to 12 mm	0	0	0	0	2	4.4
Total	11	100	11	100	46	100

Table D53: Comparison of Rim Profile, Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Out-Flaring	4	36.4	7	63.6	32	69.6
Straight	0	0	4	36.4	2	4.4
Indeterminate	7	63.6	0	0	12	26.0
Total	11	100	11	100	46	100

Table D54: Comparison of Evidence of Manufacture, Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Pinching	7	63.6	5	45.5	2	4.4
Unsmoothed Coils	1	9.1	1	9.0	3	6.5
Laminated Break	0	0	0	0	14	30.4
Indeterminate	3	27.3	5	45.5	27	58.7
Total	11	100	11	100	46	100

Table D55: Comparison of Surface Treatment, Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Cord-Malleated	8	72.7	3	27.3	16	34.8
Smooth	2	18.2	1	9.0	0	0

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Smoothed-Over-Cord-Malleated	0	0	2	18.2	5	10.9
Indeterminate	1	9.1	5	45.5	25	54.3
Total	11	100	11	100	46	100

Table D56: Comparison of Decorative Techniques (Rim), Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Plain	2	18.2	1	9.1	1	2.2
Linear Stamping	1	9.1	1	9.1	6	13.1
CWS	1	9.1	2	18.2	18	39.1
Corded	0	0	1	9.1	0	0
Plain Cord-Malleated	0	0	4	36.4	3	6.5
Incised	0	0	2	18.2	6	13.1
Indeterminate	7	63.6	0	0	12	26.0
Total	11	100	11	100	46	100

Table D57: Comparison of Decorative Techniques (Neck), Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
CWS	0	0	2	18.2	19	41.3
Linear Stamping	0	0	1	9.1	2	4.4

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Linear Stamping over CWS	1	9.1	0	0	1	2.2
Plain Cord-Malleated	0	0	4	36.4	6	13.1
Linear Stamping over Smoothed-Over-Cord-Malleated	0	0	0	0	2	4.4
Corded	1	9.1	2	18.2	4	8.7
Corded over Plain	1	9.1	0	0	1	2.2
Incised	1	9.1	1	9.1	3	6.5
Other	0	0	0	0	3	6.5
Indeterminate	7	63.6	1	9.1	5	10.9
Total	11	100	11	100	46	100

Table D58: Comparison of Rim Motif, Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Plain (Smoothed)	2	18.2	1	9.1	1	2.2
Obliques	1	9.1	5	45.5	29	63.0
Plain Cord-Malleated	1	9.1	4	36.4	3	6.5
Horizontals	0	0	1	9.1	0	0
Intersecting Obliques	0	0	0	0	1	2.2

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Indeterminate	7	63.6	0	0	12	26.0
Total	11	100	11	100	46	100

Table D58: Comparison of Neck Motif, Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Horizontals	0	0	4	36.4	7	15.2
Horizontals over Plain	2	18.2	0	0	0	0
Plain Cord-Malleated	0	0	3	27.3	4	8.7
Plain Smoothed-Over-Cord-Malleated	0	0	1	9.1	3	6.5
Obliques	0	0	1	9.1	3	6.5
Obliques over Horizontals	1	9.1	0	0	0	0
Filled Triangle over Plaits	1	9.1	0	0	1	2.2
Hatched	0	0	1	9.1	0	0
Blank Triangles/Horizontals	0	0	0	0	3	6.5
Verticals/Horizontals	0	0	0	0	2	4.4
Plain/Horizontals	0	0	0	0	2	4.4
Other	0	0	0	0	15	32.6
Indeterminate	7	63.6	1	9.1	6	13.1

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Total	11	100	11	100	46	100

Table D59: Comparison of Punctates, Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Present	1	9.1	2	18.2	32	69.5
Absent	3	27.3	9	81.8	6	13.0
Indeterminate	7	63.6	0	0	8	17.4
Total	11	100	11	100	46	100

