THE INTRODUCTION OF HAVANA-HOPEWELL IN WEST MICHIGAN AND NORTHWEST INDIANA: AN INTEGRATIVE APPROACH TO THE IDENTIFICATION OF COMMUNITIES, INTERACTION NETWORKS, AND MOBILITY PATTERNS

By

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ABSTRACT

THE INTRODUCTION OF HAVANA-HOPEWELL IN WEST MICHIGAN AND NORTHWEST INDIANA: AN INTEGRATIVE APPROACH TO THE IDENTIFICATION OF COMMUNITIES, INTERACTION NETWORKS, AND MOBILITY PATTERNS

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This research examines approximately 500 Middle Woodland (~150 B.C. – A.D. 400) pottery samples from 56 habitation and burial mound sites in west Michigan and northwest Indiana to identify the different types of mechanisms that were associated with the introduction and persistence of Havana-Hopewellian information and ceramic technology in the study region. It achieves this by fusing stylistic pottery analyses with compositional (i.e., ceramic petrography) analyses to define the social boundaries of different types of communities on multiple spatial scales.

The results have provided insight into the complex and dynamic types of cultural interactions and mobility patterns operating within the study region, the distinct behavioral patterns unique to each individual community, and the assortment of mechanisms responsible for the spread and maintenance of Havana-Hopewell. Mechanisms identified in this research include diffusion, fission, migration, family visitation, the likely frequent intermarriage between communities, the seasonal use or scheduling of resource use within buffer zones, territorial expansion, pilgrimage, potential community merger, down-the-line exchange, the likely exchange of food and other material goods, and a shared multi-community mortuary program. The results ultimately suggest that social boundaries on both local and regional spatial scales were open, fluid, and probably unbounded.

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CHAPTER 1 INTRODUCTION

Introduction

The Havana-Hopewell phenomenon has largely been defined in singular *interregional* terms (e.g., a wide network of trade of raw materials and exchange of ideas, a specific mortuary cult, a worldview, or a network of peer polities, among others) (see Chapter 2 for a more complete discussion). One reason why early researchers focused on interregional interactions was because previous Havana-Hopewellian studies tended to focus on highly visible prestige goods or artifact types. This occurred at a time when these artifact types were more numerous in collections and habitation site data were nearly non-existent. However, these highly visible items only address a limited sphere of interaction that emphasizes status goods, organized transport, and elite involvements (Fie 2006, 2008) and downplays the important roles of distinct communities and their contribution to the distribution of particular material culture types (Carr 2006d).

Consequently, it has become increasingly apparent that the Havana-Hopewell phenomenon was more dynamic than these early studies suggest and that a panoply of mechanisms operating at different spatial scales was likely involved in the sharing of Hopewellian information and objects. There is a need to more thoroughly examine Havana-Hopewell as a local phenomenon and to consider the development and nature of Havana-Hopewell at multiple spatial scales (as suggested or exemplified by Bolnick and Smith 2007; Buikstra 1976; Buikstra and Charles 1999; Carr and Case 2006a; Carr and Komorowski 1995; Carr and Maslowski 1995; Charles 1995; Greber 1976, 1996, 1997; Griffin 1967; Pacheco 1993, 1996; Pacheco and Dancey 2006; Prufer 1964; Prufer et al. 1965; Smith 1992; Stoltman 2015;

Wymer 1996, 1997). This need is especially strong within the study region due to the lack of studies employing multiscalar approaches.

In response, this dissertation acknowledges that the diversity of economic, political, social, and ideological processes operating *inside* each cultural group is as important as external processes (i.e., long distance exchange and interaction) in shaping the overall organization of an interaction network (Dobres and Hoffman 1994; Stein 2002). It, therefore, employs a bottom-up approach to initially identify communities on the intraregional spatial scale through the examination of pottery from approximately 56 habitation and burial mound sites in west Michigan and northwest Indiana (Figure 1-1). This particular study region is conducive to the approach employed in this dissertation, despite the fact that most Havana-Hopewellian studies have historically focused on the so-called "core areas" of Havana-Hopewell influence: Ohio and Illinois. It is clear, however, that Havana-Hopewell was present in most other areas of the Eastern Woodlands and that people outside of these "core areas" displayed unique variations in what we archaeologically recognize as Havana-Hopewell in character, and that each region possessed unique social, political, and economic complexities (e.g., Bense 1994; Fortier 2006; Jeske 2006; Kellar 1979; Logan 2006; McKern 1942).

Simply applying general models from Illinois or Ohio to the study region, therefore, is untenable. As opposed to Ohio Hopewell models that were developed from populations that incorporated low-degrees of horticulture, displayed relatively higher degrees of sedentism, and more complex sociopolitical organization (Pacheco and Dancy 2006), there is a need within the study region to develop models from within that better align with the sociopolitical organization of peoples inhabiting west Michigan and northwest Indiana during this time period. Specifically, a model that more clearly incorporates small-scale/hunter-gatherer theory is required because it appears that, in contrast to Ohio and Illinois populations, both west Michigan and northwest Indiana peoples were relatively egalitarian and relied primarily on hunting and gathering as their primary mode of subsistence (Brashler et al. 2006; Brashler, Garland, and Lovis 1994; Mangold 2009; Brashler and Holman 2004; Mangold and Schurr 2006). To this end, the main goal of this dissertation is to employ a theoretical framework drawn from ethnographic and ethnohistoric data of small-scale or hunter-gatherer societies to identify and explain the different types of interactions and mechanisms that were associated with the introduction and persistence of Havana-Hopewellian information into west Michigan during the Middle Woodland period (~150 B.C. – A.D. 400). The types of information of interest in this research are Havana-Hopewellian socioreligious and technological ideas related to identity and interaction networks present in the study region.

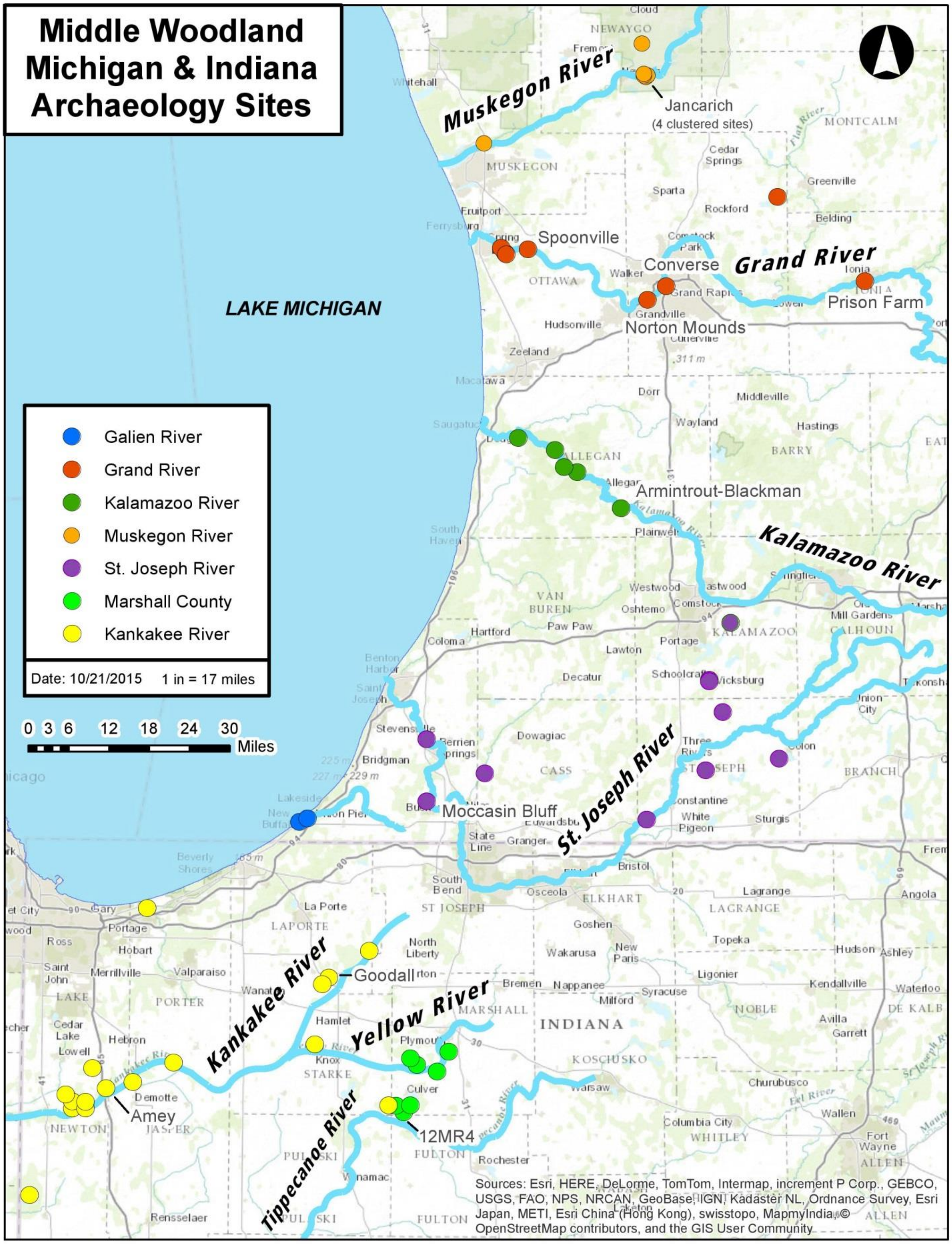


Figure 1-1: Study Region

In order to approach the primary goal of investigating the ways in which new socioreligious information (i.e., Havana-Hopewell) and ceramic style and technology is spread across time and space, this research employed a bottom-up approach, as stated above. Because I am interested in understanding cultural processes on the local spatial scale before moving onto regional scale interactions, the most important step involved an identification of small-scale *intraregional* communities within river valleys. This was accomplished through ceramic compositional and stylistic analyses. Once these communities were identified, their interactions with other communities and their involvement in regional interaction networks were then examined. This approach provided a comprehensive multiscalar identification of communities and the types of interactions between these communities which considered the varying roles of individual communities in the adoption of a foreign belief system (i.e., Havana-Hopewell).

The boundaries of these different types of communities were defined through the fusion of an analysis of visual style with technical style (focusing on ceramic petrography). This approach yielded robust results capable of achieving the major goals of this project. This type of pottery analysis is a rare and sorely needed approach within the study region. Only recently, however, have sufficient data been available in west Michigan to address these types of issues from an approach relying on both stylistic and compositional analyses.

Following Morris (1995), *visual style* refers to the visible, elaborate formal variation that is actively used to communicate messages. Examples of visual style variables are surface decoration type or surface finish (e.g., slip). *Technical style*, on the other hand, is the formal variation that results from individual or group choices in the techniques of production. The ceramic petrography variables used in this research that are related to vessel composition (e.g., percent sand or silt, natural inclusion type, temper type etc.) are good examples of technical style variables (refer to Chapter 3 for a more complete discussion of variables used in this research). Technical styles can be both visible and obscure and can actively communicate messages (Lechtman 1977) or passively reflect enculturation patterns (Sackett 1982). Unlike visual styles that have extensive distributions, technical styles commonly exhibit significantly more restricted geographic distributions that reflect localized technical systems and their populations (Morris 1995). The use of this framework, as described below, ultimately illuminated the types of mechanisms responsible for the initial spread and temporal continuation of Havana-Hopewell in the study region.

Another important intention of this research was to draw conclusions that went beyond the commonly relied upon tradition-phase model. Although a normative framework (based upon the tradition-phase model, specifically the west Michigan Norton Tradition and the northwest Indiana Goodall Tradition: see Figure 1-2) was initially used to provide an important starting point to examine interaction patterns, this research transcended this time-honored culture-historical archaeological definition of the tradition by examining the dynamic cultural processes operating within and between small-scale communities within the study region, before delving into their participation in larger communities on the regional spatial scale. This process was enhanced and supported through the development of a new and more up-to-date temporal model for the study region, which is defined in Chapter 5. The theoretical framework described below served as the foundation from which to accomplish the goals of this research.

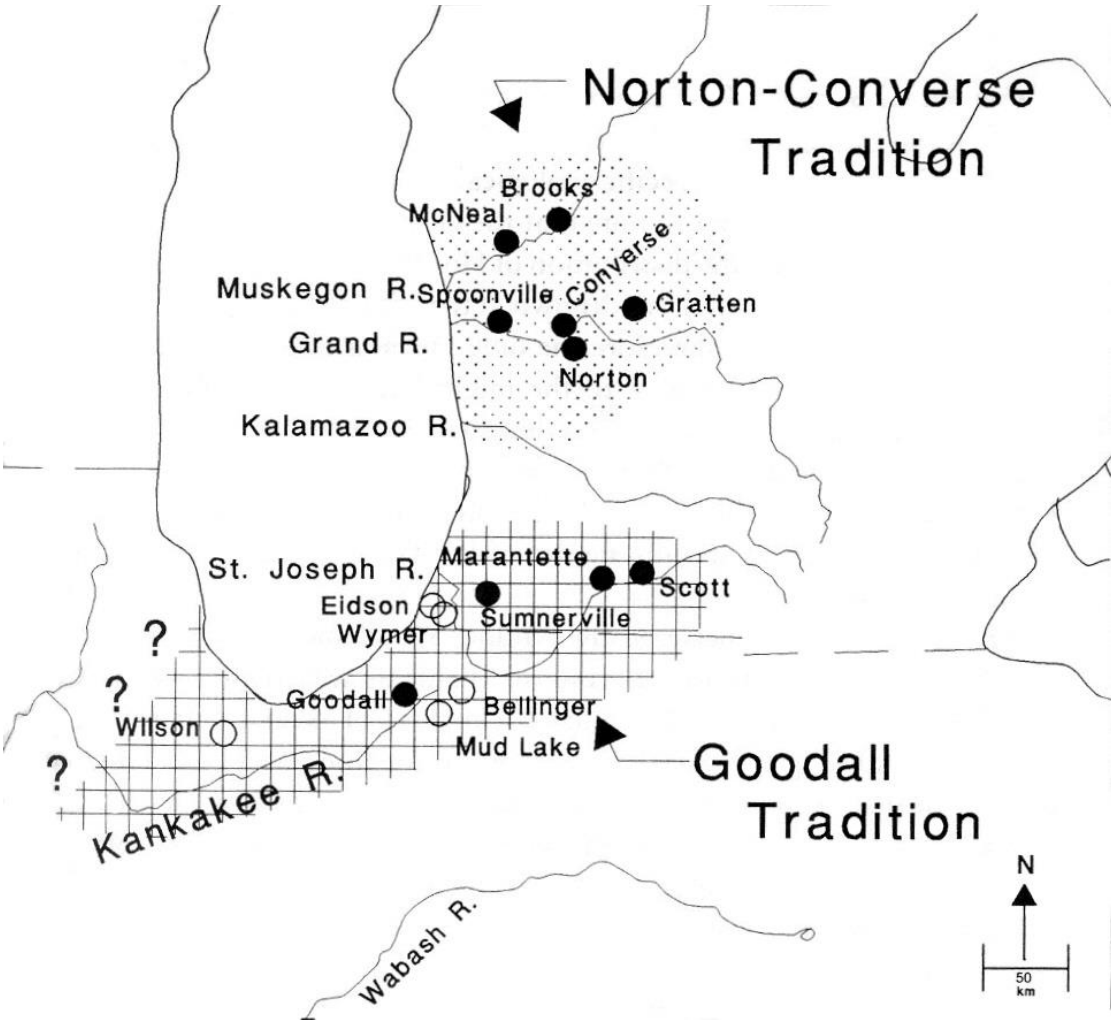


Figure 1-2: Norton and Goodall Traditions
(from Mangold and Schurr 2006)

Theoretical Framework

This research applies a theoretical framework that details the nature of different types of interaction and exchange activities that are expected to operate on different spatial scales (e.g., intraregional, regional, interregional). Although many of these behaviors are described as belonging to a certain spatial scale, it is acknowledged that they may be present along a spectrum of multiple scales. However, I attempt to identify specific behaviors on differing spatial scales when I can. The theoretical framework described below draws on ethnographic and ethnohistoric data that specify the varying types of interaction patterns and the types of communities (e.g., residential, sustainable, symbolic) operating on these spatial scales. The discussion begins with intraregional spatial scale expectations and community types and then moves onto regional and interregional spatial scale expectations and communities. An explanation for the use of technical and visual styles on each spatial scale is also included.

Intraregional Interactions, Residential Communities, and Technical Style

On the intraregional spatial scale (i.e., within river valleys or between kin groups), *residential communities*, which are defined by coresidence or close residence, and regular face-to-face interaction (Carr 2006a; Mahoney 2000; Ruby et al. 2006; Varien 1999), are the types of communities expected to be operating. Archaeologically, a residential community may conform to either a village or neighborhood. The village residential community is equivalent to a single archaeological site, while a neighborhood may be equivalent to a cluster of sites within a small area (Ruby et al. 2006).

At this scale, the frequency of regular face-to-face interaction is significantly more common compared to larger spatial scales. These small-scale indigenous societies are usually united through ties of kinship and marriage, although these ties can be extremely fluid and opportunistic in nature (Lovis and Whallon 2016; McClurken 1988; O'Shea and Milner 2002; Whallon, Lovis, and Hitchcock 2011). Sharing and gift-giving are the types of exchange most common between these communities and usually consist of the exchange of subsistence-maintenance goods (Kelly 1995; Whallon, Lovis, and Hitchcock 2011). Local social boundaries amongst these peoples are sometimes created or shared through a combination of built structures (e.g., enclosures, mounds, ossuary sites) or the ideological incorporation of major nature features (e.g., rivers) (O'Shea and Milner 2002). Of importance, drainage systems can play a central role in the way in which mobile hunter-gatherers, especially northern foragers, organize themselves and how they use and perceive their landscape (Jarvenpa and Brumbach 2016; Lovis and Donahue 2011; Lovis and Whallon 2016).

These closely related societies tend to stress the importance of society, social roles, and communal identities over individual and personal identities (Carr 1995b; Voss and Young 1995). Consequently, and as it relates to material culture expression, messages that are deemed most important culturally (i.e., society-wide values) are encoded in attributes that are the most visible due to their effectiveness for communication, while less important messages (i.e., individual concerns) are encoded in the remaining more obscure attributes (Carr 1995b; Carr and Maslowski 1995; Lowman and Alland 1973; Wobst 1977). Therefore, material culture variation and identity on this spatial scale are expected to be both passively and actively marked, depending on whether the intended message is related to individual- or social-scale significance (Carr 1995b; Carr and Neitzel 1995).

Formalized active marking of *society- or community-level* identity via material culture symbolism is not likely between these communities, however, because a shared communal identity is most likely already in place (O'Shea and Milner 2002; Parkinson 2006; Zvelebil 2006), partly due to the sharing of a common landscape (Basso 1996; Lovis and Whallon 2016). Active communication of individual artisans, non-blood kin, or family identity can occur through the use of obscure/poorly visible attributes though (Carr 1995b; Lemonnier 1986, 1990, 1993a). The use of these obscure attributes (e.g., interior vessel lip notching, etc.), especially when viewing distances are small or when separate groups interact in a restricted space, express within-group cooperation and social integration (Carr 1995b). This type of behavior is expected among small-scale societies on this spatial scale (Carr and Case 2006b; Hall 1997; Pryor and Carr 1995; Washburn 1995; Wiessner 1983).

In light of these factors, it was decided that a *technical style* analysis would be the most useful approach to document the various types of exchange and interaction patterns (such as those detailed in Carr 1995b: Table 7-1 and 7-2) on this spatial scale. Rather than visual styles that are portrayed in the end product, there are also *choices* that artisans make which are represented in the way the end product (i.e., pottery) is made or achieved: “the technical styles of doing things” (Morris 1995: 431). These choices are drawn from a socially constrained pool of attributes that are the product of the history of the particular community (Carr 1995b; Dobres and Hoffman 1994; Hoffman 1995; Hoffman and Dobres 1999; Lechtman 1977; Mahias 1993; Sackett 1982, 1985, 1990; van der Leeuw 1993). Importantly, technical styles represent the learned “recipes” of ceramic construction in this research.

These technical styles commonly have restricted distributions that reflect *localized* technical systems and their populations (i.e., residential communities) because they are generally learned as a result of close interaction among producers and/or through hands-on instruction (Dobres and Hoffman 1994; Galaty 2008; Gosselain 1998; Hegmon et al. 2000; Hodder 2000; Hoffman and Dobres 1999; Ingold 1990; Lemonnier 1986, 1990, 1993a, 1993b; Miller 2007; Schiffer and Skibo 1987; Skibo and Schiffer 2008; Stark 1999; Wallaert-Petre 200; Wright 1993). As such, vessel composition and various forms of morphology and decoration functioned as indicators of personal and social identity amongst and between closely-related communities in this research.

Regional and Interregional Interactions

The types of communities operating on the regional and interregional spatial scales are sustainable and symbolic communities. Composed of relationships beyond the residential community, s*ustainable communities* are regional social networks designed to offset and buffer against local subsistence shortages and local demographic variations (e.g., birth and death rates, sex ratios, etc.) through the exchange of mates, labor, food, and other material resources. Sustainable communities can be thought of as playing a role in long-term viability by meeting the size requirements necessary to avoid incest and maintain a viable mating network (Carr 2006a; Mahoney 2000; Ruby et al. 2006). *Symbolic communities*, on the other hand, emphasize symbols to actively define, communicate, and negotiate membership in a social group that transcends or crosscuts local residential groups for common political, economic, social, and/or religious purposes (Carr 2006a; Charles 1995; Ruby et al. 2006). This research focuses on the social and religious aspects (specifically mortuary ritual at burial mound sites) to define symbolic communities in this research since there are not enough data available at this time to identify other potential segments of a symbolic community, such as age grades, cult societies, sodalities, or gender-based groups (Ruby et al. 2006). Both sustainable and symbolic communities may have fluid boundaries and membership resulting from changing social, political, or economic environments. Both would have also functioned to temporarily unite independent and loosely organized communities for various social, economic, and/or spiritual reasons (Hall 1997).

Interaction and exchange between communities on these spatial scales becomes more formalized and ritualized due to an increase in social and/or geographic distance or linguistic differences (O'Shea and Milner 2002). At the interregional scale, interaction and exchange become even more formalized due to increasing degrees of social distance and can be executed to acquire esoteric goods, materials, or knowledge that are locally scarce or unavailable. Compared to intraregional interactions, interaction and exchange on this scale can more frequently be carried out for sociopolitical machinations (e.g., to increase or validate the authority or prestige of leaders) (Carr 2006d; Helms 1988; O'Shea and Milner 2002; Parkinson 2006; Zvelebil 2006).

Therefore, ceramic decoration, due to its highly visible nature, longer viewing distances, and correlation with society-at-large communication (Carr 1995b), is expected to reflect active and/or conscious messages characteristic of interactions between sustainable and symbolic communities exhibiting some degree of social distance (Hodder 1979; Wiessner 1983, 1984; Wobst 1977). Specifically, the symboling of community boundaries using material culture on this scale often involves larger viewing distances and more highly visible attributes (Carr 1995b).

For these reasons, it was most appropriate to apply a *visual style* analysis to explore the types of interactions common on these spatial scales. A focus on *active* material symbolism of identity and messaging aligns with the nature of interactions on this scale, which involves communities with perhaps no prior face-to-face contact interacting, residing, and cooperating under potentially stressful conditions (O'Shea and Milner 2002). Unlike technical styles that have restricted distributions, visual styles have extensive distributions because highly visible decorative traits are easily copied and shared amongst far-flung peoples. It is recognized that visual styles are *actively* used to communicate messages and identity among peoples interacting on these spatial scales (Morris 1995).

A word of caution is warranted here. It should be noted that the multi-scalar relationships described above acted as important starting points in this research but they are not as simple as initially stated. For example, larger social units, such as symbolic and sustainable communities, and the degree of active and/or passive interaction between them have been revealed through the study of obscure attributes (i.e., those most commonly associated with technical style) (Carr and Maslowski 1995; Graves 1982; Hodder 1982; Newton 1974; Roe 1979; Voss 1982; Washburn 1983). This is a caution against relying solely on visual style in defining symbolic and sustainable communities. Conversely, passive indicators of identity can be included in pottery vessel exchange on the regional or interregional spatial scales.

Furthermore, active displays of personal or social identity may be evident between two geographically close residential communities. The range of possibilities is great and requires a more integrative approach to understanding the variable nature of interactions during the Middle Woodland period. In addition to an attribute's visibility, a consideration of its context of production and use, and its geographical distribution are necessary in order to narrow down the more specific potential processes responsible for its existence (see Carr 1995b; Carr and Neitzel 1995).

Predicted Outcomes and Expectations

Intraregional Spatial Scale Expectations and Analysis

This section details the expectations and predictions of this research, focusing mostly on the local or nonlocal nature of pottery vessels in this research. It does not comprehensively explain the methodology/analysis of the research (refer to Chapter 3 for this discussion). The first step in this research was to define intraregional residential communities. One expectation that should be stated in the forefront is that a residential community should usually conform to a neighborhood (collection of closely-spaced sites) rather than a village (a single site) because the populations in this research were seasonally mobile. In this case, several geographically-close sites should exhibit very similar visual and technical styles. Specifically, a pattern of within-site (or intraregional) homogeneity along with between-site (or interregional) heterogeneity was expected for residential communities (e.g., Ferring and Pertulla 1987). This was generally found to be a reasonable assumption and allowed for the identification of residential communities.

There are also a number of expectations regarding the local and nonlocal nature of pottery vessels constructed by people between river valleys in the Norton and Goodall Traditions. Table 1-1 displays these expectations and outlines the relationship between my "stylistic" and compositional analyses. Note that the compositional distinctions (paste vs. body) made in the table are the products of the petrographic analysis. Whereas the *body* refers to the bulk composition of the vessel, including temper, clays, and all courser natural inclusions, the *paste* represents the mixture of natural materials, clays, and courser inclusions found in the raw sediments collected by potters before tempers are added (Stoltman 2001). The body functions as a gauge of technology, function, and informs on the learned and shared "*recipe*" of ceramic production, while the paste informs more on the acquisition of raw materials.