Table 9: Comparison of Castellations, Location 15

	Juvenile		Miniature		Adult	
	N	%	N	%	N	%
Present	2	18.2	1	9.1	19	41.3
Absent	1	9.1	7	63.6	6	13.0
Indeterminate	8	72.7	3	27.3	21	45.7
Total	11	100	11	100	46	100

Appendix E: Statistical Results

Correlations

		NeckDiameter	NeckThickness	RimDiameter
NeckDiameter	Pearson Correlation	1	.686**	.961**
	Sig. (2-tailed)		.000	.000
	N	23	23	23
NeckThickness	Pearson Correlation	.686**	1	.692**
	Sig. (2-tailed)	.000		.000
	N	23	23	23
RimDiameter	Pearson Correlation	.961**	.692**	1
	Sig. (2-tailed)	.000	.000	
	N	23	23	23

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

Figure 21: Pearson product-moment correlation coefficient for neck diameter, neck thickness, and rim diameter

Correlations

		NeckThickness	RimDiameter
NeckThickness	Pearson Correlation	1	.701**
	Sig. (2-tailed)		.000
	N	27	27
RimDiameter	Pearson Correlation	.701**	1
	Sig. (2-tailed)	.000	
	N	27	27

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

Figure 22: Pearson correlation for neck thickness and rim diameter

Correlations

			NeckThickness	RimDiameter
Spearman's rho	NeckThickness	Correlation Coefficient	1.000	.718**
		Sig. (2-tailed)	.	.000
		N	27	27
	RimDiameter	Correlation Coefficient	.718**	1.000
		Sig. (2-tailed)	.000	.
		N	27	27

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

Figure 23: Spearman's rank correlation (rho) coefficient for neck thickness and rim diameter

Correlations

			NeckDiameter	NeckThickness	RimDiameter
Spearman's rho	NeckDiameter	Correlation Coefficient	1.000	.677**	.959**
		Sig. (2-tailed)	.	.000	.000
		N	23	23	23
	NeckThickness	Correlation Coefficient	.677**	1.000	.704**
		Sig. (2-tailed)	.000	.	.000
		N	23	23	23
	RimDiameter	Correlation Coefficient	.959**	.704**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	23	23	23

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

Figure 24: Spearman's rank correlation (rho) coefficient for neck diameter, neck thickness, and rim diameter

Correlations

		RimDiameter	NeckDiameter	ShoulderDiameter
RimDiameter	Pearson Correlation	1	.971**	.970**
	Sig. (2-tailed)		.000	.000
	N	12	12	12
NeckDiameter	Pearson Correlation	.971**	1	.982**
	Sig. (2-tailed)	.000		.000
	N	12	12	12
ShoulderDiameter	Pearson Correlation	.970**	.982**	1
	Sig. (2-tailed)	.000	.000	
	N	12	12	12

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

Figure 25: Pearson correlation for rim diameter, neck diameter and shoulder diameter

Correlations

			RimDiameter	NeckDiameter	ShoulderDiameter
Spearman's rho	RimDiameter	Correlation Coefficient	1.000	.964**	.921**
		Sig. (2-tailed)	.	.000	.000
		N	12	12	12
	NeckDiameter	Correlation Coefficient	.964**	1.000	.952**
		Sig. (2-tailed)	.000	.	.000
		N	12	12	12
	ShoulderDiameter	Correlation Coefficient	.921**	.952**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	12	12	12

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

Figure 26: Spearman's rho for rim diameter, neck diameter and shoulder diameter

Correlations

		RimThickness	RimDiameter
RimThickness	Pearson Correlation	1	.700**
	Sig. (1-tailed)		.000
	N	28	28
RimDiameter	Pearson Correlation	.700**	1
	Sig. (1-tailed)	.000	
	N	28	28

**. Correlation is significant at the 0.01 level (1-tailed).

Figure 27: Pearson correlation for rim thickness and rim diameter

Correlations

			RimThickness	RimDiameter
Spearman's rho	RimThickness	Correlation Coefficient	1.000	.790**
		Sig. (1-tailed)	.	.000
		N	28	28
	RimDiameter	Correlation Coefficient	.790**	1.000
		Sig. (1-tailed)	.000	.
		N	28	28