	Exotic Visual Style	**Local Visual Style**
Local Paste & Body	*B.* "Copies"	*A.* Locally Manufactured (utilitarian pots)
Nonlocal Paste & Body	*C.* Imports	*D.* Imports
Nonlocal Paste/clay only + **<u>Local Body</u>**	*E.* "Copies" made elsewhere & brought back to site	*F.* Made during a visit to another region & brought back to site
Nonlocal Body/recipe only + **<u>Local paste</u>**	*G.* Made by visitors to site using most commonly used clay type	*H.* Made by visitors to site using most commonly used clay & most common decorations at that site

Table 1-1: Eight Expectations for Local vs. Nonlocal Character of Ceramic Samples

The category that proved most useful for identifying and defining the parameters of intraregional residential communities included the types of vessels with local visual style designs and local paste and body compositions (box “A” in Table 1-1). These were assumed to represent the majority of pottery within a site assemblage and were regarded as locally-manufactured utilitarian pots. Because the degree of ceramic stylistic similarity between sites was expected to be directly related to the amount of social interaction between those communities (Deetz 1965; Longacre 1964, 1970; Whallon 1968), the visual styles of these vessels were anticipated to be alike (due to the high frequency of interaction expected to occur within a site). Meanwhile, the technical styles or recipes for ceramic construction (involving those obscure petrographic attributes) should be similar due to enculturation/apprenticeship events occurring amongst and between these closely-related learning pools or communities (Colson 1974; Gosselain 1998; Pryor and Carr 1995; Wallaert-Petre 2001; Wiessner 1983).

These vessels likely played an important *integrative* role in creating and maintaining cohesion within or between residential communities through the exchange of subsistence-maintenance goods. In these contexts, strict boundary maintenance was not expected because it is acknowledged that the most prudent adaptive strategy (among these types of societies) would be to use style and morphology for community integration (Kelly 1995; Pryor and Carr 1995). Based on theories put forth by Carr (1995b), O’Shea and Milner (2002), Parkinson (2006), Pryor and Carr (1995), and Zvelebil (2006), these pots can signal both active and passive processes related to the individual and family within residential communities, such as a shared cultural history, potter’s personal preferences, enculturation (Hill 1970; Longarce 1964), raw material availability, or technology of construction, among others (see Carr 1995b Table 7-2 for a full synopsis).

It is possible, however, that two separate sites could employ very similar visual styles but differ in the technical style used to construct these vessels, which could indicate two separate ceramic construction techniques and communities and the sharing of decorative elements to communicate a shared identity. If this was the case, two separate residential communities were defined. The converse could also be true: two separate sites could employ very similar technical styles but differ in the use of visual styles. This would also constitute the definition of two separate residential communities since it is likely that these two closely related communities have chosen to actively distinguish themselves from each other.

Regional and Interregional Expectations and Analysis

Once residential communities were identified within individual river basins, their involvement in regional-scale sustainable and/or symbolic communities (Charles 1995; Mahoney 2000; Ruby et al. 2006) were examined. The most pertinent vessels of interest on this scale comprised the "*outliers*" from the initial identification of residential communities. When nonlocal compositions were discovered at an individual site, these sherds informed on community-level interactions occurring on the regional and interregional spatial scales. Habitation site outlier pots were expected to possess either nonlocal visual styles or nonlocal technical styles/recipes. Finding "matches" for these recipes or styles from other communities (or sites) was sought in order to determine that vessel's origin.

Compared to habitation site vessels, the use of burial mound vessels presented a more complicated case. Archaeologists frequently assume that the interment of individuals and cultural objects in Middle Woodland burial mounds involved the aggregation and participation of several distinct regional communities originating from different parts of a region (Mainfort 1996; Reid 1991; Struever 1964; Yerkes 2002). This assumption was expected to hold up to testing since mortuary pots likely played a role in regional-scale interactions due to the likely integrative nature of these communities (Carr 2006a; Hall 1997; Pryor and Carr 1995; Washburn 1995). It was expected that the nonlocal signature of either the visual or technical styles of these vessels would aid in the identification of their place of origin (i.e., residential community) and/or the type of mechanism responsible for its existence at a particular site (e.g., copying of local decorations, shared participation in mortuary ritual, etc.). It was also expected that other mortuary pots assembled with nonlocal technical and/or visual styles would aid in the identification of a more distant community's involvement in this mortuary ceremony. This analytical process assisted in the definition of the geographical extent of symbolic and/or sustainable communities and even the potential use of multiple burial mounds by a single community (e.g., Carr 2006c; Ruby et al. 2006).

Returning to Table 1-1, there were primarily seven other potential ceramic outcomes of analysis (boxes "B" – "H") that had a significant bearing on my interpretation of interaction networks on the regional and interregional spatial scales. First, Middle Woodland pots with exotic visual style designs but with local paste and body compositions ("B" in Table 1-1) were defined as "copies," or imitations of nonlocal styles. These were assumed to be made by local communities or individuals who copied outside design styles in order to actively convey a shared identity among symbolic communities and/or sustainable communities. Although these vessels could result from intermarriage between separate communities with different identities, it is more likely that they result from the choice to convey a shared identity. As Braun (1977: 123) states, "homogeneity in decorative behavior is highest among persons who make pottery together, *regardless* of where they learned the craft."

If copies are found within a burial mound, they were assumed to indicate symbolic community interaction, while those excavated from habitation sites would signal sustainable community interaction. This is based upon the following considerations. Although a single ritual site may simultaneously function as a ceremonial center for a local symbolic community and a broader sustainable community (Carr 2006a, 2006c), mounds in west Michigan were likely utilized by symbolic communities focusing on cooperative efforts, group unity, and shared property. Considering the likely integrative nature of these communities, it is more likely that burial mounds were used by symbolic communities because sustainable communities, in contrast, focus on competitive displays and do not emphasize group unity (Buikstra and Charles 1999; Morris 1991).

The second and third potential analytical outcomes related to regional scale interaction patterns involved vessels referred to as "imports." All imported vessels are characterized by both nonlocal paste and body compositions. In general, imported vessels were assumed to arrive through long-distance exchange/down-the-line exchange, exchange accompanying interregional visitation (Fie 2000, 2006, 2008), intermarriage, or other processes detailed in Carr (1995a, 1995b). They could also result from long-distance learning of esoteric knowledge in which "proof" (in the form of pots) is brought back with the intention of incorporating Havana-Hopewellian beliefs into society (Carr 2006d).

There are two types of imports identified in this research, however: one with exotic visual styles ("C" in table) and one with local visual styles ("D" in table). The former likely represents interaction with members from other sustainable or symbolic communities (due to the perceived need to use a rare decorative trait in order to actively communicate a shared identity/message). Similar to "copies," these imports are assumed to have played a primary role in actively communicating a shared communal identity among symbolic communities (if found within burial mound contexts) or sustainable communities (if excavated from habitation site contexts). The second type of imported vessel, on the other hand, likely hints at interaction with a closely related and frequently visited residential community due to the sharing of common decorative traits.

The fourth and fifth potential categories are more difficult to interpret but include vessels with nonlocal pastes and local recipes/bodies. The fourth ("E" in Table 1-1) likely represents another type of "copy" based upon the use of nonlocal decorative designs. In this instance, however, these vessels were likely made by people while at another community's village (hence, the nonlocal paste) and were brought back and deposited at the home village site of the vessel creator. This complex scenario likely hints at sustainable and/or symbolic community interaction, based upon the copying of exotic visual styles in order to communicate a shared identity.

The fifth ceramic category ("F" in Table 1-1) contains vessels with local visual styles and body values but have nonlocal pastes/clay types. Similar to the fourth category explained above, mobility patterns seem to explain the nature of these vessels. As was the case with the fourth category, the fifth category of vessels were likely made by people while away at another community's village and were brought back and deposited at the home village of the person who manufactured the pot. The major difference between the two classes is that "F" in Table 1-1 likely hints at interaction between distinct, but closely-related and frequently interacting, residential communities due to the use of very similar or identical visual styles. Again, “homogeneity in decorative behavior is highest among persons who make pottery together…” (Braun 1977: 123).

The sixth and seventh potential ceramic outcomes also represent complex scenarios. Both of these types of vessels have nonlocal recipes that differ from the local recipe unique to a particular site, but they also have local pastes common to that site. Both of these scenarios suggest the presence of people who originate from different residential communities (hence, nonlocal recipe/body) than the residential community that inhabited the site at which these vessels were made at (hence, local paste/clay) and recovered from. In other words, it appears that other people from other residential communities traveled to this site, used the most commonly used clay type (local paste) employed at that site by that home community to construct a vessel, but made that vessel with the recipe characteristic of that person’s community (nonlocal body). The major distinction between categories “G” and “H” in Table 1-1 is the implied nature of the interaction, based upon the use of decorative elements. Whereas category “G” vessels hint at interaction among people interacting within sustainable or symbolic communities (based upon use of exotic visual styles), category “H” suggests interaction events between different, but frequently interacting, communities.

Expected Research Gain

It is clear that a sociopolitical and ideological transition occurred during the Middle Woodland period in west Michigan and this research examined the varying types of interactions accompanying this shift. In response to a general lack of information exchange (e.g., sharing of Havana-Hopewell information) in models of past interactions, this project evaluates information exchange in a more quantifiable and inclusive manner than previous research in the study region.

It expands our dialogue on information exchange to include active and passive expressions of personal and social identity and considers the development of interaction networks on multiple spatial scales. Because ethnographic data only address a limited temporal component, this research also provides a long-term perspective to information exchange processes among small-scale societies, as they pertain to the adoption of a foreign belief system (i.e., Havana-Hopewell). The research also examines long-term processes of identity and mobility, displaying the ways in which community identity is distributed across the Hopewellian landscape.

Furthermore, the integration of style with compositional analysis (i.e., petrography) allows for the identification of separate communities reflecting distinct behavioral patterns, which was based upon the implied sociopolitical context in which the vessels were constructed, as outlined in Table 1-1. This ultimately assisted in the discrimination between various types of Havana-Hopewellian interactions amongst these separate communities. This research design is intended to address certain deficiencies common in previous work, specifically that research within the study area has relied almost exclusively on visual style to explain interaction networks. Besides broad tradition and phase distinctions, social boundaries prior to this dissertation were not adequately identified in the archaeological record within the study area, especially in west Michigan. Instead of relying on normative types and phases characteristic of culture-history, this research examines the *process* of information exchange and dynamic interaction networks. The wedding of visual and technical style provides a significantly more comprehensive explanation of these interaction networks than has previously been possible and makes substantial contributions to an understanding of the spread of the Middle Woodland Havana-Hopewell phenomenon outside of the relatively more popular Illinois and Ohio "core areas." Of note, this research does not perform "source analysis" per se because it, instead, uses the analysis of clay from individual pottery sherds as a proxy for different clays used by ancient potters in the study region (see Chapters 3 and 4).

On a more general level, this research provides important insights into the functioning of segmentary tribal societies. Although Hopewell peoples in west Michigan (and in other areas of the Midwest) lacked well-developed agriculture, craft specialization, centralized distribution, and a hierarchical social structure (Hall 1997), this project illuminates the different types of interactions and mechanisms (such as diffusion, migration, family visitation, symboling of personal or community identity, etc.) that were responsible for integrating these seasonally mobile and decentralized societies for various social, ceremonial, political, and economic motives. The importance of drainage systems (e.g., Jarvenpa and Brumbach 2016; Lovis and Donahue 2011; Lovis and Whallon 2016) as an organizing factor for these communities is also exemplified throughout the dissertation.

This project's approach is also applicable to understanding the spread of Havana-Hopewell into other areas of the Eastern Woodlands and, generally, to understanding the spread of information in other regions and temporal periods as well. Based on social boundaries investigated here, future studies can incorporate lithics, fauna, and other analyses in order to provide a more complete view of Middle Woodland cultural dynamics in the Midwest. The use of multiple media and an appreciation of multiple perspectives on the past can only enhance our understanding of it.

Furthermore, the "bottom-up" approach taken here, which initially focused on local contexts, adds both a humanistic and an empirically scientific archaeological contribution to the field of anthropology. Lastly, the application of petrography (originally a geologic technique) to address archaeological problems, as exemplified in this research, highlights the multidisciplinary nature of anthropology and the benefits of working with professionals in other disciplines (such as geology) to advance archaeological method and theory.

Organization of Dissertation

In order to introduce the reader to the research conducted as part of this research, the dissertation is organized in the following manner. Chapter two provides a historical background on the Middle Woodland Havana-Hopewell phenomenon. It includes a general introduction and literature review of Havana-Hopewell research in the Midwest United States. This is followed by a more specific discussion on the Middle Woodland period within the study region, focusing separately on Michigan, the northwest Indiana Kankakee River basin, and Marshall County, Indiana. Chapter three discusses the methodology employed in this research in order to address the goals stated in the current chapter. The sampling methodology, choice of visual style and technical style variables, and the types of statistical analyses performed on these variables are explained. Chapter four introduces the results of this project's analyses. Final results related to the visual and technical styles of both Havana-related and Hopewell-related samples are discussed.

Chapters five and six draw from these results to identify and define the parameters of individual communities across the intraregional, regional, and interregional spatial scales. Mechanisms responsible for the spread of Havana-Hopewell into west Michigan and its temporal persistence are also highlighted. Chapter 5 also includes a discussion on new AMS dates collected as part of this research and how these guided my interpretations regarding the timing of events and the definition of communities through time. This ultimately led to the development of a new temporal model for the study region. Chapter seven provides a discussion on how my results fit within the larger archaeological literature regarding Havana-Hopewell interaction patterns. It also functions as a conclusion in which final thoughts are explained and recommendations for future research are suggested. Finally, appendices and references are inserted at the end of the dissertation, including a glossary (Appendix B) describing various terms that are commonly used in this dissertation.

CHAPTER 2 THE MIDDLE WOODLAND HAVANA-HOPEWELL PHENOMENON

Introduction

This chapter provides a historical background to the Middle Woodland period in the Midwest United States in order to set the context for the case study presented herein. It begins with a general discussion of the Havana-Hopewell phenomenon in the Midwest, followed by a discussion of how west Michigan and northwest Indiana Middle Woodland societies fit within this larger context (see Figure 1-1 for sites included in this dissertation). Current understandings of the origins of Havana-Hopewell and the chronology of the study region, including a short discussion of previous radiocarbon dates, are included in this discussion. Lastly, characteristics common to Michigan and northwest Indiana Havana-Hopewell societies are briefly introduced and justification for their inclusion in this research is explained.

The Havana-Hopewell Complex in the Midwest

Although non-Hopewell Middle Woodland cultures existed in the upper Great Lakes region (e.g., Lake Forest Middle Woodland consisting of Laurel, North Bay, Saugeen, and Point Peninsula traditions: see Brose and Hambacher 1999; Mason 1981; Fitting 1975) and in other parts of Eastern North America (e.g., Bense 1994; Milanich 1973), the Middle Woodland period is more commonly known for the Hopewell culture. The Middle Woodland Hopewell culture, spanning across much of eastern North America, dates from approximately 200 B.C. – A.D. 400. In general, all Hopewellian cultures share several basic traits that are easily recognized archaeologically: mound and/or geometric earthwork building and a remarkable mortuary program that frequently included the presence of a vast array of personal items crafted from exotic raw materials, such as copper celts, panpipes and earspools, mica cutouts, shell cups, ornaments of shell and stone, obsidian blades, diagnostic projectile points fashioned from exotic cherts, grizzly bear claw necklaces, smoking pipes made from exotic pipestone, Hopewellian pottery, or lumps of silver, chlorite, galena and red ocher, among many others (Bense 1994; Brose and Greber 1979; Burks and Cook 2011; Carr and Case 2006; Carr and McCord 2013; Case and Carr 2008; Charles and Buikstra 2006; Emerson, Farnsworth et al. 2013; Fagan 2000; Giles 2013; Greber 2009; Hively and Horn 2013; Nolan, Seeman, and Theler 2007; Seeman 1979).

Early to middle 20th century scholars explained the presence of this phenomenon as representing an interregional phenomenon and as a single monolithic culture. Shetrone (1930), for example, posited Hopewell was a single culture that spread from Ohio through conquest or diffusion, while Deuel (1952) suggested that Hopewell constituted a loose confederation of contemporaneous peoples who cooperated with one another and were tied together via trade, genealogy, and colonization from Ohio. Others (Hooten 1922; Neumann 1950, 1952; Prufer 1961; see Buikstra 1979 for a summary) suggested that Hopewell simply originated from a single long-headed people who shared an identical biological stock. Seltzer (1933) envisioned Hopewell as a series of similar cultures that developed from one common ancestral culture in the Southeastern United States. These interpretations, however, are dated and are no longer endorsed.

Perhaps the most influential early interpretations regarding Hopewell were put forth by Caldwell (1964) and Struever (1964, 1965). Both defined Hopewell as an interregional phenomenon and as a single, coherent entity separate from local culture. Their fixation upon the interregional scale derived from their reliance on what they termed the “Hopewell Interaction Sphere” (Struever 1964), an interregional exchange system linking much of the continent through the exchange of exotic raw materials. Caldwell and Struever both defined Hopewell as a religious, mortuary, ceremonial, social, and material symbolic phenomenon associated with the interregional spatial scale, which excluded consideration of more local level secular, domestic and subsistence-settlement practices and ideas.

Thus, following Caldwell and Struever, the Hopewell phenomenon was historically defined in similar and singular interregional terms by archaeologists. Carr (2006d: 576-577) succinctly summarizes the various ways in which Hopewell has been defined in this manner: a wide network of trade of raw materials and exchange of ideas (Struever 1964; Struever and Houart 1972), a specific mortuary cult (Prufer 1964), a shared religion (Caldwell 1964; Maxwell 1947), a worldview (Carr 1998, 1999; Carr and Case 1996; Romain 2000), a *Sprachbund* (speech area of shared understandings) (Seeman 1995), a Great Tradition of religious-based interaction and innovation (Caldwell 1964), a complex social organization interwoven with a symbol-ideological system for marking and claiming leadership and prestige (Seeman 1995), a network of peer polities involved in competitive display and consisting of two "core areas" in the Scioto and Miami valleys in southern Ohio and the Illinois and Mississippi River valleys in Illinois (Braun 1986; Dancey and Pacheco 1997), or simply an ecological adaptation (Braun 1986; Dancey 1996).

Although some of these scholars later acknowledged local contexts by articulating regional and local aspects of Hopewell, the primary focus of most of these studies was on the interregional Hopewell Interaction Sphere exchange system and/or explanation of how interregional distributions of interaction sphere goods arose (e.g., Brose 1990; Carr and Sears 1985; Goad 1978, 1979; Hatch et al. 1990; Hughes 2006; Struever and Houart 1972; Walthall 1981; Walthall et al. 1979, 1980), or on the interregional exchange of artifacts and ideas (Penney

1989; Smith 1979; Toth 1979). Thus, these studies focused on the connections between distant cultures or the nature of interregional interactions, *at the expense* of local practices and local conditions that led to the wide distributions of cultural similarities within the Eastern Woodlands (Carr 2006a).

It should be noted that one reason for the early archaeological fixation upon general "cult" behaviors or ritual interregional connections was due to the infancy of ^{14}C dating at the time, as well as the early emphasis in the field of archaeology on the culture-historical approach (Trigger 1989), and specifically on the use of W.C. McKern's (1939) Midwestern Taxonomic System (also see Trigger 1989 and Griffin 1943 for a discussion on the origins of the system). Although culture-history and McKern's classification system were (and still are) necessary to the field of archaeology due to the importance of developing chronological frameworks, they did lead early researchers to rely on normative spatial-temporal frameworks that did not draw the connection between the domestic/habitation and funerary/ceremonialism spheres.

Despite this trend, some archaeologists, most notably James B. Griffin (1967) did not ascribe to this interregional fixation and laid the initial groundwork for subsequent research on local cultural contexts. Griffin (1967) attributed the distribution of Hopewellian traits to variations among distinct, regional traditions and not to a pan-Middle Woodland mechanism that earlier studies generally proliferated. Griffin described the Hopewellian origin in Michigan, for example, as resulting from a migration of peoples from the Illinois valley, while Ontario Hopewell populations were posited to have arose due to either diffusion or population movements. Additionally, he suggested that independent regional traditions obtained exotic raw materials independently of other traditions, thus keeping the study of Hopewell within its local context. An important consequence of Griffin's (1952, 1965, 1967) work was a return of focus to non-mortuary contexts. For example, he suggested that Hopewell Ware was not only used in mortuary-Interaction Sphere contexts, but also in local domestic contexts (Griffin 1952). Thus, Griffin argued against Struever and Caldwell's separation of local culture and interregional practices by urging the re-connection of the domestic and funerary aspects of Hopewell and defining Hopewell as deriving from local-level cultural practices.

Griffin's early influence really began to be expanded upon in the late 1980s and 1990s when archaeologists began to incorporate new analytical techniques and technologies (e.g., geochemical or mineralogical sourcing [INAA, x-ray fluorescence, ceramic petrography], residue analysis [phytolith analysis], lithic use-wear analysis, DNA analysis, etc.). New approaches that focused more on symbolism and ideology in order to examine differences between regional Hopewell expressions also influenced the discipline at this time. These new methodologies and approaches ultimately led to the illumination of a new picture of Hopewell, one that shifted the focus of research to the more variable expressions of local variants of Hopewell and the examination of local contexts. Attention paid to local contexts and a multiscalar approach led to the realization that Struever and Caldwell's interregional model of Hopewell masked the variability present within regions and the significantly more complex cultural dynamics operating during the Middle Woodland period.

Smith (1992), for example, explicitly fused local with interregional practices and the domestic sphere (consisting of small farming settlements) with a "corporate-ceremonial sphere" (consisting of earthwork and mound complexes). Rather than aligning the corporate-ceremonial sphere with only the interregional scale, Smith defined Hopewell as being generated from both local domestic and ceremonial practices, which acted to provide a strong link between both spheres. Consequently, a more holistic and multiscalar paradigm ensued which carefully considered local contexts and their connection to larger regional traditions (e.g., Bolnick and Smith 2007; Buikstra 1976; Buikstra and Charles 1999; Carr and Case 2006a; Carr and Komorowski 1995; Carr and Maslowski 1995; Chapman 2006; Charles 1995; Greber 1976, 1996, 1997; Griffin 1967; Pacheco 1993, 1996; Pacheco and Dancey 2006; Prufer 1964; Prufer et al. 1965; Stoltman 2015; Wymer 1996, 1997).

As a result, variable and unique Hopewell regional expressions (outside of Ohio and Illinois) have now been recognized and defined in local contextual terms in the Eastern United States, such as the Marksville culture in the Lower Mississippi River valley (Gibson and Shenkel 1988; Mainfort 1996; Mainfort and Sullivan 1998), the Copena, Swift Creek, and Miller complexes in the Southeast (Bense 1994), the Kansas City Hopewell (Logan 2006; Wedel 1943b), the Mann phase occupation in the lower Wabash River valley area (Kellar 1979; Ruby 2006; Ruby, Carr, and Charles 2006; Ruby and Shriner 2006; Stoltman 2015), the Waukesha phase in southeastern Wisconsin (Jeske 2006; McKern 1942; Salzer n.d.), the Trempealeau phase in southwestern Wisconsin (McKern 1942; Stoltman 1979, 2006), or the Crab Orchard Tradition in the American Bottom (Fortier 2006; Fortier et al. 1989; Struever 1964). These distinct variants of Hopewell point towards the adoption of only certain elements of Hopewell information and material culture that fit within preexisting (and variable) cultural values.

This research follows this more contemporary trend by implementing a multiscalar approach to identify and more holistically define Havana-Hopewell in west Michigan and northwest Indiana. It implements a bottom-up approach that initially focuses on local cultural domestic contexts and their contributions to the generation of larger Havana-Hopewell domestic and ritual interaction patterns. The case study of this research focuses on the examination of local contexts among small-scale communities in the Norton (west Michigan) and Goodall (northwest Indiana) Traditions (Figure 1-2), with a particular emphasis on west Michigan populations and their adoption of Havana-Hopewell information and pottery technology. It examines Havana Ware, representing an early Middle Woodland Illinois stylistic influence in Michigan, and Hopewell Ware, which evidences an increasing Ohio Hopewell stylistic influence in Michigan. Although more recent Hopewellian studies have begun to examine local region interactions occurring within the interaction sphere, this research distinguishes itself because this dissertation refocuses on cultural processes the other kinds of studies do not consider. Specifically, it inquires about a whole different suite of questions related to the specific types of mechanisms responsible for the introduction and sharing of new information (i.e., Havana-Hopewellian socioreligious and technological ideas related to identity and interaction networks), thus providing a richer understanding of the dynamic cultural processes operating during this time period.

As described below, Michigan and northwestern Indiana's Middle Woodland archaeological signatures each represent unique Havana-Hopewellian expressions. This research focuses on the ways in which Havana-Hopewellian information was incorporated into a relatively egalitarian Michigan and northern Indiana Middle Woodland society that relied almost exclusively on hunting and gathering as their primary mode of subsistence, based upon the lack of evidence pointing towards a heavy reliance on cultigens in both of these regions (Brashler et al. 2006; Brashler, Garland, and Lovis 1994; Mangold 2009; Brashler and Holman 2004; Mangold and Schurr 2006). A discussion of Michigan and northwest Indiana Havana-Hopewell ensues. Appendix A broadly describes individual sites included in this dissertation and cites the sites' major references.

The Middle Woodland Period in Michigan

Historical Background

Havana-Hopewell in Michigan is currently separated into the west Michigan Norton Tradition (Griffin et al. 1970; Kingsley 1981, 1999) and the east Michigan Saginaw Tradition (Kingsley 1981, 1999). However, cultural relationships between Illinois and west Michigan have been noted for over 70 years and have continued to influence our understandings of the Middle Woodland period in Michigan. This relationship is evidenced by submound log-lined central tombs with ramps and burials associated with ceramic vessels, copper, mica, engraved turtle shell, and other exotic materials encountered in Illinois site assemblages (Flanders 1979; Griffin et al. 1970; Quimby 1941a, 1941b). As a result, Michigan Havana-Hopewell was originally implicated to have developed out of the "Goodall focus," as defined by George Quimby (1941a, 1941b, 1943) who noted ceramic and mortuary similarities between the Goodall region in northern Indiana and the Havana Tradition in Illinois. Of the ten sites used to define this focus, nine were located in Michigan, while only one was actually located in Indiana, the Goodall site itself.

The use of the "focus" concept by Quimby was intended to identify a group of sites that exhibited artifactual and stylistic similarities in contrast to other cultural groupings defined elsewhere. Although the Goodall focus did reflect some degree of similarity within Michigan Havana-Hopewell, it masked considerable variation for several reasons. First, it encompassed an uncomfortably large geographic region, especially when compared to our contemporary use of the phase-based taxonomy which usually attempts to define phases more limited to a river valley or a segment thereof. The Goodall focus crossed five major river valleys and covered a linear distance of over 300 kilometers between the Goodall site as the most southerly located site and the Brooks Mound component in the more northerly Muskegon River valley (Mangold and Schurr 2006). Quimby's focus also ignored other Havana-Hopewellian sites in the region because the artifacts were collected by looters, were vaguely described in print, were not available to Quimby to study, or the sites produced only a small amount of ceramics (Mangold and Schurr 2006). Furthermore, the focus concept is rarely, if ever, employed today partly because this taxonomic unit "does not accommodate temporal variability and thus masks cultural dynamics" (Kingsley 1999: 148).

Regardless, Quimby defined the Goodall focus as encompassing northern Indiana and the Muskegon, Grand, and St. Joseph River valleys in west Michigan. James A. Brown (1964) later reiterated linkages between Illinois and west Michigan, but stated that the "precise cultural relationship… was not apparent" (Brown 1964: 122) between the two. In fact, Brown redefined northwestern Indiana as a regional ecological adaptation within the Prairie Peninsula, separate from west Michigan. Although the connection between Michigan and the Illinois core was clearly alluded to by Quimby and Brown, sociocultural influences from the Ohio core area were simply suggested to "… have been received second-hand from… Illinois" (Quimby 1941a: 144).

In 1952, James B. Griffin (1952) authored the seminal paper on Havana-Hopewellian ceramic typology in Illinois, which has remained the gold standard of Illinois ceramic typology (Morgan 1985, 1986). Revised from Cole and Deuel's (1937) original typology, Griffin (1952) proposed an early Havana phase, followed by a Havana-Hopewell phase, and a later terminal Hopewellian Pike/Baehr phase. In 1970, Griffin et al. (1970: 188-189) subsequently named these Illinois phases, implied that Quimby's Goodall "focus" should be discarded, and also identified two separate phases in Michigan (Norton and Converse phases) that aligned with corresponding phases in Illinois. The latter two phases now comprise the west Michigan Norton

Tradition and generally supported Brown's earlier distinction between the Middle Woodland occupations of west Michigan and northwest Indiana.

Griffin et al. (1970: 189) proposed the Norton phase as representing the initial occupation of Hopewellian peoples in west Michigan, dating between 10 B.C. and A.D. 200. It was posited to have roughly corresponded with the Ogden and Bedford phases in the central and lower Illinois River valleys (Flanders 1977, 1979; Griffin et al. 1970; Kingsley 1999). More recently, Cantwell (1980) has revised the Middle Woodland Illinois chronology for the central Illinois valley by suggesting a Caldwell phase (150 B.C. - 50 B.C.) and a subsequent Fulton phase (50 B.C. – A.D. 150), both of which would correspond to the Norton phase. Both Griffin et al. (1970) and Richard Flanders (1977) officially proposed the Converse phase as representing the latter half of Hopewellian occupation in Michigan, dating between A.D. 200 and 400. This phase supposedly corresponded to the Pike and Steuben phases in the central and lower Illinois River valleys and the LaPorte phase in northwest Indiana.

Introduction of Havana-Hopewell

Due to the cultural similarities to Illinois Havana-Hopewell populations, the vast majority of archaeologists from the 1960's and into the 1990's viewed the introduction of Havana-Hopewell into Michigan as resulting from the migration of peoples out of the central Illinois River valley during the Fulton phase, traveling along the Kankakee River valley in northwest Indiana and into west Michigan (Brown 1964; Faulkner 1961; Flanders 1977; Garland and DesJardins 1995, 2006; Griffin et al. 1970; Kingsley 1981, 1990, 1999; Quimby 1941a). From there, these peoples are posited to have interacted with peoples in the Saginaw Valley region in the eastern Lower Peninsula of Michigan, continuing cultural interaction patterns likely established during the Early Woodland period (Beld 1993; Brashler and Mead 1996; Ozker

1982).

Despite early interpretations regarding the cultural “cohesiveness” of Illinois, Indiana, and Michigan Hopewell peoples, contemporary researchers now classify Michigan Havana-Hopewell as a separate phenomenon, distinct from the Goodall Tradition and Havana Tradition (Brashler 2003; Brashler et al. 2006; Garland and DesJardins 2006; Griffin et al. 1970; Kingsley 1999; Mangold 2009; Mangold and Schurr 2006). Furthermore, the idea of the origin of Havana-Hopewell in Michigan as resulting from the spread of ideology or information (i.e., diffusion), rather than migration, has picked up considerable steam in recent years (Brashler 2003; Brashler et al. 1998; Hambacher, Robertson, Brashler et al. 2003; Mangold 2009; Prahl 1991). Whereas proponents of the migration hypothesis relied upon what they interpreted as the lack of early diagnostic Illinois Havana Wares (e.g., Naples Ovoid Stamped, Neteler Stamped, etc.) and a “clear lack of a developmental sequence from Early to Middle Woodland” (Kingsley 1999: 151) in Michigan, more recent research supporting diffusion point out the drawbacks of relying on an Illinois-derived Havana-Hopewell model in Michigan, cite the early Middle Woodland Prison Farm site (Brashler et al. 2006) as evidence of a potential Early to Middle Woodland development, state that nearly every Havana site in Michigan with Middle Woodland ceramics also contains Early Woodland ceramics, note the recent discovery of very early Middle Woodland Naples Ovoid Stamped sherds in the Grand River valley, and point out that, despite the adoption of Havana-Hopewell stylistic traits, ceramic technology in Michigan was not as sophisticated as that seen in the Illinois Valley.

Unlike the Norton Tradition, which has historically been assumed to be the result of a migration of an Illinois-derived population, Saginaw Valley groups are suggested by Kingsley (1981; 1999) and Fitting (1975) to have simply adopted Havana-Hopewell traits (probably from west Michigan Norton phase peoples), resulting in the manifestation of a distinct “acculturated” cultural tradition referred to as the Saginaw Tradition. Regardless of its assumed origin, the Saginaw Tradition (Fischer 1972; Fitting 1972, 1975; Kingsley 1981, 1999) is not considered in this research because it is geographically beyond what has traditionally been seen as the localized *initial* movement of Havana-Hopewell into west Michigan. The inclusion of Saginaw Tradition sites would introduce confounding factors and is better left for subsequent study. Havana-Hopewellian cultures north of the Muskegon River valley (e.g., Traverse Corridor and the northern Lower Peninsula region) (Brashler and Holman 2004; Brose and Hambacher 1999) are also not included in this dissertation research because sites here reflect only an ancillary use of this area by Havana-related peoples from west Michigan and the Saginaw River valley (Brashler and Holman 2004).

Thus, the focus of this dissertation is the Norton Tradition and the “Goodall periphery” (as described below) and their relationships to the Goodall Tradition in northwest Indiana. The Norton Tradition (Griffin et al. 1970; Kingsley 1981) in this research tentatively comprises the Muskegon (Prahl 1970), Grand, and Kalamazoo River basins. On the other hand, the St. Joseph River valley, which represents the southern-most boundary of Michigan Havana-Hopewell, is tentatively not included in the Norton Tradition because it has a more “mixed” sociocultural nature than the Muskegon, Grand, and Kalamazoo River valleys. Termed the “Goodall periphery,” it has attributes more characteristic of Goodall Tradition sites but simultaneously contains some attributes similar to more northerly sites in the Grand and Muskegon valleys (Garland and DesJardins 2006). Thus, it has sometimes been subsumed under the Goodall Tradition (Mangold 1981; Mangold and Schurr 2006; Schurr 1997). Recent research by Mangold (2009), however, excludes the St. Joseph River valley from the Goodall Tradition while including only the Galien River basin sites in extreme southwest Michigan. The ambiguous nature of the St. Joseph River valley will provide a starting point from which to examine interaction networks between separate communities within and between the Norton and Goodall Traditions.

Subsistence and Settlement Patterns

West Michigan Middle Woodland groups appear to have been characterized by a relatively low population density, a high level of mobility, and the continued practice of a Late Archaic lifestyle (Brashler, Garland, and Lovis 1994; Brashler et al. 2006; Garland and DesJardins 2006). "A pattern of nonintensive use of available plant foods, in which cultigens were known but marginally significant, may have persisted from Late Archaic times well into the Late Woodland period in western Michigan" (Brashler et al. 2006: 275). In other areas of the Eastern Woodlands, however, societies did incorporate a low-degree of horticulture during the Middle Woodland period. New studies implementing new methodologies such as stable isotope analysis of bone (Schoeninger et al. 1983; Schoeninger and Moore 1992), fatty acid analysis of pottery pastes (Eerkens 2005; Malainey et al. 1999), analysis and identification of microbotanical and macrobotanical remains (Messner 2011; Messner et al. 2008; Mulholland 1993), or dating of domesticates and carbonized residues with the use of accelerator mass spectrometry (Lovis 1990; Monaghan, Lovis, and Egan-Bruhy 2006; Raviele 2010, 2011) have provided good evidence for an earlier than expected use of domesticates in several regions of the Eastern Woodlands (see Raviele and Lovis 2014 and Hart and Lovis 2013 for summaries). For example, in the Saginaw basin region of Michigan, Raviele (2010) discovered evidence for the use of a dried version (i.e., kernels or flour) of maize as early as the early Middle Woodland period. Although recent studies such as these point toward an earlier than expected use of domesticates, there still remains a lack of evidence that subsistence patterns in west Michigan were drastically altered since Late Archaic times (Brashler, Garland, and Lovis 1994) or that the early use of maize (and other domesticates) resulted in a transition to a settled agricultural village lifestyle (Hart and Lovis 2013; Hart and Means 2002).

Instead, it appears that west Michigan subsistence and settlement patterns revolved around seasonal movements targeting different resources, which is reminiscent of a residentially mobile hunter-gatherer society. Social aggregations would occur during the late fall and spring seasons, which would have provided opportunities to create and reaffirm kinship ties (Brashler et al. 2006). Burial mound activity and social aggregation would have also occurred during the warm season. It should be noted that mounds in west Michigan do not exhibit the scale, variability in functional types (e.g., lacking platform mounds and earthworks), or social complexity (lacking evidence of rank), as those in Illinois (Brown 1981; Carr 2006b) and Ohio (Greber 1976, 1979; Greber and Ruhl 1989).

The heavy exploitation of large game (especially white-tail deer) would have occurred throughout the year but would have been especially important during the fall and winter. Nut collection would occur primarily during the fall, while edible wild plants would have been collected during the spring or summer (Brashler et al. 2006). Although most of the large sites occur along the main river banks, the cold-season use of interior upland/hinterland sites for short-term hunting purposes or other various uses was an important part of the settlement pattern as well (Egan-Bruhy 2003; Stretton, Chapman, and Brashler 2000). Populations also appear to have dispersed to interior lakes and headwater regions during other parts of the warm season (Brashler and Holman 1999; Egan-Bruhy 2002), and possibly to the lower reaches of the major river valleys in order to focus on resources in the marshes and swamps of these areas

(Hambacher and Robertson 2002). Seasonally available fish species, such as anadromous fish (e.g., sturgeon), would become important supplements to large game hunting in the spring time (Brashler et al. 2006).

Although west Michigan groups did focus heavily upon lake sturgeon (Brashler et al. 2006), they do not appear to have focused as heavily on aquatic resources as those people in the Saginaw Valley region of east Michigan (Cleland 1966; Lovis et al. 2001; Luxenberg 1972). Within the Saginaw valley, subsistence activities focused on the exploitation of wetland resources such as fish, aquatic mammals, turtles, or water snakes (Lovis et al. 2001), along with large game (especially white-tailed deer). This subsistence base was diversified and supplemented through the incorporation of secondary resources, such as storable nuts, squash, wild rice, aquatic tubers, and probably maize and sunflower (Egan 1993; Lovis et al. 2001; Monaghan and Lovis 2005; Monaghan, Lovis, and Egan-Bruhy 2006; Raviele 2010).

Radiocarbon Dates and Temporal Considerations

As mentioned above, the two temporal phases in the Norton Tradition are the Norton phase and the Converse phase. The Norton phase was assumed to begin with the introduction of early Illinois-derived Havana Ware (10 B.C. – A.D. 200), while the later Converse phase was assumed to arise with the introduction of Hopewell Ware (A.D. 200 – 400). The problems inherent with these temporal schemes are significant, however. It is important to acknowledge that the Norton and Converse phases are simply heuristic devices derived from an Illinois analogue. Since the Illinois model probably is not wholly applicable to the unique archaeological record in Michigan, it is no surprise that the Norton and Converse phases are difficult to assess with material from Michigan sites. Contributing to this problem is the fact that radiocarbon dates and phase-sensitive artifacts are relatively rare from Michigan Hopewell sites, precluding a confident determination of many sites' phase designations. Radiocarbon dates published prior to this dissertation are detailed in Table 2-1 below.

Lab Number	Site	Site #	CONVENTIONAL AGE	CALIBRATED AGE/RANGE	*Suggested Phase Designation
M-1982	Jancarich	20NE113	2260 +/- 140 BP	Cal BC 790 to AD 20	Norton
Beta-113899	Prison Farm	20IA58	2100 +/- 40 BP	Cal BC 195 to 5	Norton
Beta-113897	Prison Farm	20IA58	2090 +/- 70 BP	Cal BC 355 to 290/ Cal BC 230 to AD 70	Norton
Beta-113898	Prison Farm	20IA58	2020 +/- 60 BP	Cal BC 175 to AD 110	Norton
M-1938	Schumaker Mound	20NE107	2030 +/- 140 BP	Cal BC 390 to AD 315	Norton
Beta-148361	Converse	20KT2	1970 +/- 40 BP	Cal BC 50 to AD 110	Converse
Beta-153908	Converse	20KT2	1960 +/- 40 BP	Cal BC 40 to AD 120	Converse
Beta-83091	Prison Farm	20IA58	1960 +/- 40 BP	Cal BC 35 to AD 130	Norton
Beta-69939	Arthursburg Hill	20IA37	1960 +/- 70 BP	Cal BC 32 BC to AD 125	Norton
M-1493	Norton Mound C	20KT1	1960 +/- 120 BP	Cal BC 58 to AD 240	Norton
Beta-153907	Converse	20KT2	1950 +/- 40 BP	Cal BC 40 to AD 130	Converse
M-1965	Palmiteer Mound	20NE101	1960 +/- 140 BP	Cal BC 370 to AD 380	Norton
Beta-113900	Prison Farm	20IA58	1910 +/- 80 BP	Cal BC 50 to AD 265/ Cal AD 290 to 320	Norton
Beta-113894	Prison Farm	20IA58	1910 +/- 40 BP	Cal AD 25 to 220	Norton
Beta-148359	Converse	20KT2	1890 +/- 40 BP	Cal AD 40 to 230	Converse

Table 2-1: Radiocarbon Dates for Middle Woodland Sites in Michigan
(* Following Kingsley 1999; Brashler et al. 2006)

Table 2-1 (cont'd)

Beta-113896	Prison Farm	20IA58	1890 +/- 40 BP	Cal AD 55 to 235	Norton
Beta-65120/ CAMS-8329	Zemaitis	20OT68	1890 +/- 60 BP	Cal AD 110 to 249	Norton or Converse?
Beta-64946	Arthursburg Hill	20IA37	1880 +/- 60 BP	Cal AD 76 to 236	Norton
Beta-6557	Zemaitis	20OT68	1870 +/- 70 BP	Cal AD 75 to 240	Converse
Beta-113895	Prison Farm	20IA58	1860 +/- 60 BP	Cal AD 45 to 330	Norton
M-1490	Norton Mound H	20KT1	1850 +/- 100 BP	Cal AD 71 to 324	Norton
M-1428	Spoonville village	20OT1	1840 +/- 120 BP	Cal AD 66 to 341	Norton or Converse?
Beta-231474	Davis Swamp	20MU132	1820 +/- 40 BP	Cal AD 90 to 260/ Cal AD 290 to 320	Converse
M-1488	Norton Mound H	20KT1	1790 +/- 120 BP	Cal AD 71 to 426	Norton
Beta-153909	Converse	20KT2	1770 +/- 40 BP	Cal AD 140 to 380	Converse
M-1427	Spoonville village	20OT1	1735 +/- 110 BP	Cal AD 148 to 426	Converse
	Mushroom	20AE88		Cal AD 265	Converse
Uga-2347	Mushroom	20AE88		Cal AD 410	Converse

Michigan archaeologists have generally found it simpler to affix sites to the Norton phase based on the presence of early Havana Ware-related ceramics. In contrast, all Converse phase assignations are highly questionable (Kingsley 1999), which is likely due to the fact that the transition between the two phases is poorly understood and has never been adequately documented (Brashler 2003; Brashler et al. 2006). This leads Kingsley (1999: 151) to suggest that "it is entirely possible that the two-phase division is not warranted," a sentiment some contemporary archaeologists still share today. In fact, most sites assigned to the Converse phase are included therein because of an absence of early material (e.g., Havana Ware) or because they are somehow "unusual," thus suggesting "lateness" (Kingsley 1999). Even today, there are not enough data or adequate ceramic typologies present that would explain the cultural dynamics operating during the later Converse phase from approximately A.D. 250 to A.D. 400 (Brashler 2003).

More recent research has shed a ray of light on some of these uncertainties. Based on the recent study of Norton and Converse phase ceramics, Brashler (2003) and others (Brashler et al. 2006; Hambacher, Robertson, Brashler et al. 2003) have opined for a reconsideration of the temporal boundaries of both phases and have called into question the validity and usefulness of the Converse phase itself. There are two important developments here. First, the inception of the Norton phase (along with Norton phase ceramics/Havana Ware analogs) has more accurately been determined to date to approximately 100 B.C., based on recent radiocarbon dates from Havana Ware analogs from the Prison Farm site (Brashler et al. 2006; Chivis and Brashler 2007). This reveals an earlier introduction of Havana-like (and related Norton Ware) pottery in west Michigan, at least 90 years earlier than what was traditionally accepted.

Secondly, it now appears that there was also an earlier introduction of Hopewell Ware pottery into west Michigan. Based upon examination of Hopewell Ware-like ceramics from the Converse village site, Brashler (2003) has provided strong evidence for the "Hopewellianization" of west Michigan during the early stages of what was originally the temporal span of the Norton phase (10 B.C. – A.D. 200). Several ceramics with Hopewellian traits originally believed to belong to the Converse phase (those with plain rocker stamping, incising, and dentate rocker stamping) produced dates of A.D. 40, A.D. 50, and A.D. 60. These dates are approximately 150 years younger than what was believed to be the initiation of the Converse phase (A.D. 200) and they even predate the single Norton phase Havana Ware-like sherd at Converse. It appears that there is chronological overlap of Havana and Hopewell-related ceramics together at the site (Brashler et al. 2006).

Taken together, we now have evidence pointing to an earlier-than-expected introduction of both Havana- and Hopewell-related pottery into west Michigan. As a result, this has led to the creation of a new temporal model detailing the Middle Woodland sequence in west Michigan (Brashler 2003; Brashler et al. 2006; Hambacher, Robertson, Brashler et al. 2003). This model suggests that Havana and the related Norton Ware ceramics were introduced early in the 1st century B.C. These ceramics are characterized by relatively thick-walled, smoothed-over cordmarked or cordmarked vessels with decorative traits consisting of thick toothed dentate stamping, zone lines, beveled lips, and nodes. The Norton phase, then, is now posited to date from 100 B.C. to A.D. 100. The dates of the subsequent Converse phase have been shifted to A.D. 100 to A.D. 400, roughly coinciding with the appearance of Hopewellian ceramic technology and designs, such as plain rocker stamping, incising, combing, brushing, cross-hatching, hemiconical punctates, and thin zone lines. This chronological model is compared to the contemporary chronology of the Kankakee River valley (Mangold and Schurr 2006) in Table 2-2 and is tentatively employed in this research as a starting point for interpreting Havana-Hopewell interactions. As will be discussed in Chapter 5, this model is slightly revised and manipulated in order to yield more meaningful comparative results regarding the types of mechanisms responsible for the introduction and practice of Havana-Hopewell in the study region.

<table>
<tr><th>Date</th><th>West Michigan Phases[*1]</th><th>Kankakee Valley Phases[*2]</th></tr>
<tr><td>A.D. 400</td><td rowspan="2">Converse</td><td>LaPorte</td></tr>
<tr><td>A.D. 200</td><td rowspan="2">Goodall</td></tr>
<tr><td>A.D. 100</td><td rowspan="4">Norton</td></tr>
<tr><td>A.D. 1</td><td rowspan="3">Stillwell</td></tr>
<tr><td>50 B.C.</td></tr>
<tr><td>100 B.C.</td></tr>
<tr><td>200 B.C.</td><td>Early Woodland</td><td>North Liberty</td></tr>
</table>

Table 2-2: Norton Tradition and Goodall Tradition Phases
(*Sources*: [*1] from Brashler et al. 2006; [*2] from Mangold and Schurr 2006)

The Middle Woodland Period in the Kankakee Basin of Northwest Indiana

The other focal point in this dissertation is the Goodall Tradition (Quimby 1941a, 1941b; Mangold 1981, 2009; Mangold and Schurr 2006), which encompasses the Kankakee River valley in northwestern Indiana. The earliest Middle Woodland occupation appears to have occurred in the western portion of the "Kankakee Marsh" (Brown 1964) and the central and upper Kankakee valley with most sites being located between St. Joseph and Porter counties and most mound sites located on the northern side of the Kankakee (Mangold 1997, 2009; Mangold and Schurr 2006). Presumably, the preference for site locations on the northern edge of the valley reflects the importance of upland resources and the use of the uplands as a transportation corridor. Conversely, the lower Kankakee travels away from these uplands and most sites there appear to be somewhat later than those in the upper Kankakee. Around A.D. 200, populations start to expand from the central Kankakee into the lower Kankakee and surrounding areas (Mangold 2009; Mangold and Schurr 2006). Partly based upon macroscopic and petrographic observations of pottery, Mangold (2009) excludes the extreme lower Kankakee from the Goodall Tradition altogether.

Similar to west Michigan populations, there is a general lack of evidence for substantial architectural construction, storage, and Eastern Agricultural Complex domesticates (Mangold and Schurr 2006). The four site types employed in the Kankakee appear to be marsh-edge mound groups with associated habitations, small marsh extraction sites utilized to gather aquatic resources, large island sites, and small camps in the uplands. Therefore, a highly mobile lifestyle revolving around seasonal movements between the marsh, marsh edge, and the uplands is evident (Mangold 2009: 225; Mangold and Schurr 2006). As Mangold and Schurr (2006: 226) state, “the Goodall Tradition was at the lower end of complexity for Middle Woodland societies, and it is not certain if they represent ‘Big Men’ societies or something even less complex.”

Stylistic analyses on Goodall Tradition ceramics have demonstrated an overall similarity in decorative elements to Havana Tradition societies located further south and west in the Illinois River valley (Mangold 1981, 2009; Mangold and Schurr 2006; Schurr 1997). In contrast, there is generally a lack of characteristic Michigan Norton Tradition design aspects within the Goodall core area in northwestern Indiana (Mangold, personal communication 2009). In fact, the Norton and Goodall Traditions are suggested to be two wholly distinct entities (Mangold 1981, 2009; Mangold and Schurr 2006; Garland and DesJardins 2006; Schurr 1997). The North Liberty, Stillwell, Goodall (A.D. 1 – 200), and LaPorte phases (Mangold and Schurr 2006) of the Goodall Tradition are of interest in this research, since they generally correspond to the Norton and Converse phases in west Michigan (see Table 2-2 above).

The Middle Woodland Period in Marshall County, Indiana

Another important region that has not previously been considered in detail is Marshall County in north-central Indiana. The Yellow River basin drains a large portion of Marshall County and joins with the Kankakee River to the west (Figure 2-1). Although it would be logical to assume that the most intense Middle Woodland occupation of Marshall County would have occurred on the Yellow River (presumably due to ease of travel between the county and the Kankakee), this is simply not the case. In fact, only one site with Middle Woodland pottery was found along the Yellow River during the survey of the county (Faulkner 1961) and most Middle Woodland sites in the county are located on sandy loam or sandy dunes in the western part of the county.

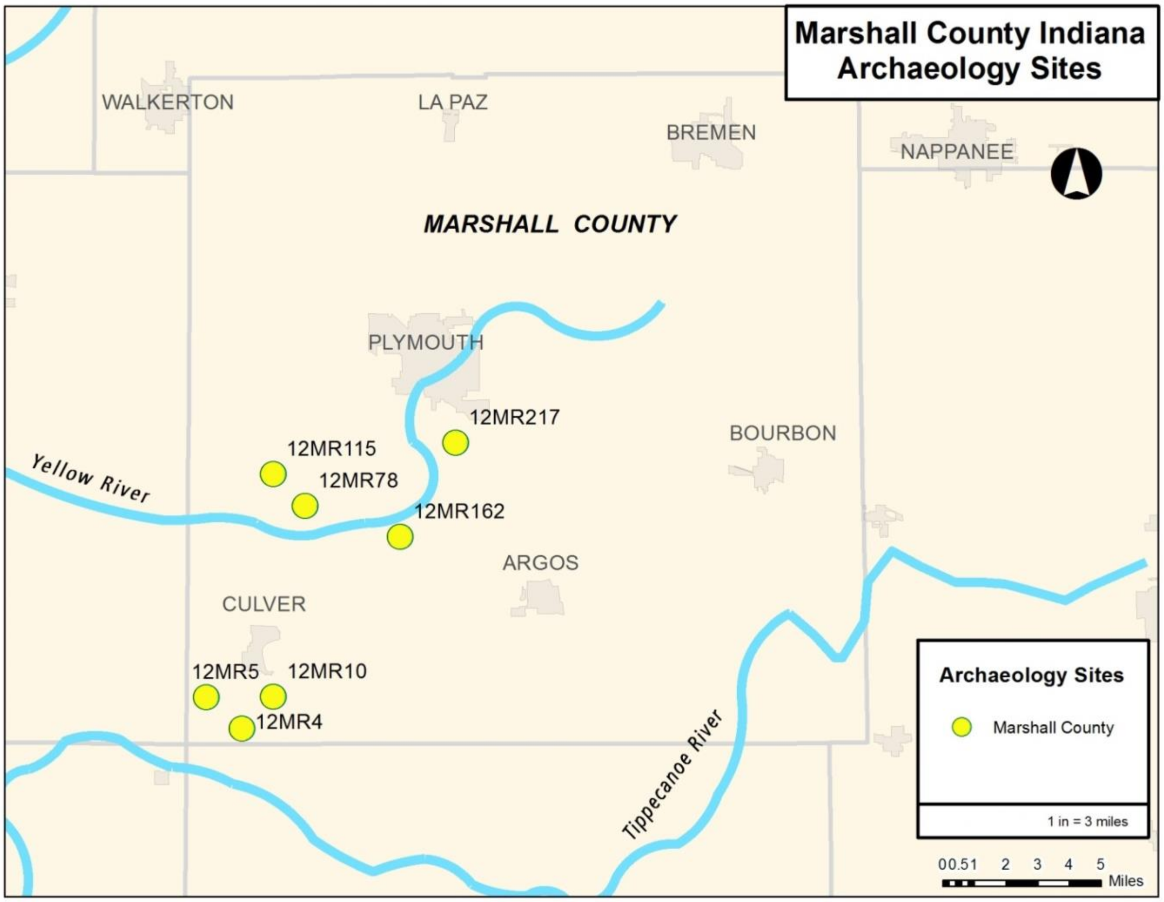


Figure 2-1: Yellow River Basin, Marshall County

The favorite place of residence for Middle Woodland peoples appears to have been near Lake Maxinkuckee in the southwest corner of Union Township, which is the township located in the far southwest corner of the county (Faulkner 1960, 1961). Havana and Hopewell ceramics from seven sites (12MR4, 12MR5, 12MR10, 12MR78, 12MR115, 12MR162, 12MR 217) in Marshall County are included in this research and were helpful in elucidating the breadth of interaction patterns within the study region and the variety of design elements incorporated into extant decorative repertoires by different communities. These sites are detailed in Faulkner's (1961) survey of Marshall County and are briefly discussed in Appendix A.