**. Correlation is significant at the 0.01 level (1-tailed).

Figure 28: Spearman's rho for rim thickness and rim diameter (1-tailed)

Correlations

		RimThickness	RimDiameter
RimThickness	Pearson Correlation	1	.700**
	Sig. (2-tailed)		.000
	N	28	28
RimDiameter	Pearson Correlation	.700**	1
	Sig. (2-tailed)	.000	
	N	28	28

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

Figure 29: Pearson correlation for rim thickness and rim diameter (2-tailed)

Correlations

			RimThickness	RimDiameter
Spearman's rho	RimThickness	Correlation Coefficient	1.000	.790**
		Sig. (2-tailed)	.	.000
		N	28	28
	RimDiameter	Correlation Coefficient	.790**	1.000
		Sig. (2-tailed)	.000	.
		N	28	28

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

Figure 30: Spearman's rho for rim thickness and rim diameter (2-tailed)

Appendix F: Spatial Test Results

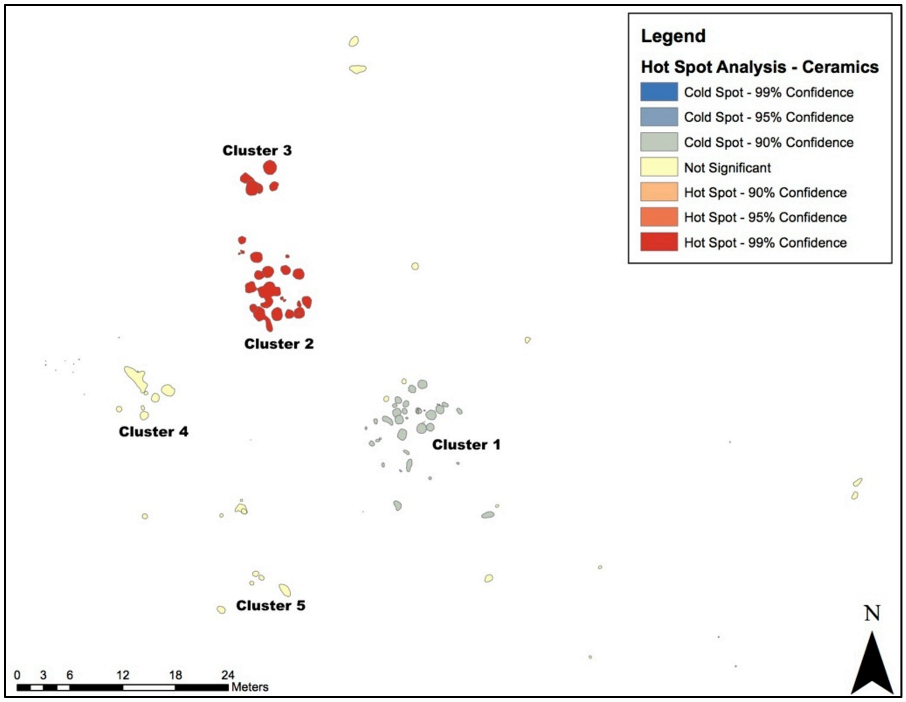

Figure 31: Hot Spot Analysis - Ceramics (Location 15)