Conclusion

This chapter began with a discussion of early Havana-Hopewellian studies, which have tended to focus on highly visible prestige goods within the Hopewell Interaction Sphere. These items, however, only address a limited sphere of interaction that emphasizes status goods, organized transport, and elite involvements (Fie 2006, 2008) and downplays the important roles of distinct communities and their contribution to the distribution of particular material culture types (Carr 2006d). Unlike these early studies, this dissertation benefits from the post culture-historical theoretical and methodological developments of the field of archaeology, including the continued discovery and refinement of habitation, mortuary, and subsistence-settlement data, as well as the now-prevalent ^{14}C frameworks available at hand. These factors allow this dissertation's approach to contrast with those earlier culture-historical studies by acknowledging that the diversity of economic, political, social, and ideological processes operating *inside* each cultural group is as important as external processes (i.e., long distance exchange and interaction) in shaping the overall organization of an interaction network (Dobres and Hoffman 1994; Stein 2002).

In light of this acknowledgment, this research took a “bottom-up” approach by first utilizing ceramic groupings to identify and describe intraregional residential communities and then examining how these groups incorporated themselves into other communities on larger spatial scales. This more comprehensive multiscalar approach surpasses previous studies that have employed a more narrow focus on interregional interactions. As Brashler et al. (2006) state, “we need to understand what was happening here first and then look at how the relationships between the Grand and other areas during the Middle Woodland can advance our understanding of Middle Woodland cultural processes.” The following chapter describes the methodologies employed in this research to accommodate such an approach.

CHAPTER 3 CERAMIC METHODOLOGY AND ANALYSIS

Introduction

Chapter 1 explains that identifying different types of communities involved in the initial spread of Havana-Hopewellian information into west Michigan was the initial focal point of this research. This research problem was approached through the study of Havana-Hopewellian pottery from both habitation and burial mound contexts and through a multiscaler approach that fused visual style and technical style. The approach employed in this dissertation is a result of decades of advancements in the study of ceramics and their pastes. The initial study of archaeological pottery focused on the artistic design of these vessels, which produced data composed primarily of stylistic and decorative attributes. This allowed for initial classification and typologies to be developed, ultimately resulting in the establishment of chronologies.

Despite these important contributions, there was little interest in identifying and explaining the technologies inherent in the process of ceramic production. Anna Shepard's (1936, 1939, 1942, 1956, 1965) studies, however, highlighted the importance of ceramic technology and vessel function to explain past cultural systems. Of importance to this research, Shepard introduced the utility of petrographic analysis of ceramic pastes by applying the method to the qualitative identification of temper types used by pre-Columbian potters in New Mexico. Similar concern over ceramic technology was exemplified by Peacock (1968, 1977) and Warren (1967) in their qualitative analysis of pottery vessels. Another influential contribution to ceramic analysis was Matson's (1965) ceramic ecology, which called for the collection and study of the raw materials used in pottery manufacture in order to make connections between the technological choices made by the potters and the production and use of the ceramics. These early studies encouraged many later scholars (e.g., Bishop 1980; Bishop, Rands, and Holley 1982; Braun 1982, 1983; Grim 1968; Hoard, Khorasgany, and Goplaratnam 1995; Neff, Bishop, and Sayre 1988, 1989; Neupert 1994; Rice 1982, 1984, 1985, 1987; Rye 1976, 1977, 1981; Steponaitis 1984; Williams 1983) to employ various technological approaches (e.g., neutron activation analysis, electron microscopy, x-ray diffraction, atomic absorption spectroscopy, etc.) of pastes to better explain the function of these vessels and their physical, mineralogical, and chemical properties.

In the late 1980's and early 1990's, Stoltman (1989, 1991, 2001, 2015) introduced a new and innovative petrographic method for the study of ceramic pastes. Whereas previous ceramic petrography analyses were almost exclusively qualitative in nature, Stoltman (1989, 1991) applied the point-counting method to thin section analysis in order to yield quantitative data. With the advent of technical (also called technological) style (Lechtman 1977; Morris 1995; Stark 1999; also see Chapter 1 discussion), the discipline was ready for an approach that combined ceramic petrography with a technical style analysis, but one geared towards the exploration of identity in the archaeological record. This is precisely the approach taken in this dissertation and constitutes the first Middle Woodland study in the study region to do so. It ultimately combines compositional analyses (specifically, the qualitative and quantitative description of ceramic thin sections) with stylistic and morphological pottery analyses. As explained in Chapter 1, this allowed for the examination of community identity on multiple spatial scales and the subsequent identification of these communities' interaction and mobility patterns. Although ceramic pastes can inform on the function of vessels (see studies cited above and Skibo and Schiffer 2008), the use of technical style in this research allows for an identification of communal identity due to its ability to detect visually obscure attributes of ceramic manufacture that are passed on from generation to generation and that are unconsciously or subconsciously incorporated in the production process (see Chapter 1 and below). Additionally, the separate study of Havana-related samples and Hopewell-related samples in this research was also implemented in order to ensure that differences in function between the two ware categories would not skew my interpretations regarding the identification of identity (see below).

This chapter introduces the reader to this methodology, which is employed to accomplish the goal of identifying separate communities (residential, sustainable, and symbolic) on multiple spatial scales and how the use of both visual and technical styles support this endeavor (see the glossary of terms in Appendix B for terms commonly used in this dissertation). It begins with an explanation of the sampling methodology employed and the importance of decorative repertoires in the original sampling process. Next, visual style and technical style variables are discussed separately. Lastly, spatial scale expectations regarding the local or exotic nature of pottery samples are discussed.

Sampling Methodology

This project's sampling methodology was designed to sample representative pottery sherds from each river valley and to use these to, first, identify and define small-scale residential communities on the intraregional spatial scale, and, second, to examine the variable nature of interactions between these communities on the regional and interregional spatial scales. A previous pilot study conducted by the author on the large Prison Farm site ceramic collection aided in defining an adequate sampling methodology, which is described below.

The first sampling step involved locating Middle Woodland Havana Ware-related and Hopewell Ware-related sherds and separating them from non-Middle Woodland ceramics.

Diagnostic traits used to identify the samples included zoning, dentate stamping, cordwrapped stick impressing, noding, punctation, and other Havana and Hopewell Ware traits (e.g., Griffin 1952; Morgan 1985). While smoothed or plain sherds might be included in Middle Woodland assemblages, these were excluded if the site was multicomponent so that the selection of early Middle Woodland sherds was not jeopardized. A minimum size limit of 35 millimeters in length was also implemented to guard against the overestimation of certain decorative elements due to small sherd size.

Second, for each of the Middle Woodland sherds at each site, the decorative attributes that were used to adorn it were recorded. Performing this on all of the sherds yielded the total *decorative repertoire* that was used on the vessels from a particular site. It was assumed that sherds originated from a range of vessels. Importantly, at this stage, precedence was given strictly to exterior decorative elements because, due to their high visibility, these are likely to communicate a high degree of active personal or communal identity, which is a focal point of this research (Carr 1995a, 1995b). The total decorative repertoire, consisting of the percentages of each individual exterior and interior decorative element used in the site's ceramic collection, was calculated. These data were used to select specific samples for inclusion in this research.

The last step involved the actual selection of rim and body sherds (from separate vessels if possible) that closely mirrored the total decorative repertoire of the "population." For example, if 16% of a site's total decorative repertoire was characterized by the presence of dentate stamping, then approximately 16% of the number of samples chosen from this particular site contained dentate stamping. The individual decorative elements that comprised the largest percentage of the total decorative repertoire, based on counts, were given precedence in sampling because of their potential importance in defining a residential community. At the same time, sherds with rare decorative traits were also included because these represent potential "exotic" designs and were vital to identifying a site's involvement in regional-scale symbolic and sustainable communities.

This project attempted to include pottery from as many sites as possible in order to more comprehensively define the areal/geographical extent of a community's social boundaries. The research also incorporated the use of both rim and body sherds, which allowed for the potential identification of variability in the decorative repertoires employed by communities within and between river basins in the study area. Havana-Hopewell people frequently applied different decorative elements or combinations to the upper neck or rim portion of the vessel as opposed to the body section (Griffin 1952; Morgan 1985). The simultaneous use of both rim and body sherds was considered a necessity for identifying the complete decorative repertoire embraced by potters at a particular site.

Visual vs. Technical Style Variables

As stated in Chapter 1, both visual and technical style variables are used to define residential, sustainable, and symbolic communities. This section describes the variables of importance incorporated in this analysis of visual and technical styles. The stylistic and ceramic petrography methods used to study pottery sherds are discussed in this section. Also included is a short discussion regarding the justification of separating Havana-related and Hopewell-related pottery samples in this research. Visual styles are discussed first, followed by a summary of the technical style variables.

Visual Style Variables

This research applies Carr's (1995b) unified middle-range theory of artifact design, along with the author's previous pilot project, to form the basis for the choice of visual style and technical style variables described below. Morris (1995) defines *visual style* as the visible, elaborate formal variation that is *actively* used to communicate messages. The reasoning behind the selected visual style variables was based upon the concept that the most visual aspects of ceramic vessels have the potential for playing a role in the active communication of identity of large social units (Carr 1995b).

Although highly visible attributes, which are easily copied and can diffuse quickly and widely, are generally not good indicators of interaction (Friedrich 1970), attributes of high to moderate visibility may, in fact, reflect social interactions if the interactions are important economically, politically, socially, and/or ecologically, and if they come to be actively recognized, materially symbolized, and communicated (Carr 1995b). The latter circumstance is expected during the Middle Woodland period in west Michigan and northwest Indiana, as evidenced by the widespread sharing and/or adoption of Hopewellian ideas, symbols, and traits in both regions. In these kinds of cultural contexts where style is used actively to express social or individual messages, these active processes may dominate the production and form of the more visible attributes (Carr 1995b). In this case, it is assumed that the use of similar symbols within the study region denotes a shared identity and belief system.

The qualitative or categorical visual style variables employed in this research include surface finish (e.g., slip), surface decoration type/motif (e.g., stamping, incising), surface decoration orientation, exterior sherd color, oxidation/reduction, and temper type. These traits were later coded for statistical analyses. Given the nature of visual symbols as effective and frequent communicators of intentional messages (Carr 1995b), the decorations that are illuminated by these variables were seen as having an active role in the communication of communal identity.

Technical Style Variables

Technical style is defined by Morris (1995) as the formal variation, both visible and non-visible, that results from individual or group traditional choices in the techniques of production. It encompasses parts of Lechtman's (1977) definition of technical style and Sackett's (1982) isochrestic style. Thus, technical style can actively communicate messages or passively reflect enculturation patterns. Most of the chosen technical style variables in this research are visually obscure on the regional and interregional spatial scales (i.e., to members of separate symbolic and sustainable communities) due to the nature of the ceramic-making process, which involves teaching/imitation events in which contact is close, very intimate, and frequent (Carr 1995b; Gosselain 1998; Wallaert-Petre 2001).

Generally, compared to visual style variables, the similarity of these obscure attributes between social groups is a more accurate indicator of the degree of active and passive community interaction (Carr 1995b; Friedrich 1970; Pryor and Carr 1995). Since obscure attributes are not easily copied and do not diffuse quickly, they can indicate group interaction through intermarriage, family networks of artisans, more informal networks of passively interacting artisans, artifact exchange, intimate ceremonies, and so on (Carr 1995b; Friedrich 1970). It must be stated, however, that these variables can potentially operate like visible nominal variables, but only if they have dramatic modalities (Carr 1995b; Spaulding 1982; Voss 1982; Voss and Young 1995), but this was not experienced in this research.

Non-Petrographic Technical Style Variables

Some non-petrographic morphological and continuous "decorative" variables were critical to understanding interactions on various spatial scales. These variables fall within the technical style construct herein described and were helpful in identifying patterning or differences between groups. The non-petrographic technical style variables related to vessel morphology included rim shape, lip shape, rim height, lip thickness, rim thickness, body thickness, and rim angle. These variables may be a visual and active representation of personal identity but are a more likely passive indicator of social identity since they are not visible at a large distance and are poor candidates for effective communication (Carr 1995b). Obscure continuous variables relating to surface decoration include decorative element/motif length, element width, and distance between decorative elements. These "small and simple relational" obscure attributes can reflect a wide variety of active and passive personal and personal-physiological processes (Carr 1995b).

Ceramic Petrography Technical Style Variables

The petrographic variables and indices implemented in this study represent aspects of technical style because they are directly related to the ceramic production process and, therefore, active and passive individual and/or social identity (Bober 2003; Dobres and Hoffman 1994; Hodder 2000; Hoffman and Dobres 1999; Ingold 1990; Lemonnier 1986, 1990, 1993a, 1993b; Miller 2007; Wright 1993). As will be seen, these types of petrographic variables proved to be the most useful of all variables in this research and acted as excellent starting points for defining small-scale residential communities and their geologic variability (see Chapters 5 and 6).

The petrographic methodology employed in this project adhered to Stoltman's (1989, 1991, 2001, 2015) approach, which is designed to extract both qualitative and quantitative data from ceramic thin sections. Each thin section is subjected to a two-step analysis. The first, or qualitative, step involves forming initial observations of the thin section, including observing the mineral inclusion types and compiling a list of natural inclusions and temper types (Stoltman 1991).

The second step involves the derivation of quantitative data through point counting, in which a grid is superimposed over a thin section and every observation at a grid intersection point is recorded (Stoltman 2001). Using a 1-mm grid interval ensures that between 100 and 350 points are counted for each slide, and the level of precision obtainable with this technique to estimate the paste composition of ceramic vessels normally can be expected to exceed 95% (Stoltman 1989).

Qualitative/categorical petrographic variables employed in this study included temper type and texture, natural inclusion type and texture, void type within the clays, ARF (argillaceous rock fragments) presence (di Caprio and Vaughn 1993), the optical activity of the clay matrix, and the matrix/fabric type (also called the b-fabric: see Whitbread 1995 or Josephs 2005). The quantitative and calculated petrographic variables included mean grain size, mean temper size, mean void size, the percentage of grains of each mineral and temper species, and the percentage of artifact volume comprised by each mineral species, temper type, and void type. Although the qualitative identification of temper may signal personal or social identity, the total composition of pottery was expected to be more pertinent to the identification of residential communities in this research. The reason for this is because this within-vessel composition is assumed to have been learned as a "recipe" of ceramic production and proved essential to identifying personal and family identity markers and, thus, small-scale communities.

A potential concern of the petrographic methodology in this research design involved the choice to not collect regional clay sources. The author decided not to conduct this type of analysis, or another type of "source analysis," for two reasons. First, modern clay on streams or rivers is not conducive to the study of ancient potting techniques because too much deposition has occurred since ancient potters collected their clay. The clays that potters used are most likely buried far below the surface (Stoltman, personal communication 2007). As a result, I decided to use the clays that I characterize from individual pottery thin sections as a proxy for different clays used by ancient potters in the study region. Thus, even though exact clay "source areas" were not determined, this ultimately proved inconsequential because each site's pottery generally exhibited one main clay type that contrasted with those of other sites. Second, petrographic analysis, unlike INAA and other compositional techniques, characterizes both the *body* (bulk composition of the vessel, including clays, all courser natural inclusions, and temper) and the *paste* (mixture of natural materials, clays, and courser inclusions found in the raw sediments collected by potters before tempers are added) (Stoltman 2001). While the body is a gauge of technology, function, and production, the paste is more conducive to studying the acquisition of raw materials.

Therefore, studying paste and body yielded data that characterized clay types and natural raw materials, but also identified communities and their culturally constituted recipes of ceramic production. The actual collection of clay sources was therefore not seen as a requirement. As discussed more fully in Chapters 4 and 5, this decision to forego the collection of clay sources proved to be beneficial. Rather than conducting a comparative analysis with clay sources that may have never been used by or been available to ancient potters in the study region, it was decided to allow the actual clays utilized by the potters to emerge from the analysis in order to define the character of the pottery.

The decision to exclude the collection of clay sources originally involved reliance on two methods of ceramic comparison. First was the "local-products-match postulate," which refers to the comparison of vessels/sherds without the aid of raw materials (Stoltman 1992; Stoltman and Snow 1998). Local production was accepted if paste, temper, and body values of vessels under investigation match those of a sample of demonstrably local vessels (i.e., those vessels with local designs and local recipes).

Secondly, the “spatial pattern postulate” involves vessel-to-vessel comparison across space but only within a single ceramic functional class. Following this logic, Havana-related samples were analyzed separately from Hopewell-related samples due to the perceived differences in functional use (i.e., utilitarian vs. ceremonial) and the resulting morphological differences between the two classes. Observed differences in wall thickness, vessel size, visual styles, or clay and temper use between the two wares prevented one-to-one comparisons. According to the spatial pattern postulate, if a vessel is locally produced, vessel compositions will display a pattern of within-site homogeneity along with between-site heterogeneity (e.g., Ferring and Pertulla 1987). This was certainly witnessed in this research and is unsurprising since the ethnographic record reveals that potters usually procure clay sources within 1 mile and temper sources within 1 km of a village (Arnold 1985). Both the local-products-match and the spatial pattern postulates produced very robust interpretations and results that are further discussed in Chapters 4 – 6.

Analyses

Descriptive/summary statistics and visual charts for the visual and technical style variables described above were completed using SPSS, version 22.0 for Windows (SPSS, Inc. 2013), which allowed for rudimentary ceramic comparisons within and between sites on multiple spatial scales. Inferential statistics for quantitative variables, such as t-tests, were also computed utilizing SPSS in order to test hypotheses that ceramics from a site or between geographically-close sites derived from the same population. T-tests are a standard approach within the field of archaeology to examine these types of issues. These tests (all at the 95% level), along with the descriptive statistics, aided in the definition of residential communities and hinted towards the role of active and/or passive identity displays on different spatial scales.

An analysis of the petrographic variables in this project yielded additional quantitative information that allowed the author to plot and characterize these sherds on a ternary diagram, utilizing Todd Thompson Software's *TriPlot* (version 4.1.2) (obtained from http://mypage.iu.edu/~tthomps/programs/html/tnttriplot.htm). Ternary diagrams provide a clear visual representation of residential communities and their potential involvement in sustainable and/or symbolic communities in this research. In this research, the diagrams do not display statistically significant results deriving from relatively more advanced statistical analyses (e.g., *t-tests*, etc.), but they do clearly display visually self-evident compositional differences between pottery samples, in most cases. The original descriptive and inferential statistics results, however, almost always supported the patterns illustrated on these ternary diagrams. The qualitative or categorical variables employed in this research were also coded for statistical analyses (e.g., percentages or presence by region, etc.). Lastly, cluster analyses were also performed (using SPSS) in order to identify larger groupings and to explore the nature of the variability present in the data sets.

Conclusion

This chapter introduced the methodology employed by the researcher to identify and define separate communities on multiple spatial scales. First, the original sampling methodology was explained. The identification and use of the visual and technical style variables was then discussed. Concluding the chapter was a discussion on the types of statistical analyses performed on these chosen variables. In the next chapter, the results stemming from the implementation of these methodologies to the data set are introduced.

CHAPTER 4 RESULTS

Introduction

This chapter discusses the results derived from the stylistic, morphologic, and ceramic petrography analyses. All of the statistical analyses were calculated with the assistance of SPSS, version 22.0 for Windows (SPSS, Inc. 2013). These results are later utilized in Chapter 5 to draw conclusions regarding the identification of communities on various spatial scales, to examine the unique interaction networks of each, and to identify the types of mechanisms related to the spread and maintenance of Havana-Hopewell in the study region. In most cases, relatively more complex multivariate analyses were deemed unnecessary because the initial descriptive statistics results overwhelmingly yielded visually self-evident differences among variables between sites and regions. The current chapter begins with a discussion of the results from the visual style analysis which was designed to identify the Havana and Hopewell Ware decorative repertoires employed by potters in this research. It is arranged by river valley.

Next, the discussion shifts solely to the results of the Havana Ware-related samples in this dissertation. It was decided to study Havana-related samples separately from Hopewell-related samples due to significant observable differences in wall thickness, vessel size, or decorative styles related presumably to separate functions (utilitarian vs. ceremonial). The Havana Ware section initially focuses on the geologic raw materials naturally present in the clays that were most commonly utilized by potters in the study region. Subsequently, the technical style/recipe results are discussed. The last section within the Havana Ware sample discussion focuses on dentate width, a useful variable for the identification of communities in this research.

It is discussed here because it was especially useful in identifying the changing temporal patterns of this decorative trait on Havana-related samples.

An introduction to the Hopewell Ware-related results commences after the Havana Ware section. The Hopewell section follows the same format as the Havana section described in the above paragraph (i.e., clay characterization, recipe/technical styles). Lastly, the results of a cluster analysis on all samples' stylistic variables are discussed. Note that most of the data from this chapter are illustrated and included in tables and figures contained in Appendix C. This chapter ultimately provides the relevant statistical background that informs on the findings of Chapter 5, which explains the identification of communities and the mechanisms related to the spread of Havana-Hopewell in west Michigan and northwest Indiana.

Visual Styles and Decorative Repertoires for both Havana and Hopewell Ware Samples

Visual style refers to the variation inherent in the use of visible decorative traits that is *actively* used to communicate messages (Morris 1995). This section details only the results related to those highly visible decorative variables applied to the exterior surfaces of both Havana and Hopewell Ware samples that have the most potential for actively communicating communal or personal identity on the regional scale. Other "decorative traits" (e.g., interior lip notching, combing, etc.) that are not visible at a distance and are more likely signifiers of individual or family-level identity are discussed later in the technical style/recipe section. These variables were originally intended to assist in the sampling process but they later were used to support or deny the local or nonlocal character of specific samples.

Broad patterns in exterior sherd decorative traits were drawn from this research's sampling methodology (see Chapter 3) which yielded the *decorative repertoire* employed on all available Middle Woodland Havana and Hopewell Ware rim and body sherds at each site. This section will discuss patterns within individual river valleys before concluding with a more general comparison of decorative repertoire distinctions between river valleys.

Unfortunately, an accurate assessment of the decorative repertoires employed by potters at Kankakee sites was restricted by the fact that these collections were predominantly surface collected and/or contained a small number of total samples. Thus, the collector bias inherent in these collections prevented an accurate tabulation of the decorative repertoires employed by potters at these sites. The only meaningful statement regarding Kankakee River valley decorative repertoires is that the very high frequencies of dentate stamping at the Goodall site observed in these surface collections are seen in other surface collections from the site (Mangold, personal communication 2012), which suggests that this could be an accurate estimation of the real frequencies of this particular trait. Additionally, Havana Ware traits dominate Kankakee collections because Hopewell series vessels are rarely found outside mortuary contexts (Mangold and Schurr 2006; Mangold, personal communication 2012).

Muskegon River Valley

Muskegon River valley decorative repertoires are included in Appendix C, Table C-1. Jancarich site decorative trait-use stands out because of the higher frequencies of traits that potentially would signal identity differences. Jancarich contains large numbers of samples containing burnishing, brushing, dentate stamping, noding, or crosshatching. Burnishing and brushing placement on pottery sherds at Jancarich is a particularly strong characteristic of this site. Eight Jancarich samples also contained brushed interiors, which were not seen anywhere else in the Muskegon valley. The common use of hallmark Havana Ware traits at Jancarich supports the notion of a very early introduction of Havana information in this area, which is also corroborated by a former (and somewhat controversial) AMS date of B.C. 790- A.D. 20 (Beta

M-1982) and a new date included in this dissertation of Cal B.C. 200 – 50 (Beta 327507) (see Chapter 2 for previous AMS dates and Chapter 5 for a more detailed discussion of new AMS dates).

The presence of higher frequencies of these particular traits is not surprising considering the location of the Jancarich site (see Appendix A), which sits directly adjacent to the largest mound complexes in the Muskegon River valley (e.g., Brooks, Parsons, Palmiteer, or Schumaker Mounds). Due to the location of the Jancarich site, it is reasonable to assume that mortuary activities and related preparations were being conducted at the site. Accordingly, it is expected that traits that would be used to actively communicate identity or other messages were placed on pottery vessels. Therefore, the Jancarich site stands out as a location in which the highest degree of active symbolism (through Havana and Hopewell Ware pottery decoration) was communicated within this river valley.

The Davis Swamp site also stands out for its high frequencies of plain rocker stamping and dentate rocker stamping. Although early Havana Ware types are present at the site, Hopewell Ware decorative traits are more common. This conforms with the AMS date from Davis Swamp of Cal A.D. 90-260 and Cal A.D. 290-320 (Beta 231474), a logical date considering that the earliest Hopewell Ware traits in west Michigan appear at the Converse site during the first century B.C. (Brashler 2003). Lastly, Toft Lake's common use of cordmarked and smoothed over cordmarked surface treatments and low frequencies of diagnostic Havana or Hopewell Ware traits is expected considering the supposed utilitarian function of this site (see Appendix A for site descriptions).

Grand River Valley

There are several patterns that emerge from the study of Grand River valley decorative repertoires (see Appendix C, Table C-2). Prison Farm is a very early Middle Woodland site (~ 100 B.C. – A.D. 150) and is subsequently unique in many respects. This site contains high percentages of cordmarking and noding, and possesses other traits not recorded elsewhere by the author in the Grand River valley, such as fingernail and fabric impressing. Conversely, Prison Farm is lacking in high frequencies of smoothed or brushed exteriors, or crosshatching. These results highlight the overwhelmingly abundant Havana Ware-related component present at the site and the relative lack of Hopewell Ware decorative traits.

Another early Middle Woodland site, Norton Mounds, possesses decorative traits characteristic of early Havana Ware but differs from Prison Farm in that a more elaborate suite of traits can be found here, reinforcing its mortuary-related function. Norton Mounds contains high percentages of smoothed surface treatments combined with dentate stamping, punctation, tool impressions, and zoning. Similar to Prison Farm, Hopewell Ware decorative traits, such as plain rocker stamping and crosshatching, are relatively uncommon.

Unlike the more Havana Ware-related Prison Farm and Norton Mounds sites, the Converse site is characterized by a larger Hopewell Ware component. Smoothed and brushed exterior surfaces are common and are decorated with relatively high percentages of plain and dentate rocker stamping. Another site with a relatively late component, Battle Point, appears to follow a similar pattern, exhibiting plain rocker stamping decoration. Lastly, Spoonville contains relatively high percentages of smoothed and smoothed-over-cordmarked surfaces and low frequencies of cordmarked surfaces. I assume that the decorative repertoires from these three sites likely align with the initial introduction and intensification of Hopewell information into the Grand valley.

Another important Grand River valley trait is the sole presence in west Michigan of Naples Ovoid Stamped vessels. One Naples Ovoid Stamped sample from the Sand Creek site is included in this research. This rare ceramic type accounts for only 0.2% of all samples in the Grand valley that were available for study. Unavailable for inclusion in this research were the only other known west Michigan Naples Ovoid Stamped samples from the Ada, Norton Mounds, and Connor Bayou sites in the Grand River valley. Combined, these samples suggest a very early Middle Woodland adoption of Havana information into west Michigan. Thus, the Grand River valley represents the northward boundary of ovoid stamping and is the only river valley which possesses this type.

Kalamazoo River Valley

Cordmarking is more frequent in the Kalamazoo than in any other river valley and is especially common at Armintrout-Blackman (see Table C-3 in Appendix C). Among Kalamazoo sites, Armintrout-Blackman has the only occurrence of brushing, fingernail impression, and crosshatching recorded in this research. Mushroom contains the only occurrence of fabric and tool impressing in the valley and has relatively higher percentages of incising and punctation. Hart and Swan Creek, meanwhile, have decorative repertoires more characteristic of Havana Ware, such as thick dentate stamping and noding.

St. Joseph River Valley

In general, the St. Joseph valley is characterized by the highest percent of dentate stamping (23.5%) in west Michigan (Appendix C, Table C-4). The Sumnerville mound complex has the only occurrence of dentate rocker stamping and crosshatching in the river valley. It also has one of the three total brushed samples in the valley and contains half of the incised samples. Rock Hearth has the lowest percent of smoothed exteriors in the river valley and the highest percent of cordmarked exteriors. Moccasin Bluff possesses the highest percent of tool impression and contains three of the four total fingernail impressed samples. Hopewell Ware traits, such as plain and dentate rocker stamping, are rare but are observed in minor frequencies at Moccasin Bluff, Dieffenderfer, Schilling, and Sumnerville.

RIVER VALLEY (n)	**smoothed**	**cord-marked**	**smoothed-over-cord-marked**	**burn-ished**	**brushed**	**incised**	**dentate stamped**	**punctate**	**noded**
Muskegon (243)	62.6%	20.2%	14.4%	***17.7%***	***17.3%***	1.6%	7.8%	4.1%	10.3%
Grand (401)	44.6%	16.0%	16.7%	0.2%	0.7%	***12.0%***	***18.5%***	***11.2%***	***23.2%***
Kalamazoo (199)	52.0%	***41.4%***	5.1%	0.0%	1.0%	9.6%	3.5%	6.1%	8.1%
St Joseph (255)	68.6%	22.0%	7.1%	0.0%	1.2%	3.9%	***23.5%***	9.8%	16.5%
	cord-wrapped stick impressed	**finger-nail impressed**	**cross-hatching**	**fabric impr-essed**	**tool impr-essed**	**plain rocker stamping**	**dentate rocker stamping**	**zoning**	**ovoid stamped**
Muskegon (243)	3.3%	0.0%	2.9%	0.4%	3.3%	4.9%	1.2%	7.0%	0.0%
Grand (401)	3.7%	1.2%	3.0%	1.7%	7.7%	***9.0%***	0.7%	***21.2%***	***0.2%***
Kalamazoo (199)	1.5%	***7.1%***	1.0%	1.0%	0.5%	6.1%	0.0%	3.0%	0.0%
St Joseph (255)	8.2%	1.6%	7.8%	0.0%	7.5%	2.0%	0.4%	***16.9%***	0.0%

Table 4-1: Comparison of Decorative Repertoires of All River Valleys
(***Bold-italicized*** figures in table are discussed in text)

Table 4-1 illustrates several stylistic patterns that become apparent when viewed from a regional perspective (some of the most pertinent patterns discussed in the text below are highlighted in ***bold-italics*** in Table 4-1). The Muskegon River valley is characterized by the highest percentages of burnished and brushed exterior surfaces in west Michigan, most of which originate from the Jancarich site.

The Grand River valley is characterized by a relatively high percent of incising, dentate stamping, punctation, noding, and plain rocker stamping. The latter suggests a relatively intensive Hopewell occupation within the valley, as evidenced at the Converse site. The Grand valley shares a nearly equal percent of dentate stamping, zoning, and tool impression with the St. Joseph and shares a similar percent of fabric impressing with the Kalamazoo River valley. Also significant is the rare but important presence of ovoid stamping, as discussed above.

The Kalamazoo River valley decorative repertoires do not exhibit the same elaborate use of certain decorative traits as the other river valleys in west Michigan. No burial mounds are known in the valley and Kalamazoo valley sites contain decoration expected from short-term extraction or logistical sites and utilitarian seasonal sites (Garland and DesJardins 2006). For example, common utilitarian decorations, such as cordmarking and fingernail impression, are most common in the Kalamazoo. Low percentages of dentate stamping, noding, cordwrapped stick impression, crosshatching, and zoning is also characteristic. Since these more elaborate decorations are aligned with active communication of identity, it is reasonable to assume that Kalamazoo valley interactions were not characterized by a frequent need to actively signal identity. The available literature suggesting the seasonal utilitarian site use of this river valley (e.g., Garland and DesJardins 2006) and the results of this research support this notion.

Lastly, the St. Joseph River valley is characterized by the highest percent of dentate stamping in west Michigan. A similar high percent is witnessed in the Grand, but the author found that the use of dentate stamping in the St. Joseph is more similar to that in the upper Kankakee which exhibits thicker average dentate widths than in west Michigan (see dentate width results later in the chapter). This result is corroborated with results from previous studies (e.g., Mangold 1981, 2009; Mangold and Schurr 2006). Other similarities with the Grand River valley include the percent of noding, zoning, and tool impression.

HAVANA WARE SAMPLES

Commonly Used Clays and Raw Materials

Based upon ethnographic data (e.g., Arnold 1985), it is assumed that locally available clays and raw materials located in close proximity to archaeological sites were used more frequently (due to ease of access) by potters inhabiting these sites than those located further away. The variables described in this section are directly related to the *most commonly used* clays and raw materials available and used by an ancient potter to construct a pottery vessel and were identified in the ceramic petrography analysis. Keep in mind that these variables are part of the *paste* and are not as useful for defining a community identity or technological signature as the *body* (i.e., recipe). Despite this, the paste variables below were particularly useful in characterizing the raw materials available in the clays chosen for pottery manufacture in particular regions or river valleys. In fact, regional differences in the distinct clays Middle Woodland potters used became very clear and were quantified. Subsequently, this information was successfully used to define the statistical parameters of the *most commonly used* clay types on the local scale, identify the geographical origin of the nonlocal samples present at each site, and designate these nonlocal samples as imported vessels or copies.

Percentage of Sand and Silt in Clays: PASTE

In this research, the study of the percentages of sand, silt, and matrix in the *paste* was the most convenient and productive method of identifying and defining local clay types. It provided an excellent starting point from which to initially characterize these clays. Using these data in tandem with other paste variables described in this section yielded robust definitions of the most commonly used clays within river valleys, as well as their variability across space.

As discussed in Chapter 3, each individual sample from each site was analyzed in order to define the statistical compositional parameters of the clays used by potters. For example, Table 4-2 details the parameters of the most commonly used clay type for the Jancarich site. It illustrates the statistical percentages of each of the three key components of the paste (matrix, silt, sand) and their standard deviations. Confidence intervals and variability indices were also calculated for each site in order to compare the variability present in paste compositions at various sites.

Jancarich site	**N**	**% Matrix**	**% Silt**	**% Sand**	**Variability Index**
	20	87.0 ± 7.5	2.5 ± 2.1	10.4 ± 6.0	5.2
95 % Confidence Interval		83.4-90.5	1.5-3.5	7.5-13.2	

Table 4-2: Jancarich site paste statistics

The simplest means of highlighting compositional differences within and between sites, however, is through the use of ternary diagrams. In this chapter, I primarily use ternary diagrams derived from Todd Thompson Software's *TriPlot* (version 4.1.2), obtained from http://mypage.iu.edu/~tthomps/programs/html/tnttriplot.htm, to visually portray these statistical results. On ternary diagrams, the three poles represent the percentages of clay matrix, sand, and silt present in the pastes. The diagrams do not display statistically significant results per se, but they do clearly display visually self-evident compositional differences between pottery samples, in most cases. Based on the descriptive statistics results illustrated above and calculated elsewhere, it was possible to distinguish the most commonly used clay at the Jancarich site from other samples exhibiting nonlocal clay types (Figure 4-1). The mean local clay type was plotted on the diagram as well and proved very useful for comparing clay types throughout the study region. Defining the most commonly used clays for every individual site allowed for simple site-to-site comparisons, as illustrated in Figure 4-2.

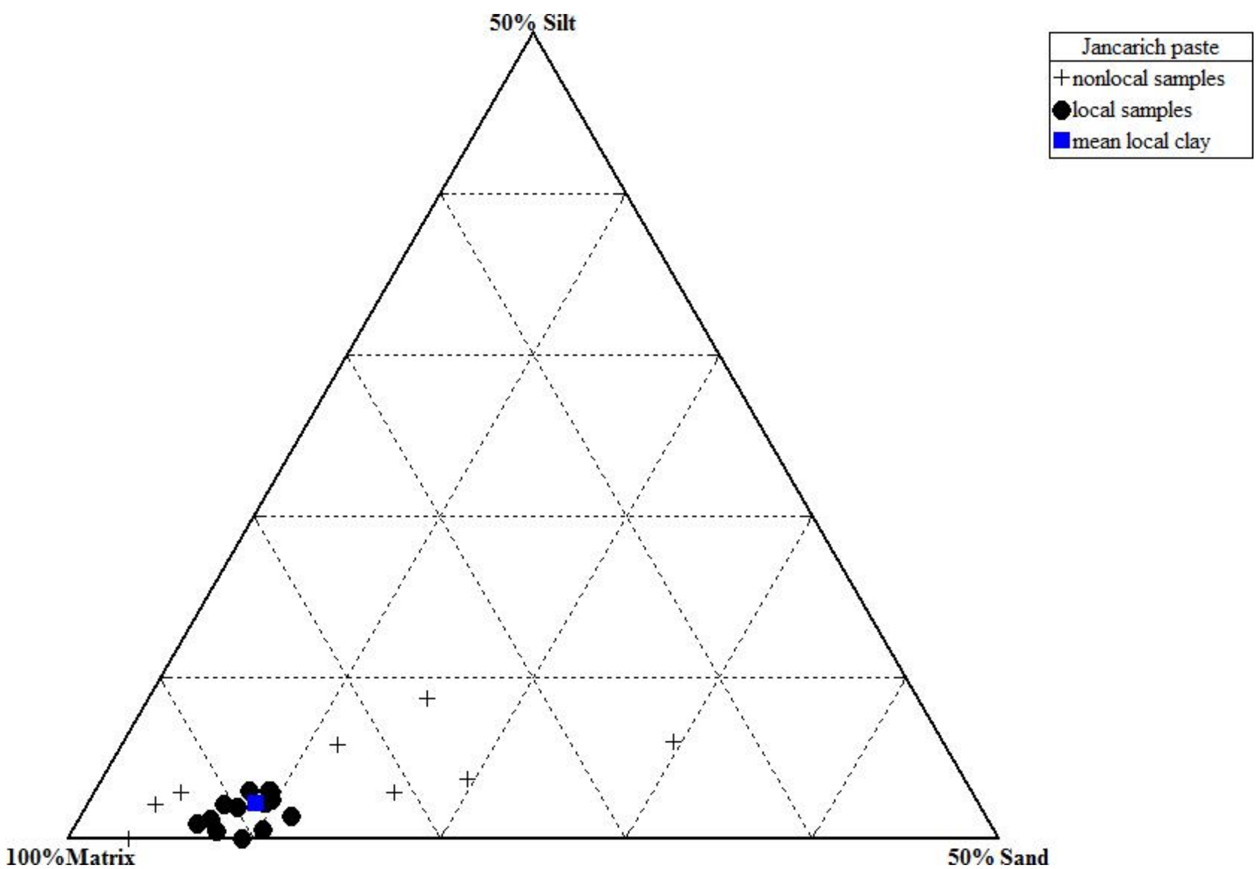


Figure 4-1: Jancarich Site Most Commonly Used Clay Type

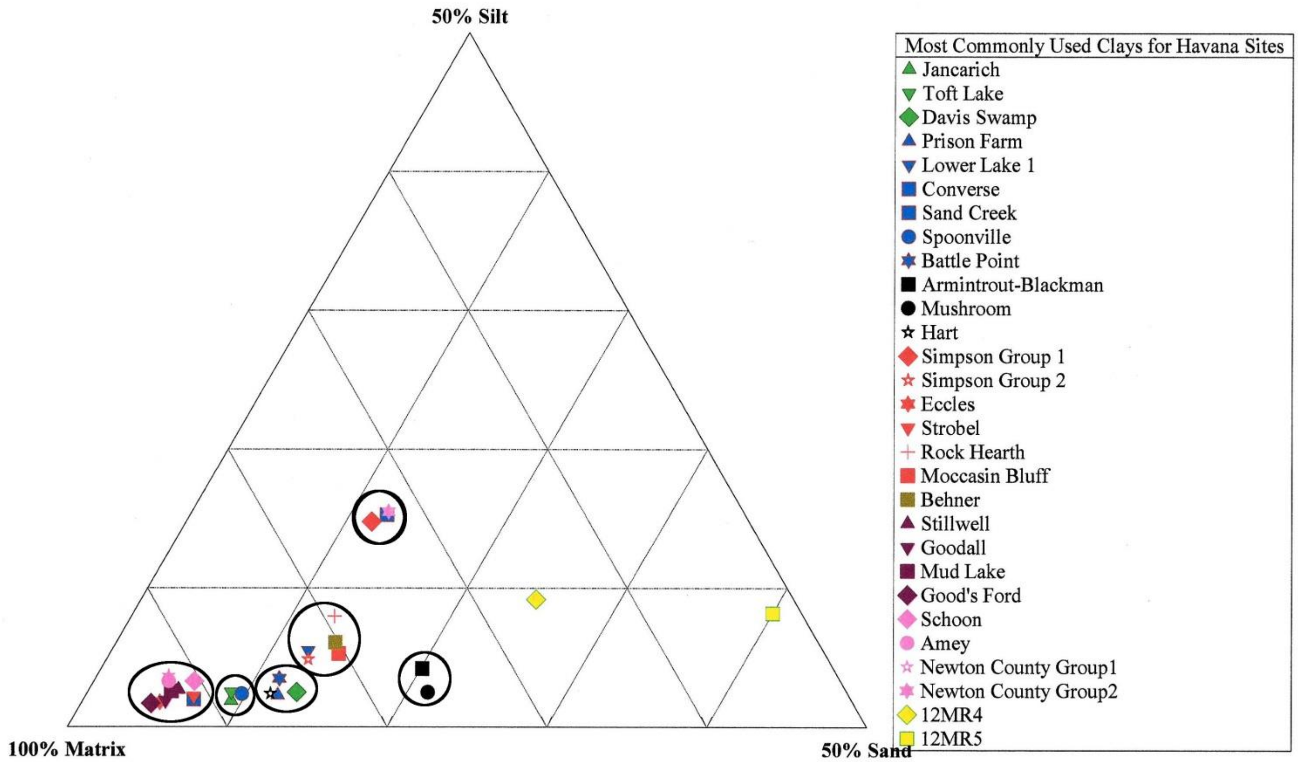


Figure 4-2: Mean Local Paste Parameters for all Havana Sites
(***Muskegon River valley sites; Grand River valley sites; Kalamazoo valley sites; St. Joseph valley sites; Galien valley sites; Upper Kankakee valley sites; Lower Kankakee valley sites; Marshall County sites***)

As illustrated by Figure 4-2, regional or inter river valley clay type variability became easily identifiable. This diagram plots the mean local clay types representative of each site and compares these to other sites. Keep in mind that these observations are quantified and are drawn from descriptive statistics results calculated for each individual site. The circles in this ternary diagram were drawn by the author in order to make these distinctions more visually apparent to the reader; they do not necessarily match the exact statistical boundaries of each cluster of sites but they do approximate them. Nonetheless, these separate clusters illustrate the variation between river valleys/regions and represent the paste differences of the clays most commonly used by potters in the different regions of this research.

Figure 4-2 highlights several important results. The lowest percentage of sand present in the study region was found in clays originating from pots from the Kankakee River valley (statistically calculated to 4.4% – 6.9%). The next highest percent sand comes from the Jancarich, Toft Lake, and Spoonville site cluster (9.0% – 9.7%). There is also a tendency for lower Kankakee River valley sites to possess samples with clays that are unusually high in the amount of silt present in their pastes. Although these are minority types present in the study region, they do appear more common at sites such as Amey, Watson, or Schoon. It appears that these people more frequently employed the use of siltier "loessic" clays in contrast to people located elsewhere in the study region where the use of alluvial clays predominated.

The two sites in the Marshall County region (12MR4 and 12MR5) possess the highest percentages of sand (24.7% and 40%, respectively) and slightly more silt (8.2% - 9.2%) than all other clusters, excluding the siltiest cluster including the Simpson, Newton County, and Sand Creek site samples (14.8% - 15.5%). The two Kalamazoo River valley sites (Armintrout-Blackman and Mushroom) clearly stand out, as well, by possessing relatively more sand (20.1 – 21.3%) than the Muskegon, Grand, St. Joseph, and Kankakee River valley clusters. There also is a potential diagnostic lower St. Joseph River valley (Moccasin Bluff, Rock Hearth, Behner region) feature which is characterized by roughly twice as much silt compared to Grand River valley clays.

Ultimately, the differences in clays illustrated in this ternary diagram closely mirrored the differences in recipe values (i.e., *body*) described below, a fact which allowed for the straight forward identification of the boundaries of residential communities and the most commonly used clays during the ceramic production process. This is described in more detail in the following sections and in Chapter 5.

Natural Inclusion Types in Clay Types

This section describes the types of natural inclusions present in ceramic pastes of Havana sherd samples found in different river valleys or regions. Again, these results entirely supported the groupings illustrated in the preceding paste ternary diagram (Figure 4-2). Although there are a few noticeable differences within river valleys (e.g., upper and middle Kankakee vs. the lower Kankakee River valley), it was found that there was a higher amount of variability between river valleys. Thus, it became more useful to examine and document the differences in clays *between* river valleys, although intra-river valley distinctions are mentioned when appropriate. See Appendix C, Table C-5 for a visualization of the total number and percentages of each mineral type present within each river valley. Note that quartz is not included in this table because all clays in this research had an abundance of quartz, and it was therefore not useful for clay type characterization and distinction.

Taking a north to south approach (i.e., Muskegon River valley to Kankakee River valley) is helpful in describing some of the variability inherent in the separate clays used by potters between and within river valleys. The presence of opaque minerals in the paste is diagnostic of only the Muskegon River valley clays and is exclusively a Muskegon River valley occurrence in this research. Pyroxene is primarily a Grand River and Muskegon River valley occurrence. Otherwise, there is very little pyroxene presence in the Kalamazoo River valley (only 11% - 16.7%) and even less in the St. Joseph River valley (only present at the Simpson site). In general, pyroxene frequency decreases from north to south, (i.e., Muskegon River valley to Kankakee River valley). Muscovite is rare to nonexistent in the Muskegon and Grand River valleys.

Chert particles are relatively common in clay pastes from the Kalamazoo (76.5%), St. Joseph (61%), Kankakee (58.6%), and Muskegon (45.5%) valleys. The Grand River valley, on the other hand, has a relatively low percentage (22.9%) of samples containing chert within its clays. Another observation of note from the ceramic petrography analysis is that chert color is more of an orangish-brown in the Good's Ford site area, which contrasted with the more general and more common gray color of chert in the other river valleys. This distinction served as a clue to the identification of paste origin in this research.

Hornblende is common in the highest frequencies in the Kalamazoo (79.4%) and St. Joseph (72.9%) River valleys, but is also seen in relatively less frequencies in samples from the Kankakee River valley and in Marshall County, Indiana (37.5% total). Furthermore, hornblende presence drops off significantly from the Grand (24.3%) to the Muskegon River valley (6.1%).

Perhaps the most important diagnostic mineral present in St. Joseph River valley clays is perthite. St. Joseph River valley clays easily contain the highest percentage of perthite (23.7%), followed by the Kankakee at only 1.6%. Within the St. Joseph River valley, the Rock Hearth site (37.5%) and the Moccasin Bluff site (32.3%) have the highest percentage of perthite anywhere in the study region. Since both sites are geographically adjacent to one another, it is safe to assume that perthite is most common in this part of the St. Joseph River valley. This was helpful in determining whether or not samples from other sites and regions were made with clays from this portion of the St. Joseph River valley.

Several other minerals were very helpful in characterizing Kankakee River valley clay types and distinguishing these from west Michigan clays. Although rare, sandstone (2.3%), micaceous sandstone (1.6%), and intraclast grainstone (0.8%) presence were all found only in the Kankakee River valley and/or Marshall County. Rhyolite is also diagnostic of pottery from primarily Kankakee and St. Joseph River valley clays. Specifically, four of the six sites that have rhyolite in their clays are in the Kankakee, with only the Moccasin Bluff and Simpson sites as the exceptions. Given the geographic proximity and likelihood of interaction and/or travel between these two regions, it is not surprising that Moccasin Bluff and Simpson both exhibit clear evidence of the presence of pottery vessels originating from the Kankakee River valley clays.

Epidote is another diagnostic mineral of clays found in pots from Marshall County and the Kankakee River valley. In this region, it is present in 42.2% of all samples, while in all other river valleys, it is present in only 5.9% or less. Looking more closely at the presence of epidote within Marshall County and the Kankakee River valley itself, a more specific pattern emerges. It is most common in Marshall County (83.3%), slightly lower in the lower Kankakee River valley (56.8%), and lowest in the middle to upper Kankakee River valley (29.1%).

Biotite mica is also most common in the Kankakee valley and in Marshall County (16.4%; n=21), especially in the middle to upper Kankakee River valley. Only twenty-nine total samples in the study region contained pastes with biotite present: 15 in the middle and upper Kankakee, 4 in the lower Kankakee, 2 in Marshall County, 3 in the Kalamazoo, 3 in the Grand, and 2 in the Muskegon.

As for feldspar, several meaningful conclusions can be drawn. Microcline feldspar presence was particularly insightful. It was most common in the Kalamazoo River valley (73.5%), followed by the St. Joseph (59.3%), Grand (51.4%), Muskegon (33.3%), and Kankakee River valleys (26.6%). Within the Kalamazoo valley, Armintrout-Blackman (88.9%) and the Mushroom site (83.3%) exhibited very high percentages of microcline. However, upon closer scrutiny, several other patterns emerged. Marshall County site samples also possessed relatively high percentages of microcline at 75%. Additionally, despite the Kankakee River valley having the least amount of microcline, there was a distinction between the middle to upper Kankakee and the lower Kankakee. Of the 79 total samples in the middle to upper Kankakee, twelve (15.2%) had microcline in their pastes. Conversely, lower Kankakee pastes contained more than twice that percentage (35.1%) (13 out of 37 total samples).

Plagioclase feldspar, meanwhile, was found to be most common in samples from the Kalamazoo River valley (82.4%), followed by the St. Joseph (74.6%), Grand (58.6%), Kankakee (46.9%), and Muskegon (27.3%). The third major type of feldspar, potassium feldspar (labeled "Kspar" in Table C-5 in Appendix C), is most common in samples from the Kalamazoo River valley (73.5%), followed by the St. Joseph (72.9%), Kankakee (64.1%), Muskegon (42.4%), and Grand (35.7%). Here, the Muskegon and Grand River valleys lag behind the other three by a fair percentage.

Lastly, there was a very useful observation regarding the collective presence of the three main types of feldspars. The Kalamazoo River valley exhibited the highest percentages of potassium feldspar, microcline, and plagioclase than any other river valley. This distinction should make sense when we consider the previous observation, detailed above, that clay types from Kalamazoo River valley sites have more sand in their pastes compared to the Muskegon, Grand, St. Joseph, and Kankakee River valleys (see Figure 4-2). This discovery accounts for these very high percentages of sand in their paste. Their pastes are simply packed with more minerals than any other clays from other river valleys and these minerals are represented primarily by the feldspar group.