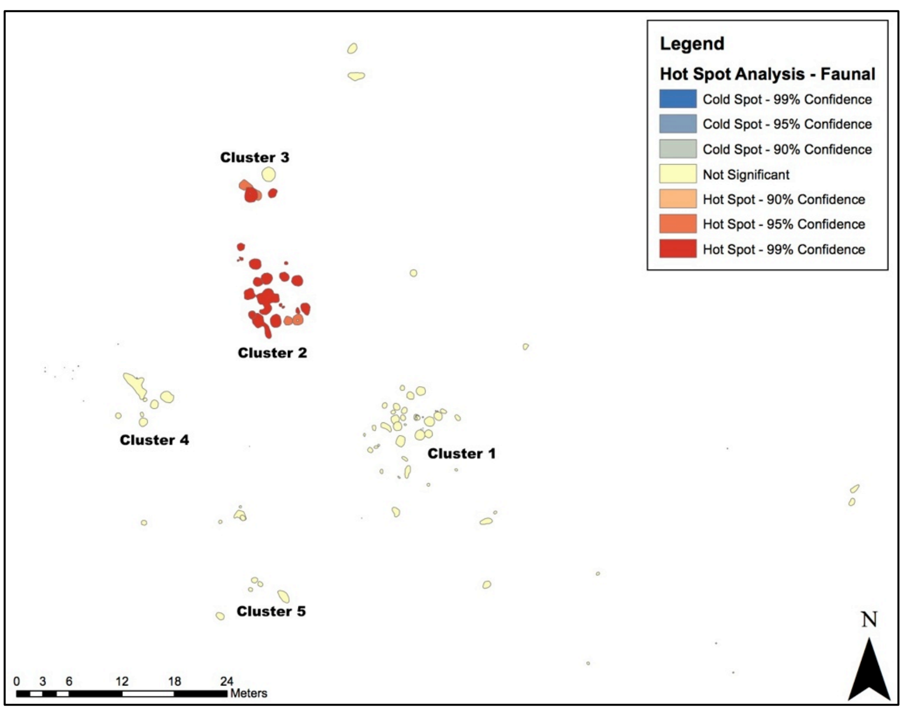

Figure 32: Hot Spot Analysis - Faunal (Location 15)

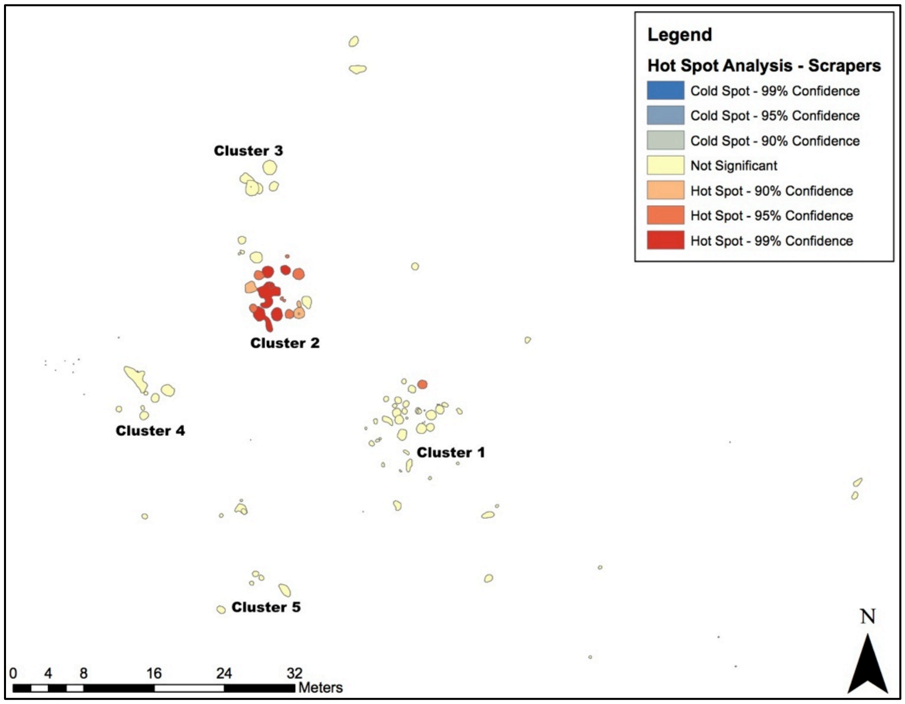

Figure 33: Hot Spot Analysis - Scrapers (Location 15)

Curriculum Vitae

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