ARF's (argillaceous rock fragments)

Argillaceous rock fragments (ARF's) are hardened clay lumps that occur naturally within clays (di Caprio and Vaughan 1993). It is vital to record ARF presence in clays because they help to characterize clay types used by potters in specific regions and to identify the potential use of these clays by other potters from different regions. Specifically, ARF presence was an extremely helpful variable in distinguishing middle and upper Kankakee clays from all other regions in the study area. In fact, this variable was one of the most useful variables in this research, as discussed below.

ARF's are frequently confused with grog temper but grog usually is composed of different inclusions that are aligned in different orientations than the clay matrix. Grog can also vitrify due to being subjected to multiple firings (i.e., originally fired as its own pot and later as a temper inclusion in another vessel). Three other features di Caprio and Vaughan (1993) identify as almost exclusively associated with grog as opposed to ARF's include:

1) An aligned internal microstructure is present in grog, specifically the parallel orientation of constituents and voids in grog fragments. This is discernible in grog down to 0.20 mm in size. ARF's, on the other hand, do not have an aligned internal structure.

2) Internal stress fractures in grog are parallel to the longest dimension of the grain. ARF's, conversely, are more homogenous and fracture in polygonal patterns.

3) There is frequently a relatively even pattern of the distribution of grog throughout the host fabric, while ARF's occur in more random patterns.

These distinctions have been useful distinguishing characteristics for the purposes of this research. Figure 4-3 clearly illustrates the usefulness of this variable when viewed from a regional perspective. Interestingly, the largest cluster for the presence of ARF's occurs in the upper and middle Kankakee River valley and corresponds to the two main residential communities that I define and discuss in more detail in Chapter 5 (Stillwell and Goodall residential communities). It also illustrates the characteristic "fall-off" pattern one would expect in these types of situations. In other words, the percentages of ARF presence steadily decreases as one travels further away from the upper and middle Kankakee River valley.

The pottery from sites within the upper and middle Kankakee River valley contain 59.7% ARF's in their pastes, by far the highest percentage anywhere in the study region. The next highest frequencies are in the lower Kankakee River valley (26.8%) and the St. Joseph River valley (21%). Of importance, it was found that most of the pottery samples that possessed ARF's and were discovered outside the Kankakee were later found to have been made with commonly used clays from the upper and middle Kankakee River valley. These conclusions were corroborated by the morphologic and recipe results. These particular vessels were later determined to primarily be nonlocal samples that represented imported vessels from the upper and middle Kankakee valley based upon the totality of the stylistic and compositional analyses.

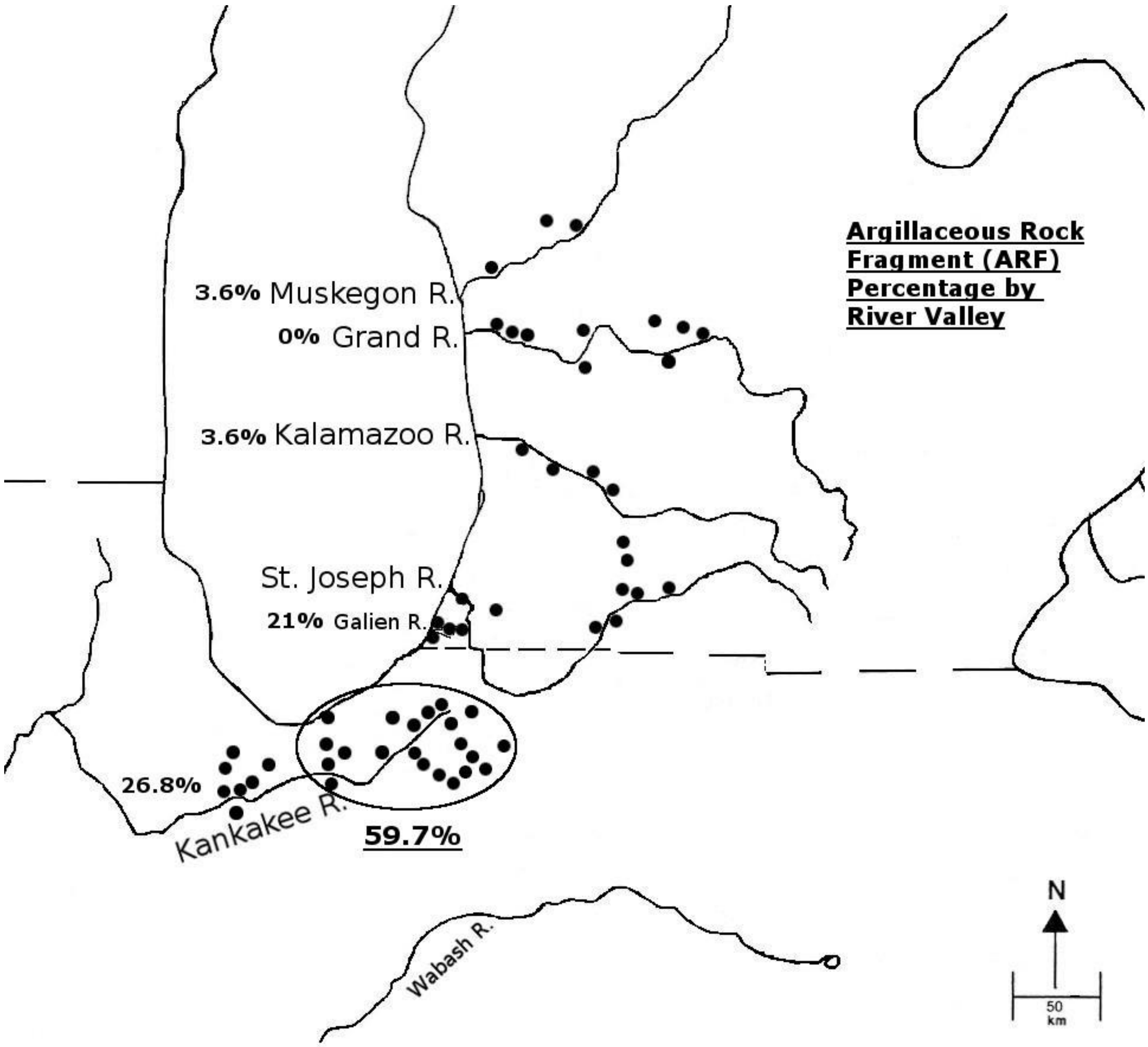


Figure 4-3: Percentages of Argillaceous Rock Fragments (ARF's) in Clay Types by River Valley (● = individual sites)

Sand Size Indices (SSI)

During the petrographic analysis, the sand sizes of each individual natural inclusion were recorded, as stated in Chapter 3. Subsequently, a sand-size index (SSI) was computed in hopes of characterizing regional clay types. The sand-size index is calculated with the use of an ordinal scale that is based on the measurement of maximum grain diameter underneath the microscope, under 4X magnification: fine (.0625-.249 mm), medium (.25-.499 mm), coarse (.50-.99 mm), very coarse (1.0-1.99 mm), and gravel (> 2.0 mm). In the ordinal scale, fine sand is assigned a size value of 1, medium sand = 2, coarse sand = 3, very coarse sand = 4, and gravel = 5.

In this research, the largest average sand size observed for individual sites was 2.0 (medium sand), while the smallest was 1.14 (fine sand). Therefore, average sand size only varied between fine and medium sand sizes. Despite this, there is a rather important visual or qualitative distinction between sand sizes of 1.0 – 1.49 and sand sizes larger than 1.5 underneath the petrographic microscope. Making this distinction has revealed a few generalizations regarding the sand size patterning of clay types within and between river valleys. Table 4-3 displays the SSI differences between river valleys in the study region, while the SPSS version 22.0 for Windows (SPSS, Inc. 2013) bar chart (Figure 4-4) illustrates the mean SSI for each individual site.

RIVER VALLEY:	**Muskegon**	**Grand**	**Kalamazoo**	**St. Joseph**	**Kankakee**
SAND SIZE:	1.41	1.37	1.34*[1]	1.48	1.58

Table 4-3: Sand Size Indices by River Valley

(*[1] excludes the only sample from the Swan Creek site [1.14 sand size] which strongly contrasts with the sand sizes of the other sites in the Kalamazoo River valley and would have skewed the data)

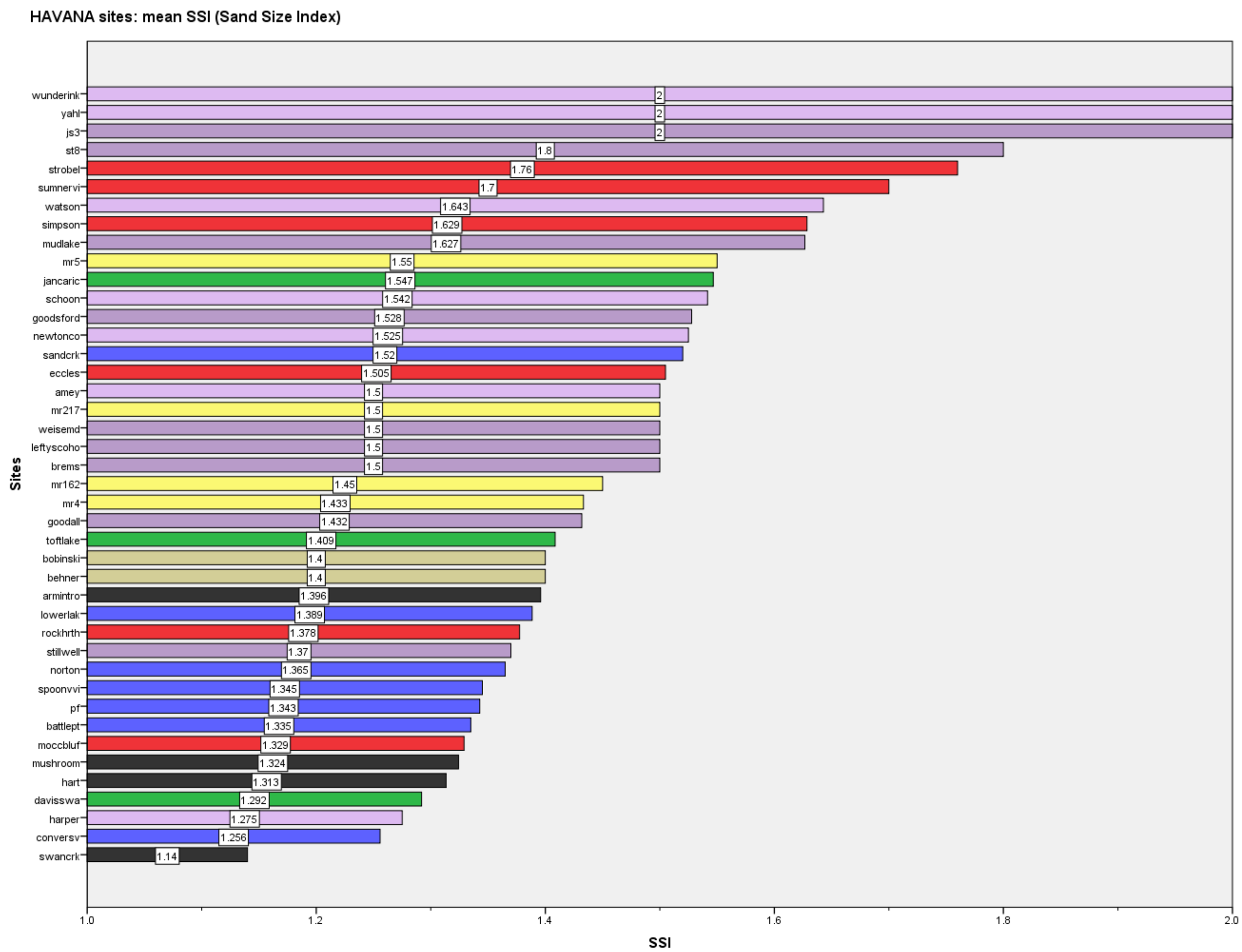


Figure 4-4: Mean SSI for all Havana sites

(Muskegon River valley sites; Grand River valley sites; Kalamazoo valley sites; St. Joseph valley sites; Galien valley sites; Upper Kankakee valley sites; Lower Kankakee valley sites; Marshall County sites)

It is evident from Table 4-3 and Figure 4-4 that there is a distinction between sand size indices in the Kankakee River valley and west Michigan. The Kankakee samples (illustrated by differing shades of light and dark purple in Figure 4-4) have the highest average SSI in the study region, while no river valley in west Michigan has an average SSI larger than 1.48. This distinction is further expanded upon in the SPSS bar chart, which shows that thirteen of the top twenty-one SSI's are Kankakee River valley sites and nineteen out of the top twenty-one SSI's are Kankakee sites and other sites affiliated with these Kankakee sites (i.e., possesses several samples with clays directly originating from the Kankakee River valley region). Additionally, there is a tendency for sites located in the lower Kankakee to exhibit even higher SSI frequencies than middle to upper Kankakee River valley sites, with six of the top seventeen SSI's originating from sites in the lower Kankakee.

Figure 4-4 also illustrates that as the SSI dips below 1.5, the frequency of non-Kankakee River valley sites increases dramatically. In fact, of the twenty-one lowest SSI's, sixteen originate from west Michigan sites. When combined with the identification of the paste parameters and natural inclusion types in each clay type, as well as the presence of ARF's, this SSI distinction has proven very useful in helping to define the most commonly used clay types and in identifying the origin of clays from nonlocal samples throughout the study region.

In general, it is fairly evident that Middle Woodland potters in the study region overwhelmingly collected alluvial clays to construct their pottery. Loessic clay types, characterized by a relatively high level of silt and a high frequency of very fine sand (e.g., SSI equaling or close to 1.0) are very rare in this study. They do represent minority clay types, however, that were infrequently used by potters in the study region, especially in the lower Kankakee valley.

Technical Styles: Ceramic Petrography

The results for the variables described in this section comprise those included in *technical styles*, as explained in Chapter 1. Technical styles can be thought of as representing part of learned *recipes* of ceramic production that are characteristic of particular groups in particular regions. The variables described below are ceramic petrography variables and are directly related to individual recipes (refer to Chapter 3 for an explanation of the ceramic petrography methodology employed in this research). These were given primacy in the initial identification and definition of residential communities because they would have been taught or shared among potters, are visually obscure variables, and would not be recognizable or detectable on the regional or interregional spatial scale (Carr 1995b). In other words, they are related to personal, family, or small-sized communal identities.

Composition: BODY

Similar to the compositional definition of the percentages of clay matrix, sand, and silt present in the paste described above, the most useful starting point from which to identify and define compositional patterns related to the recipe involved the simple calculation of descriptive statistics and their illustration on ternary diagrams. This section will discuss only the larger regional differences in recipe values because individual recipes diagnostic of specific residential communities are described in detail in Chapter 5.

Figure 4-5 illustrates the *body* values or the average local recipe for each major site, as viewed by the percentages of clay matrix, sand, and temper present in the samples that were determined to have been locally manufactured at each site. In other words, these averages exclude the nonlocal samples or statistical “outliers” at each site. Percent temper is the most important and diagnostic variable in this ternary diagram and corresponds to learned ceramic making techniques passed down from one generation to the next. Generally, as is the case with the paste, the site clusters illustrated below were later found to represent the compositional signature of local residential communities, which are more fully detailed in Chapter 5. Like Figure 4-2, the ovals in Figure 4-5 were added by the author for presentation purposes only and do not necessarily represent the real statistical boundaries of each cluster. However, the sites contained within each cluster are statistically comparable to other sites within that same cluster.

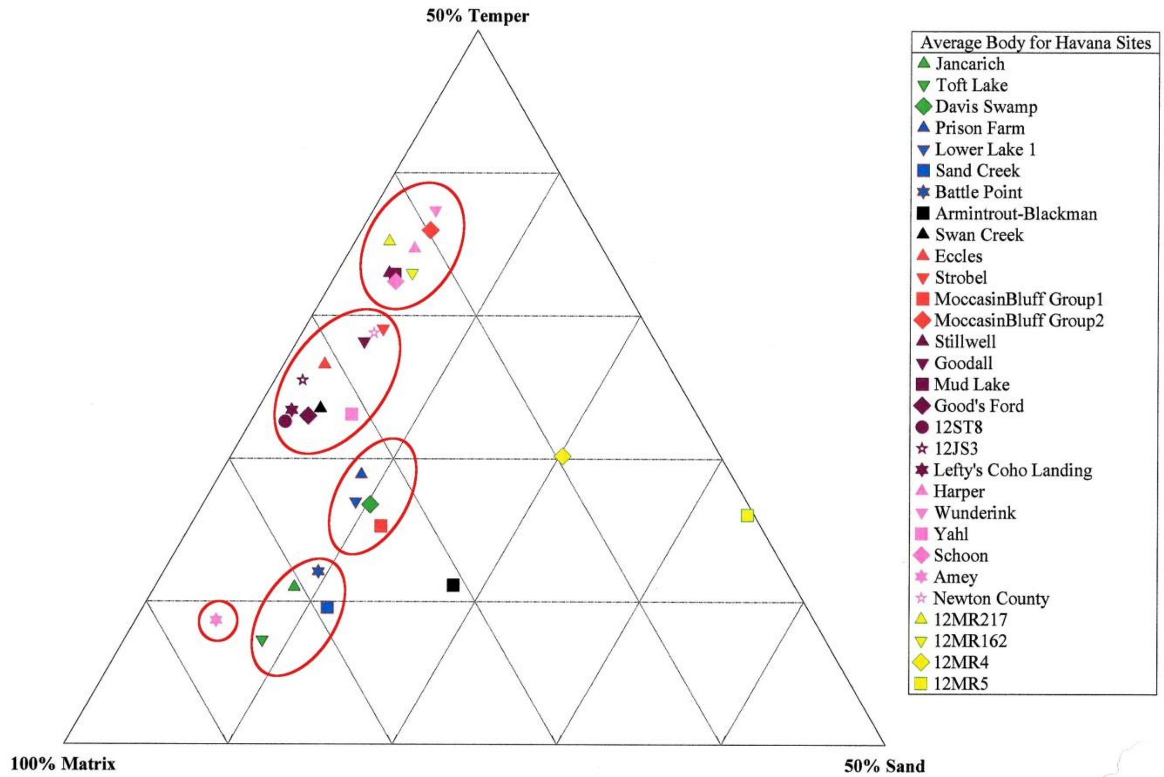


Figure 4-5: Average Body/Local Recipe for all Havana sites
(***Muskegon River valley sites***; ***Grand River valley sites***; ***Kalamazoo valley sites***; ***St. Joseph valley sites***; ***Upper Kankakee valley sites***; ***Lower Kankakee valley sites***; ***Marshall County sites***)

There are several important points to discuss from the diagram above. Sites in the Kankakee River valley are clearly distinguishable from those in the Muskegon, Grand, Kalamazoo, and St. Joseph River valleys. In general, percent temper is higher, on average, than any other river valley. Beginning at the top left of Figure 4-5, the cluster containing the Stillwell, Mud Lake, Harper, Schoon, 12MR162, and 12MR217 sites is very distinct. Diagnostic of this cluster is percent temper (ranging from 32.4% – 35.2%) and a low percent of sand (2.1% – 4.6%).

Located below this cluster is the second Kankakee valley cluster, which includes the Goodall, Good's Ford, Swan Creek, Eccles, Strobel, Bobinski, 12ST8, 12JS3, Lefty's Coho Landing, Yahl, and Newton County sites. A lower percent of temper (22.6% - 29.1%)

distinguishes this cluster from the first Kankakee cluster. Although percent sand (0.7% - 5.9%) is slightly more variable than the first Kankakee cluster, there is not enough sand variability to distinguish it from the first Kankakee cluster. Perhaps there is more variability in the second Kankakee cluster because there are more sites present in this cluster than the first cluster. Regardless, the two Kankakee River valley clusters are distinguished by all other regions by their relatively low percentages of sand and are distinguished from one another by dissimilar percentages of temper.

Another important cluster here includes the Jancarich, Toft Lake, Lower Lake 1, Battle Point, and Sand Creek sites. This cluster has the lowest percent temper of all clusters in this research (7.3% - 12.1%). The only cluster that has similar percent sand (8.4% - 11.2%) is the one above it including the Prison Farm, Davis Swamp, Lower Lake 1, and Moccasin Bluff samples (8.6% - 11.6%). These two clusters are separated by percent temper, however, with the Prison Farm cluster containing higher percentages (15.3% - 18.9%).

The three remaining clusters correspond to individual sites. The Armintrout-Blackman site recipe contains more percent sand than any of the Kankakee, Muskegon, and Grand River valley clusters. For the purposes of future discussion, note that the percent temper falls comfortably within the range of both the Jancarich and Spoonville clusters. The ramifications of this will be detailed in the Spoonville residential community discussed in Chapter 5. Finally, the two Marshall County sites (12MR4 and 12MR5) each have a very unique recipe composition.

Temper Types

The *body* composition of pottery illustrated in the above ternary diagram (Figure 4-5) proved to be the best starting point from which to identify residential communities. Temper type is another variable related to the recipe and the results from this study frequently corroborated the initial ternary diagram results. The use of a particular temper type constitutes a socially constrained choice and these patterns often correspond to spatial or temporal signatures, an observation made by several other scholars (Brashler 2006, Garland and DesJardins 2006, Mangold and Schurr 2006) who point out that Middle Woodland potters throughout the study region frequently chose to temper their pottery with granitic temper types littered with light colored feldspar minerals. Therefore, as a variable related to the choices made by individual potters, the qualitative identification of temper may signal personal or social identity and was useful to identify local and nonlocal samples present at each site.

Keep in mind, however, that the ethnographic record does reveal that potters generally procure temper sources within 1 km (~ 0.6 miles) of a village site (Arnold 1985), which suggests that the choice of temper use is partially constrained by the presence of raw materials immediately surrounding that potter or community. Subsequently, the study of the distribution of temper types can also inform on regional differences in rock type availability. In this research, temper type is primarily used to supplement the more robust ternary diagram results discussed above.

The discussion below begins with an intra-river valley site-by-site comparison followed by a more general discussion of temper use patterns and distinctions between river valleys and regions. The meaning of these patterns will not be fully explained here, however, because most are expounded upon in Chapter 5 to justify the characterization of communities and individual ceramic samples.

Intra-River Valley Temper Type Discussion

Muskegon River Valley

Table C-6 in Appendix C illustrates that Muskegon River valley potters predominantly used granite as their choice temper, which is common in other river valleys as well. The more useful findings involve the least commonly used temper types in the Muskegon valley. Jancarich has two samples with unusual temper types, one with gabbro and the other with a grog and granite mixture. Toft Lake also has two samples containing unusual temper types, one with granodiorite and the other with a granodiorite and amphibolite mixture. The most important finding here is the choice of Davis Swamp potters to incorporate a mixture of granite and diorite temper types in four of the five samples at this site. This is the only occurrence of diorite temper use in the Muskegon River valley. As will be discussed below, this is an important conclusion that is partially used to distinguish the Davis Swamp site from other sites in the Muskegon River valley and beyond.

Grand River Valley

Although Grand River valley samples (Appendix C, Table C-7) are most frequently tempered with granite, there is more variability in the types of tempers used compared to Muskegon River valley sites. For example, there is larger use of more mafic temper types (e.g., diorite, gabbro, amphibolite), especially at the Spoonville site where eight samples are tempered with a mafic rock type. It is possible that mafic temper types were more accessible in the *lower* reaches of the Grand and Muskegon River (recall Davis Swamp site results) valleys. However, they are not particularly uncommon elsewhere in the Grand River valley, such as at Prison Farm (n = 4), Lower Lake 1 (n = 2), and Converse (n = 3).

Grog is present only at the Lower Lake 1 site (n = 3). This has implications regarding this site's relationship with another site in the Muskegon valley that also possesses grog temper: the Jancarich site (described in more detail in Chapter 5). Interestingly, the presence of diorite temper totals 10% in both the Grand and Muskegon River valleys. Lastly, Prison Farm possesses one sample that contains mica schist as its tempering agent; this being one of the two total samples tempered with mica schist in the entire study region.

Kalamazoo River Valley

Not surprisingly, granite tempers dominate the samples in the Kalamazoo valley (Appendix C, Table C-8). The most pertinent finding here is the frequent use of mafic temper types at the Hart site in which eight of the nine samples at Hart contain a mafic temper type (i.e., gabbro or amphibolite). Gabbro temper use, in particular, at Hart provides excellent insight into the cultural identity and characterization of this site. As will be discussed below, the frequency of gabbro temper is most common in the Kankakee and gradually decreases as one travels north. This has been an important discovery which I use in tandem with other findings to argue that the Hart site represents an actual movement of people from the Kankakee River valley into the Kalamazoo River valley (see Hart site discussion in Chapter 5).

St. Joseph River Valley

Moccasin Bluff exhibits the most variability in temper type use within the St. Joseph River valley (Appendix C, Table C-9). This site is the only site within the valley that possesses samples with diorite temper and two other samples with a mixture of grog and granite. One of the most significant findings revolves around the first occurrence of the use of sandstone tempers in ceramic samples in the St. Joseph River valley. Specifically, quartz arenite sandstone was identified at both the Moccasin Bluff and Simpson sites. This temper type was identified only in the Kankakee and St. Joseph River valleys and points towards the strong possibility of a relationship between people inhabiting or traveling through these two river valleys. Another type of sandstone, sub-arkose, was found in one sample at the Rock Hearth site. Sub-arkose was found only at one other site located in the Kankakee: Watson. The complete absence of gabbro temper use in the St. Joseph valley samples is also noteworthy.

Kankakee River Valley

In general, there appears to be more variation in the types of tempering agents used in the Kankakee River valley in relation to the rest of the study area, which accounts for the lower percentages of granite temper use (Appendix C, Table C-10). There are thirteen different temper types or combinations of types that were being employed by potters in the Kankakee. Grog temper is present at only three sites (Stillwell, Goodall, and Schoon) while mica schist is observed in only one sample from the Weise Mound site. One unusual temper type used in this region occurs in the central Kankakee valley (at Weise Mound) and north near the Lake Michigan lakeshore (at Lefty's Coho Landing): arkose sandstone. This type of sandstone is seen only at one other site in the study region: 12MR4. Interestingly, these three sites are later included in the same residential community, as will be discussed in Chapter 5, based upon additional stylistic and compositional results.

Another unusual temper type found only in the upper Kankakee is labeled "unusual Feldspar" in the Table B-10. These temper grains were difficult to accurately assign to a rock type but they appear to be extremely heavily altered gabbro temper grains composed primarily of plagioclase, with some minor frequencies of opaques and clino- and ortho-pyroxenes. The two sites that contain samples with this type of temper are the Stillwell and Mud Lake sites, which are located adjacent to one another. This likely suggests that this temper type was collected from somewhere in this immediate vicinity.

Samples containing gabbro temper come primarily from sites in the middle to upper Kankakee River valley (Stillwell, Mud Lake, Goodall, Weise Mound, 12JS3) (n = 12), with the Amey site (n = 2) and Schoon site (n = 1) in the lower Kankakee being the only exceptions. Subsequently, gabbro temper use is mostly an upper to middle Kankakee River valley phenomenon because 80% (n = 12) of all gabbro tempered samples originate from this region. Similarly, diorite temper use also appears to be an upper Kankakee (Goodall and Good's Ford sites) phenomenon with the Amey site (n = 1) again representing the only exception.

Marshall County

The most obvious and significant Marshall County observation pertains to the raw material uniqueness inherent in the pottery from the 12MR4 and 12MR5 sites (Table C-11, Appendix C). First is the presence of microgranite, which is present in four total samples or 36.4% of all samples from these two sites. This temper type was not observed anywhere else in the study region. Also unique to these two sites is the presence of gneiss as a tempering agent. This temper type was also not seen anywhere else in the study region and constitutes 27.3% (n = 3) of the temper types used at these two sites. Importantly, both of these observations aided in the definition of 12MR4 and 12MR5 as a separate residential community (see Chapter 5). Lastly, the grog-granite mixture at 12MR162 and the granite-gabbro mixture at 12MR217 are also minority temper type mixtures found in higher frequencies in the Kankakee River valley, which points towards a potential cultural relationship with that area.

Inter-River Valley Temper Type Discussion

The following tables highlight the differences between river valleys by comparing the temper types and different combinations of temper types that were used to construct ceramic vessels in these regions.

River Valley (n)	Granite	Grano-diorite	Diorite	Diorite + Granite	Diorite + Gabbro	Gabbro	Gabbro + Granite
Muskegon (40)	32 (80%)	1 (2.5%)	-	4 (10%)	-	1 (2.5%)	-
Grand (70)	46 (65.7%)	3 (4.3%)	7 (10%)	-	-	5 (7.1%)	1 (1.4%)
Kalamazoo (35)	25 (71.4%)	1 (2.9%)	-	-	-	4 (11.4%)	3 (8.6%)
St. Joseph (57)	42 (73.7%)	2 (3.5%)	4 (7%)	-	-	-	-
Kankakee (116)	61 (52.6%)	23 (19.8%)	4 (3.4%)	-	-	4 (3.4%)	6 (5.2%)
Marshall County (13)	3 (23.1%)	-	-	-	1 (7.7%)	-	1 (7.7%)
Grand Total (331)	209 (63.1%)	30 (9.1%)	15 (4.5%)	4 (1.2%)	1 (0.3%)	14 (4.2%)	11 (3.3%)

Table 4-4: Temper Types Arranged by River Valley or Region

Table 4-4 (cont'd)

River Valley (n)	Gabbro + Grano-diorite	Grog + Granite	Amph-ibolite	Amph-ibolite + Grano-diorite	Amph-ibolite + Granite	Unusual Feldspar
Muskegon (40)	-	1 (2.5%)	-	1 (2.5%)	-	-
Grand (70)	-	3 (4.3%)	2 (2.9%)	2 (2.9%)	-	-
Kalamazoo (35)	-	-	2 (5.7%)	-	-	-
St. Joseph (57)	-	2 (3.5%)	-	-	2 (3.5%)	-
Kankakee (116)	3 (2.6%)	4 (3.4%)	2 (1.7%)	-	-	3 (2.6%)
Marshall County (13)	-	1 (7.7%)	-	-	-	-
Grand Total (331)	3 (0.9%)	11 (3.3%)	6 (1.8%)	3 (0.9%)	2 (0.6%)	3 (0.9%)

River Valley (n)	Quartz Arenite Sand-stone	Sub-Arkose Sand-stone	Arkose Sand-stone	Micro-granite + Granite + Arkose Sandstone	Micro-granite + Granite	Mica Schist	Gneiss
Muskegon (40)	-	-	-	-	-	-	-
Grand (70)	-	-	-	-	-	1 (4%)	-
Kalamazoo (35)	-	-	-	-	-	-	-
St. Joseph (57)	4 (7%)	1 (1.8%)	-	-	-	-	-
Kankakee (116)	2 (1.7%)	1 (0.9%)	2 (1.7%)	-	-	-	-
Marshall County (13)	-	-	-	1 (7.7%)	3 (23.1%)	-	3 (23.1%)
Grand Total (331)	6 (1.8%)	2 (0.6%)	2 (0.6%)	1 (0.3%)	3 (0.9%)	1 (0.3%)	3 (0.9%)

There are twenty temper types or mixtures of different temper types present in the study region (Table 4-4). The Kankakee exhibits the most variability in temper types with thirteen temper types or combinations of temper types used, followed by the Grand (nine), St. Joseph and Marshall County (seven), and the Muskegon and Kalamazoo (six) valleys. The presence of granodiorite is strongest in the Kankakee River valley (n = 26 or 22.4%) compared to the next closest: the Grand (n = 5 or 7.1%) and Muskegon (n = 2 or 5%) valleys.

The percentage of gabbro temper generally decreases from south to north. Specifically, the Kankakee valley has the most samples with gabbro temper with a grand total of thirteen samples (11.2%). The next highest percentage comes from the Kalamazoo River valley. However, six of the seven total samples in this river valley are from the Hart site, which has been determined to represent an actual movement of Kankakee River valley people into the Kalamazoo (see Chapter 5). This reinforces the interpretation that Kankakee sites have much higher percentages of gabbro than other regions. It is also interesting that there are zero samples in the St. Joseph that possess this temper type, at least in this research. There are only six samples in the Grand and one in the Muskegon River valley that contain gabbro temper, by comparison.

As mentioned above, the "unusual feldspar" temper type is only observed in the upper Kankakee River valley. Amphibolite temper, on the other hand, is relatively more rare in the Kankakee (n = 2 or 1.7%) compared to west Michigan sites (n = 9 or 4.5%). A similarly negligible difference exists for the presence of diorite in west Michigan (n = 15 or 7.4%) compared to the Kankakee (n = 4 or 3.4%).

The frequency of the use of various sandstones as a tempering agent in the Kankakee is comparable to that of the St. Joseph River valley. There are five total samples (4.3%) in the

Kankakee and five total samples in the St. Joseph (8.8%) with this temper type. Sandstone temper types are found nowhere else in the study region. Microgranite, found only at 12MR4, is another temper type not found anywhere else in the study area. Lastly, it is also rare to encounter gneiss (found only at 12MR4 and 12MR5) and mica schist (found only in one sample in the Grand River) temper types in the study region.

Temper Size Indices (TSI)

Temper size indices (TSI) were calculated in an identical manner to that of sand size indices for all individual samples, which was later used to calculate the average TSI for each individual site (see Appendix C, Figure C-1). Unfortunately, very few clear patterns in temper size could be identified. Additionally, temper size indices for Havana-related samples were only marginally larger than Hopewell Ware-related samples (discussed later in the chapter). Using TSI's to distinguish between Havana-related samples proved unsuccessful.

The most significant conclusion for the Havana-related samples, however, was the very large average temper size displayed by 12MR4 samples. An average TSI of 4.09 was easily the largest in the study region and was later used as a diagnostic of the 12MR4 residential community described in Chapter 5. Additionally, there does appear to be some temporal differences in TSI, as exemplified by the smaller TSI's from several later Middle Woodland sites, such as Behner, Simpson, Rock Hearth, Weise Mound, 12MR162, or Mushroom. Surprisingly, one of the earliest sites in the research, Prison Farm, has a TSI of 3.5, which is very average in relation to other site TSI's in this research. This cautions against relying too heavily upon the general assumption (e.g., Brashler, personal communication 2003; Chivis 2003) that Middle Woodland Havana pottery samples from earlier sites (exhibiting thicker vessel walls and different vessel functions) have larger temper sizes than later Middle Woodland Havana and Hopewell samples.

Percent Voids

The percentage of voids present in ceramic pastes is related to the ceramic making process, specifically porosity. Porosity can be controlled by the potter and can be a learned behavior. It was hoped that clear patterns would emerge from this study that would aid in defining signatures of individual sites or communities. Unfortunately, too much variability exists between sites and no clear or useful pattern was discovered for either Havana or Hopewell-related samples. Considerations regarding void percentage were more useful on an intra-site sample-by-sample basis when potential nonlocal individual samples required additional evidence to designate them as representing either imports or as non-locally manufactured.

Pyrotechnology

Ceramic firing technology employed by ancient potters is another potential process that may warrant results capable of distinguishing separate groups or communities of people. The firing temperature and length of firing are two important factors that potters consider when firing their pots. Two variables in this research related to the firing of vessels are optical activity and paste vitrification.

Optical Activity

Under the petrographic microscope, optically active clay matrices retain their birefringence (i.e., have changing optical properties such as a change in color or loss of color upon rotation of the stage under the microscope; see Whitbread 1995). Optically active vessels represent low fired ceramic wares fired in the 700°C range and suggest firing temperatures below the vitrification point of 850°C (Rice 1987: 431). When firing temperatures approach the 850° - 900°C threshold, the matrix can be either optically active to inactive, or both may be present in different parts of the sherd samples. This temperature range is similar to most ancient firing ranges (Whitbread 1995). When firing temperatures reach 1100°C, pastes become completely optically inactive. Attainment of this firing temperature is rare in ancient firings and is not observed in samples in this research.

As mentioned in Chapter 1, obscure variables such as optical activity are generally learned from teachers and practiced as part of a community. Therefore, variable expressions of optical activity in pottery samples is likely related to individual or family level identity (Carr 1995b) and is a good variable to identify residential communities. Tables C-12 through C-16 in Appendix C display the results from this study and are arranged by river valley.

In general, except for the Grand River and the 12MR4/12MR5 vicinity, all river valleys have between 70% and 79% active clay matrices. Grand River valley sites have an equal percentage of both slightly active and active (47.1%) clays. This is primarily because 90% of Norton Mounds samples have slightly active clays, which may suggest a need to fire mortuary vessels at higher temperatures. The Converse site, which also has a strong ceremonial component to it, has a relatively high percentage of slightly active clay matrices (57.1%) as well. One hundred percent of Battle Point site samples are also slightly active.

Perhaps the most important observation is that slightly active pastes are the *majority* within the 12MR4 and 12MR5 region. This is the only region within the study area in which this is the case. At 12MR4, 85.7% of all samples' clay matrices are slightly active, while 100% (n = 2) are slightly active at 12MR5. Interestingly, these sites, especially 12MR4, appear to be very early Middle Woodland Havana-related sites. It is somewhat surprising that these early sites display such a high percentage of optically slightly active pastes. Because other early Middle Woodland sites are overwhelmingly dominated by active clays, this difference in pyrotechnology at 12MR4 and 12MR5 cannot be explained away as simply resulting from expected temporal changes characteristic of later sites. As detailed in Chapter 5, this high percent of slightly active clays is another one of the distinguishing characteristics of the 12MR4 residential community.

There also appears to be a temporal component at play here because it appears that the earliest Middle Woodland peoples fired their pottery at relatively lower temperatures than later Middle Woodland populations. Two hundred eighteen of the three hundred twenty-five total samples (67.1%) possess active clays, which suggest that Middle Woodland potters usually fired their pots closer to the 700°C range rather than the upper 900°C range. The earliest sites in the research area (e.g., Prison Farm, Jancarich, Stillwell, Goodall, etc.) all have very high percentages of active clays. In contrast, there appears to be an increase in the percentage of slightly active clay matrices through time (i.e., late Goodall or LaPorte phases). Sites located in the lower Kankakee (e.g., Newton County, Schissler, Schoon, Watson) and later sites elsewhere (e.g., Spoonville, Mushroom, Battle Point) appear to have been firing their pottery at relatively higher temperatures, perhaps approaching the 900°C threshold.

Paste Vitrification

Vitrification of the clay matrix occurs between 850° and 900°C. In cases in which vitrification is consistently achieved, it suggests that potters have acquired a relatively more advanced development of firing control and also points to that society's need for hard, nonporous ceramic vessels (Rice 1987: 434). It should be noted, however, that all or most of the samples in this research that were vitrified were not completely vitrified; they were partially vitrified usually in separate portions of the sherd. Tables C-17 through C-21 in Appendix C display the percentages of paste vitrification present in pottery vessels within river valleys.

The Muskegon (5%), Grand (9.7%), Kalamazoo (8% when we exclude the Hart site), and St. Joseph River (8.1% when we exclude Rock Hearth) valleys are characterized by very low percentages of paste vitrification. Compared to the rest of the study area, Kankakee River valley sites have higher percentage of samples with vitrified pastes (28.5%). This would appear to indicate that pyrotechnology was more advanced in the Kankakee River valley. However, as stated above, over 70% of Kankakee River valley samples possessed active clay matrices like most other west Michigan samples, which would suggest an unimpressive firing temperature of around 700°C.

Admittedly, this finding does not appear to correlate with the findings for paste vitrification in this section. So how can we explain this discrepancy between optical activity and paste vitrification? The most reasonable explanation is that Kankakee potters did, in fact, fire their pottery around the 700°C range but that they simply fired their pottery *longer* than potters elsewhere in the study region. Therefore, the firing length or duration of firing is a key consideration here and it likely accounts for the reason why Kankakee River valley samples "felt harder" than other samples in the study region, a common qualitative observation recorded by the author during his analysis.

Furthermore, the Hart site has an unusually high percent of vitrified pastes present at the site. The 55.6% of vitrified pastes present at the site is a lot more numerous than any other site in west Michigan (i.e., the Muskegon, Grand, Kalamazoo, and St. Joseph River valleys). The next highest west Michigan site is the Rock Hearth site at 37.5%. As will be discussed in Chapter 5, these two sites were found to represent the actual small-scale movement of Kankakee

River valley peoples into west Michigan. This discovery lent further support for this determination.

Another important observation mirrors the findings from the optical activity study. There appears to be an increase in the level of technological sophistication through time. This is most evident in the lower Kankakee River valley, where most sites in this region are likely later than those in the middle and upper Kankakee (Mangold and Schurr 2006). Whereas only 25.5% of all samples in the upper and middle Kankakee are vitrified, 43.2% of all samples in the lower Kankakee River valley are partially vitrified. Therefore, it is likely that when there was an expansion of people out of the upper and central Kankakee into adjacent areas during the mid-late Goodall and LaPorte phases, as Mangold and Schurr (2006) suggest, there was an accompanying evolution in pyrotechnology as well.

Technical Styles: Morphology and Style

The variables described in this section are also related to technical styles but they were produced from the style and morphological analyses of this research. The following variables are related to the finished ceramic vessel product and were the most helpful morphological and stylistic variables observed in this research. Similar to the ceramic petrography variables described above, they are primarily obscure variables, would have been shared or taught among pottery makers, and are good candidates for personal and community identity identification.

Rim Thickness

Unfortunately, no large general patterns between sites or regions could be obtained from the study of rim thickness (Appendix C, Figure C-2). However, rim thickness became a vital variable when comparing individual sites and pottery samples for their inclusion or exclusion into unique residential communities. Rim thickness was also useful in relation to mean lip thickness, which is discussed in detail in the lip thickness section below.

Lip Thickness

Lip thickness was a particularly diagnostic variable. The bar chart (Figure 4-6) illustrates the mean lip thickness for each individual site. Of the sixteen sites with the thickest average lips, fifteen of those are Kankakee River valley sites or sites later determined to be affiliated with Kankakee River valley sites. The only exception was the Jancarich site, which possibly supports its early temporal placement and Kankakee influence. Also of note is the relatively thin lips present at the Prison Farm site, one of the earliest Havana-related sites in the study region and its similarity to other west Michigan site lip thicknesses.

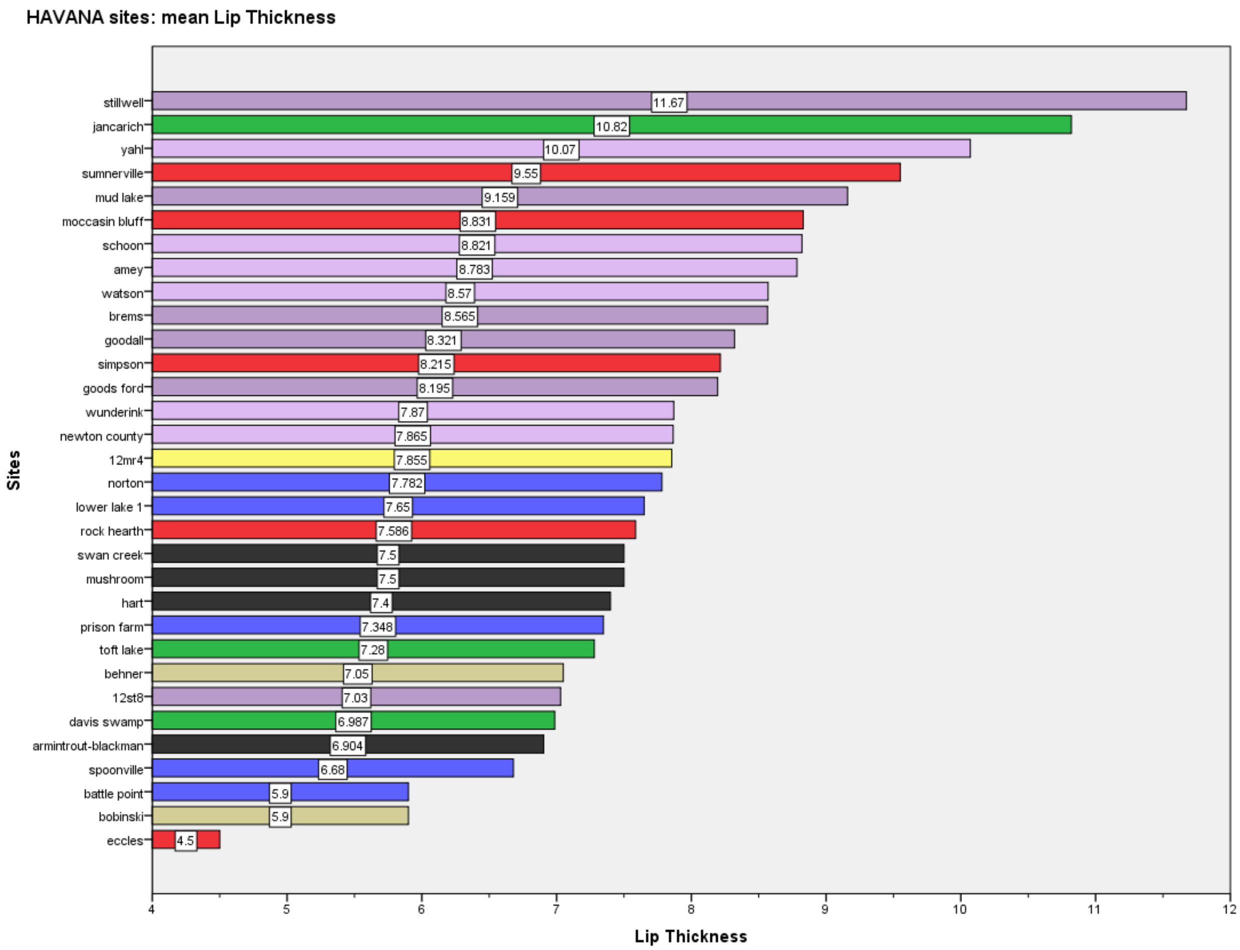


Figure 4-6: Bar Chart of the Mean Lip Thickness for all Havana-related Sites
(Muskegon River valley sites; Grand River valley sites; Kalamazoo valley sites; St. Joseph valley sites; Galien valley sites; Upper Kankakee valley sites; Lower Kankakee valley sites; Marshall County sites)

One unexpected pattern is related to the ratios of average lip to rim thickness (see Table C-22 in Appendix C). It was discovered that many sites' mean lip thickness was greater than their average rim thickness, which appears to be diagnostic of the Kankakee River valley region. Sites in which average lip thickness exceeded rim thickness included Simpson (+ 0.4), Sumnerville (+ 1.0), Bobinski (+ 0.2), Stillwell (+ 1.9), Good's Ford (+ 0.1), and Amey (+ 0.2). All of these sites are Kankakee River valley sites or have a very strong Kankakee River valley affiliation. Other sites that had lip thicknesses within 0.6 mm of their mean rim thickness included Toft Lake (rim thickness + 0.5), Lower Lake 1 (rim thickness + 0.3), Moccasin Bluff (rim thickness + 0.6), Behner (rim thickness + 0.55), Schoon (rim thickness + 0.4), and Newton County (rim thickness + 0.6). Excluding the Toft Lake and Lower Lake 1 sites, all of these sites are Kankakee or Kankakee affiliated sites.

Additionally, six other Kankakee River valley or Kankakee affiliated sites possessed mean lip thicknesses within 1.0 mm of their mean rim thickness (Swan Creek, Goodall, Mud Lake, Brems, 12ST8, Yahl). In west Michigan, only two other sites had mean lip thicknesses within 1.0 mm of mean rim thicknesses (Davis Swamp [0.9 mm] and Norton Mounds [0.8 mm]). All other west Michigan sites were characterized by larger average rim thicknesses in excess of 1.0 mm in relation to lip thickness.

The lip-to-rim thickness relationship evident at Kankakee sites can be best explained by the larger frequencies of beveled interior lips present in the Kankakee (Mangold 2009), which naturally produces a larger lip section in relation to the rim. In contrast, very few west Michigan site samples contained beveled interior lips, which resulted in thicker average rims in relation to lips. Of note, many of the west Michigan samples exhibiting an interior lip bevel were compositionally nonlocal and were frequently found to be made or imported by Kankakee River valley peoples (explained later in Chapter 5).

Body Thickness

Body thickness does not appear to be as reliable of a variable as rim or lip thickness, presumably because it is sometimes difficult to determine which part of the vessel a sample originates from. There may be significant variation in the body thickness of sherds coming from the base compared to those coming from closer to the rim. Regardless, there do appear to be several meaningful conclusions that can be drawn from the body thickness results (Appendix C, Figure C-3).

Most apparent is the very large average body thickness at the Prison Farm site, which is certainly a distinguishing characteristic of this site (and residential community). There is also an obvious temporal factor here. Of the top fourteen mean body thickness values, at least nine are regarded as the earliest Havana-related sites in the study region. Middle to late Middle Woodland sites such as Eccles, 12MR162, or Rock Hearth are characterized by relatively thinner body thickness values. Lastly, ALL of the minor and major outliers illustrated on the boxplot (Appendix C, Figure C-3) were later found to possess exotic recipe compositions and were determined to be nonlocal samples (i.e., were either imported or made by communities located elsewhere in the study region).

Lip Notching

Interior and top lip notching (Appendix C, Table C-23) is yet another obscure variable that would not be visible at a distance and is a more accurate indicator of individual or family-level identity signatures. Lip notching in this section refers to either interior lip or top lip cordwrapped stick and tool impressions. Although the results of this study are more useful to view from a residential community perspective because they strengthen the arguments for the definition of these communities (discussed in Chapter 5), some very general conclusions will be discussed here.

As a whole, the upper and middle Kankakee River valley sites have the highest percent of lip notching in the study region (59.5% or 22 of 37 total samples). St. Joseph River valley sites (42.3%) possess the next highest frequency. The Moccasin Bluff site (40%) and the other St. Joseph River valley sites exhibit strong cultural connections with the Kankakee, which is also supported by a litany of other data discussed later. An important west Michigan site that approaches the upper and middle Kankakee percentages is the Norton Mounds site (52%). The higher frequency at this site may be due to the nature of the site as a ceremonial or mortuary site, which may have called for the use of more decorative expressions.

A temporally sensitive result was discovered as well. It appears that the percent of lip notching decreases through time in the Kankakee River valley, as evidenced by lip notching presence in relatively later sites in the lower Kankakee, such as Newton Co. (37.5%), Schoon (20%), and Yahl and Wunderink (0% at both). In total, interior lip notching is present in only 20% (5 out of a total of 25 samples) of all lower Kankakee site samples.

Interestingly, the Grand (22.2%, excluding the Norton Mounds) and Kalamazoo River (7.7%) valley sites have the lowest percentages of lip notching in the study region (a combined 18.4%, or 7 out of 38 total samples). This contrasts with the relatively higher frequency of samples from sites in the Muskegon River valley (42.9%). The low sample size in the Muskegon, however, warrants a conservative interpretation of these data. Lastly, the only site in Marshall County possessing interior lip notching is the 12MR4 site, which has four of its six total samples (66.7%) displaying interior lip notching.

Interior Sherd Decorative Repertoires

In contrast to the exterior decorative repertoires described at the beginning of this chapter, decorations applied to the interior surfaces of sherds are visually obscure and are more likely indicators of individual or family-level identities or recipes. For reasons explained earlier in the chapter, Kankakee interior decorations were not recorded. West Michigan Havana and Hopewell samples were examined, however, and interior design patterns were noted (see Appendix C, Table C-24). These data derive from all pottery sherds that were examined during the author's initial calculation of the decorative repertoires of each individual site before samples were chosen for inclusion in this research. These data were used as a supplement and proved to be very useful in determining if an individual sample was likely manufactured locally or had a nonlocal origin.

There are some broad, but important, conclusions that can be drawn from Table B-24. Not surprisingly, a vast majority of interiors are smoothed (88.2%). The next most frequent interior decorative trait is cordmarking, which is present on 7.4% of all samples and suggests the continued use of this primarily Early Woodland period trait through time. The higher frequency of this decorative trait in samples from the Muskegon and Grand valleys is noteworthy, as is the lack of it in the St Joseph. Within the Muskegon valley, the Toft Lake site possessed all thirty-seven interior cordmarked samples observed from the valley. Within the Grand, seventeen of the nineteen total interior cordmarked samples were from the Prison Farm site. At Prison Farm, this accounts for 8.1% of all interior sherd designs. In the Kalamazoo, the Armintrout-Blackman site contains twenty-nine of the thirty three interior cordmarked samples from this river valley. Therefore, the large majority of interior cordmarked vessels in each of these three valleys is primarily due to the large presence of the design at the Toft Lake, Prison Farm, and Armintrout-Blackman sites.

Smoothed-over-cordmarking, fabric impressing, cordwrapped stick, tool impressing, and brushing all comprise less than two percent of all samples in the study region. Cordwrapped stick impressions occur in relatively equal percentages in the Muskegon, Grand, and St. Joseph valleys. Tool impression was found mostly in the Grand Valley at the Prison Farm (n = 6) and Norton Mounds (n = 2) sites, but also in the St Joseph at Moccasin Bluff (n = 2). The Davis Swamp site was the only site in the study region that had a sample with interior fabric impressions. Brushing was recorded only at the Jancarich site (n = 8) within the Muskegon, while two samples were observed at the Prison Farm site in the Grand River basin.

Striated interiors were present on 2.3% of all examined samples in the study region and occur in relatively equal percentages in all four river valleys. Within the Muskegon valley, the Davis Swamp site contains six of the seven interior striated samples in the valley. Interestingly, half (n = 7) of the samples containing this design in the Grand River valley originate from the Converse site, with minor occurrences observed at the Norton Mounds (n = 2), Prison Farm (n = 2), and Spoonville (n = 3) sites. In the Kalamazoo valley, all three interior striated samples come from the Armintrout-Blackman site. Moccasin Bluff (n = 3) and Eccles (n = 1) are the only St. Joseph sites that were observed to contain samples with interior striations.

Visual Style Variables

Dentate Width

In addition to the relative frequencies or percentages of stylistic traits present in the study region, mean dentate width was the only other variable which contained a sufficiently large database to be useful to distinguish between separate communities and regions. Unlike the other variables related to the recipe described above, dentate width can be a visibly striking trait and therefore has the potential to be used to actively communicate identity amongst and between communities.

Mean dentate width has been a variable relied upon by other scholars (e.g., Mangold 1981, 2009) to draw conclusions regarding differences between Kankakee River valley groups and west Michigan groups. The results of this research corroborate these initial studies. In general, the Kankakee exhibits the thickest dentate widths, which gradually become thinner as one travels from the St. Joseph to the Muskegon River valley (Figure 4-7).

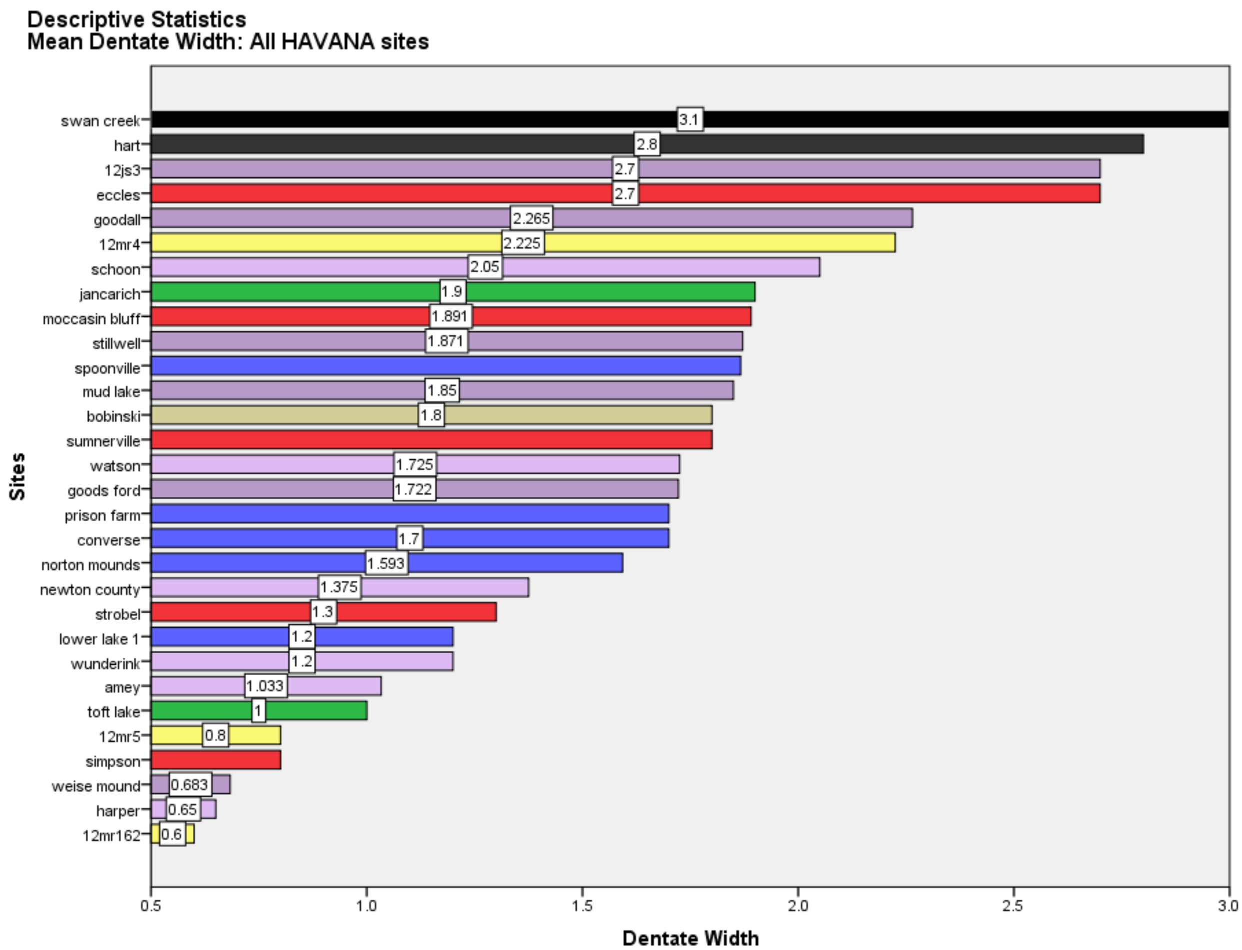


Figure 4-7: Mean Dentate Width for all Havana-related Sites
(Muskegon River valley sites; Grand River valley sites; Kalamazoo valley sites; St. Joseph valley sites; Galien valley sites; Upper Kankakee valley sites; Lower Kankakee valley sites; Marshall County sites)

Eleven of the top fourteen sites in Figure 4-7 are Kankakee sites or sites that were later found (as explained in Chapter 5) to have a strong Kankakee presence/origin. Interestingly, nine of these are among the earliest Middle Woodland sites in the study region, which also introduces a temporal factor that must be considered here. Another temporal trend is observed in which nine of the eleven sites with the smallest average dentate widths are sites that are middle to late

Middle Woodland in age. Of these, four sites are located in the lower Kankakee, a location of presumed later Middle Woodland expansion (Mangold and Schurr 2006).

In conclusion, it does appear that Kankakee sites contain larger dentate stamps, on average, than west Michigan sites. However, there is a temporal trend at work here as well, which aids in explaining the large toothed dentate stamps characteristic of early Middle Woodland sites and the smaller average dentate stamps observed at relatively later Middle Woodland sites. T-tests were also calculated to compare dentate width from various sites in the study area and these generally supported the later identification and definition of separate residential communities defined in Chapter 5.

HOPEWELL WARE SAMPLES

In comparison to the Havana samples described above, the Hopewell samples exhibited a lot more variability in the types of clays collected and the recipes employed to construct the pots. As discussed in Chapters 5 and 6, this variability is expected due to the ceremonial and/or mortuary use of Hopewell vessels and the wider participation of individuals from distinct (and perhaps far-flung) communities in these rituals.

Commonly Used Clays and Raw Materials

Percentage of Sand and Silt in Clays: PASTE

As explained in the Havana Ware section above, the study of the percentages of sand, silt, and matrix in the *paste* provided a starting point from which to initially characterize clays collected by Middle Woodland potters. However, the clays gathered to construct Hopewell-related samples were significantly more variable than those utilized for Havana Ware samples. As a result, clay types for Hopewell Ware samples did not cluster nearly as tightly as Havana

Ware samples, statistically and on ternary diagrams. The use of a wider variety of distinct clays for Hopewell-related samples is reflected in other paste variables as well, as will be seen below. In addition to an explanation of the Hopewell sample analysis, a comparison to Havana-related samples is stated when appropriate.

Table 4-5 and Figure 4-8 compare the clay types for all Hopewell samples by illustrating the mean paste values for each river valley. The percent of silt present in clays in the St. Joseph and Kankakee valleys and Marshall County is higher than those clays in the Muskegon, Grand, and Kalamazoo river valleys, on average. When comparing the percentages of sand present in Hopewell samples throughout the study region, the Grand River valley contains the highest mean percentage of sand within pastes than any other region. The St. Joseph and Kankakee valleys contain the least amount of sand, on average, than any other river valley.

River Valley/Region	**N**	**% Matrix**	**% Silt**	**% Sand**	**Sand Size Index**
Muskegon	22	81.5	2.7	15.8	1.44
Grand	47	69.9	7.4	22.7 (+9.9)	1.36
Kalamazoo	16	78.1	5	16.9	1.43 (+0.14)
St. Joseph	11	78.3	12 (+5.6)	9.7	1.47
Kankakee	34	80.8	9.4 (+4.1)	9.8	1.46 (-0.15)
MR Co, IN	8	77.9	8.1	14	1.29 (-0.21)
Total	**138**				

Table 4-5: Mean Paste Values for Hopewell Samples Arranged by River Valley/Region

text in “()” highlights marked differences in comparison to Havana samples from same river valley (for example, “(+9.9 sand)” means that the mean Hopewell samples contained 9.9% more sand, on average, than Havana samples from the same river valley)

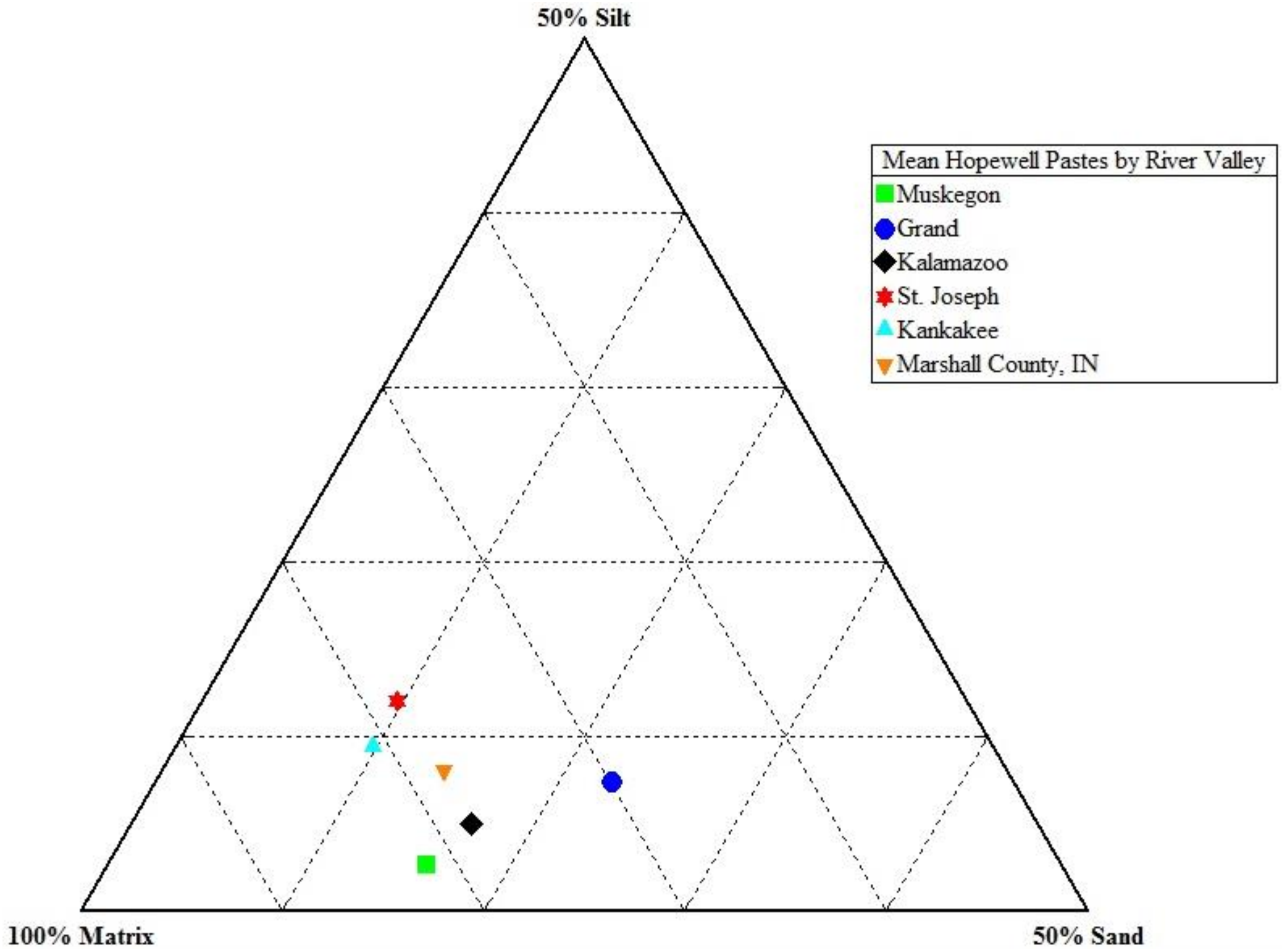


Figure 4-8: Mean Hopewell Paste Values by River Valley

There are also some important details to point out when one compares the Hopewell pastes to the Havana pastes from each river valley. Compositionally, the Muskegon and Kalamazoo River valleys, and Marshall County samples contain roughly the same percentages of silt, sand, and matrix in their pastes. This suggests the choice of similar clay types within these two regions for the construction of both Havana and Hopewell pots. Conversely, within all other regions (Grand, St. Joseph, and Kankakee), it appears that different pastes were used to make Havana and Hopewell Ware pots. In the Grand, Hopewell samples contained almost twice as much sand, on average, than Havana samples. In the St. Joseph and the Kankakee, Hopewell samples were siltier (4.1-5.6% more), on average, than Havana samples.

Natural Inclusion Types in Hopewell Sample Clay Types

Unlike most variables, the types of natural inclusions present in Hopewell samples' pastes closely mirrored the natural inclusion results for the Havana samples (despite exhibiting slightly more variability), which point to a larger geologic characterization of these clay types. Thus, this variable became an important one to identify the location of production for these Hopewell samples. This will become more apparent in Chapter 5 when the locations of production for these samples are identified and the boundaries for Sustainable and Symbolic Communities are drawn. See Appendix C, Table C-25 for a visualization of the total number and percentages of each mineral type present within each river valley for the Hopewell samples.

There are a number of results that mirror the results for the Havana samples. The presence of opaque minerals in the paste is diagnostic of the Muskegon River valley clays, although a couple samples in the Grand (n = 3) Kalamazoo (n = 1) contain opaque minerals in their pastes. Pyroxene is primarily a Grand River, Muskegon River, and Kalamazoo valley occurrence. It is absent in the St. Joseph and Kankakee valleys. Muscovite is rare to nonexistent in the Muskegon and Grand River valleys. Hornblende is common in all river valleys, except the Muskegon, where it is absent in Hopewell samples.

Perthite is relatively rare in all river valleys, except the Kalamazoo where it is absent. Unlike the Havana samples, however, in which the St. Joseph River valley clays easily contained the highest percentage of perthite, it is more widely dispersed in the St. Joseph (n = 1), Kankakee (n = 3), Grand (n = 2), and Muskegon (n = 1) river valleys. Perhaps this points to a more frequent movement of Hopewell vessels constructed by St. Joseph valley peoples throughout the region.

Mirroring the Havana sample results, sandstone (1.4%) was found only in the Kankakee River valley (n = 1) and Marshall County (n = 1). Rhyolite is also diagnostic of pottery from primarily the Kankakee, St. Joseph, and Muskegon River valley clays. Most (3 of 4 total samples) were found in pastes from sites in the Kankakee (n = 2) and St. Joseph (n = 1).

Epidote is diagnostic of clays found in Hopewell pots from Marshall County and the Kankakee River valley, where it constitutes 56.4% of all samples in these two regions. It only constitutes 7.7% or less in all other regions. Biotite mica is also most common in the Kankakee valley and in Marshall County (28.2%; n = 11), especially in the middle to upper Kankakee River valley.

Similar to the Havana samples, microcline was most common in the Kalamazoo River valley (82.4%), followed by the St. Joseph (61.5%), Grand (57.1%), Muskegon (40.9%), and Kankakee River valleys (35.9%). Lastly, and following the Havana sample results, the Kalamazoo River valley exhibited the highest cumulative percentages of potassium feldspar, microcline, and plagioclase than any other river valley.

ARF's (argillaceous rock fragments)

The presence of argillaceous rock fragments (or ARF's) in Hopewell samples' pastes drops off in comparison to Havana samples. Whereas 78 out of 403 (19.4%) total Havana samples contained ARF's, only 12 out of 140 (8.6%) Hopewell samples contained ARF's. Despite this, the finding above in the Havana section regarding the more frequent occurrence of ARF's in the middle-upper Kankakee valley clays is consistent with the findings of the Hopewell samples. Seven of the twelve total Hopewell samples containing ARF's originate from Kankakee (n = 6) and Marshall County (n = 1) sites.

Sand Size Indices (SSI)

Again, in comparison to Havana sample results, Hopewell samples exhibited more variation in Sand Size Indices (SSI) values. Due to this variation, SSI results proved to be unreliable for arriving at any concrete determinations of clay origin. Only a few rudimentary conclusions can be drawn from Hopewell samples SSI's. Regarding mean SSI values for individual sites, seven of the eight largest values in the research are from Kankakee valley sites (Amey, Goodall, Schoon, Big Grape Island/12JS3, Mud Lake, and Weise Mound). On the other hand, of the 14 lowest SSI values, 5 are from Kankakee sites and 4 are from Grand valley sites. The three lowest SSI values in the research are from Kankakee valley or Kankakee-derived sites (Good's Ford, Stillwell, Bobinski). Additionally, five of the seven Grand valley sites' SSI's clustered together between 1.33 and 1.44, the tightest grouping per river valley in the research (Marshall County sites are second with values 1.2-1.38).

Besides these very general conclusions, the SSI results yielded one other important finding. When comparing Havana vs. Hopewell samples, the number of loessic clays (characterized by a relatively high level of silt and a high frequency of very fine sand/SSI equaling or close to 1.0) employed to construct Hopewell-related samples decreases dramatically. Only one sample apiece from the Mud Lake and Stillwell sites in the Kankakee employed the use of a loessic clay. All of the other Hopewell samples (n = 138) in this research were constructed with alluvial clays.

Technical Styles: Ceramic Petrography

Composition: BODY

This section describes larger regional differences in Hopewell body values. Intra-regional distinctions are more appropriately discussed in Chapter 5 when they are used to identify the location of production or community identity of these samples. Table 4-6 illustrates the average Hopewell *body* values for each major river valley or region, while Figure 4-9 illustrates these on a ternary diagram, as viewed by the percentages of clay matrix, sand, and temper present the samples. In comparison to Havana samples, Hopewell samples generally exhibited more variation in body values. Although Muskegon valley Hopewell samples tended to approximate body (and paste) values of Havana samples within the same basin, other regions throughout the study region exhibited rather striking differences between Hopewell and Havana body values (see Table 4-6).

River Valley/Region	N	% Matrix	% Temper	% Sand	Temper Size Index
Muskegon	22	71.9	14.5	13.6	3.6
Grand	49	66.8	15.3	17.9 (+7.3)	3.67 (+0.16)
Kalamazoo	16	70.4	15.1 (-6.4)	14.5 (+4.3)	3.17 (-0.33)
St. Joseph	11	78.4	12.6 (-6.9)	9.0	3.04 (-0.25)
Kankakee	34	72.6	19.3 (-4.8)	8.1	3.36 (-0.16)
MR Co, IN	8	70.3	17.7 (-6.2)	12.0	3.59
Total	**140**				

Table 4-6: Mean Body Values for Hopewell Samples Arranged by River Valley or Region; text in "()" highlights marked differences in comparison to Havana samples from same river valley; for example, +7.3 sand means that the mean Hopewell samples contained 7.3% more sand, on average, than Havana samples from the same river valley

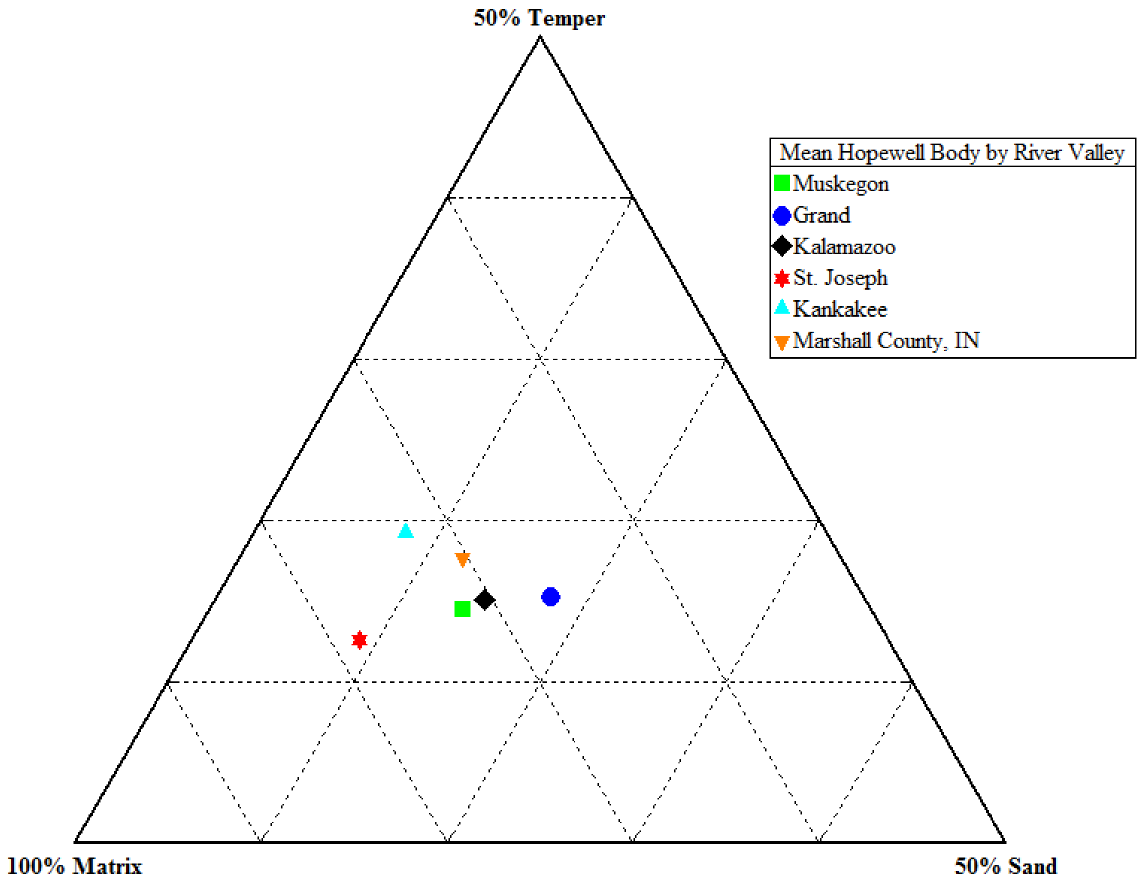


Figure 4-9: Mean Hopewell Body Values by River Valley

Generally, Hopewell samples were constructed with smaller percentages of temper and smaller temper size grains than Havana samples. Interestingly, the average percentage of temper present in Hopewell samples throughout the study region did not vary nearly as much as Havana samples, the former ranging from 12.6% - 19.3%. Grand valley mean Hopewell body values differed from Havana samples from the same region by containing 7.3% more sand and larger temper size indices (by 0.16). Kalamazoo Hopewell samples contained 6.4% less temper and 4.3% more sand than Havana samples, while temper size decreased, on average, by 0.33. St. Joseph Hopewell samples possessed 6.9% less temper and smaller average temper size indices (by 0.25) than Havana samples. Average percent temper for Kankakee Hopewell samples decreased by 4.8% compared to Havana samples, while Marshall County Hopewell samples decreased by 6.2%, on average.

Temper Types

Below, Hopewell intra-river valley site-by-site comparisons are discussed first, followed by a more general discussion of temper use patterns and distinctions between river valleys and regions.

Intra-River Valley Temper Type Discussion

Muskegon River Valley

Muskegon River valley potters predominantly used granite as their choice temper (Table C-26 in Appendix C), accounting for 77.3% of all Hopewell samples in the valley. All seven Jancarich and all four Brooks Mound samples are tempered with granite. Davis Swamp potters employed the use of more temper types, although granite is present in eight of the eleven samples at the site.

Grand River Valley

Appendix C, Table C-27 illustrates that the most frequently used temper type in the Grand valley was granite, but there is more variability in the types of tempers used compared to Muskegon River valley sites. Whereas Muskegon samples used five different temper type combinations, Grand valley samples include the use of ten temper type combinations. Most of the variation, however, comes from the Converse and Spoonville sites. Limestone is present in 3 samples at Spoonville and one from Converse. Granodiorite, diorite, and gabbro temper types are found predominately at Converse; only Boom Road contains two samples with granodiorite temper. Lastly, amphibolite is found in only two samples in the Grand (at Lower Lake and Spoonville).

Kalamazoo River Valley

Similar to Havana samples in the Kalamazoo, granite tempers dominate the samples in the Kalamazoo valley, accounting for 82.4% of all samples (Appendix C, Table C-28). Only three other temper types are present in samples from the Kalamazoo. Granodiorite is found in one sample from Armintrout-Blackman, one limestone/grog/granite sample is present at Armintrout-Blackman, and a "sand tempered" (or untempered) sample comes from Fennville.

St. Joseph River Valley

Although granite represents the most frequent temper type in the St. Joseph (Appendix C, Table C-29), it accounts for only 38.5% of all samples. Four samples are tempered with limestone: two at Dieffenderfer, one at Behner, and one at Bobinski. Grog is found in one sample at Dieffenderfer and one at Moccasin Bluff. Lastly, a weathered gabbro temper type (labelled "Unusual K-spar" in appendix) is found in one sample at Moccasin Bluff.

Kankakee River Valley

There are twelve different temper types or combinations of types present in Hopewell samples in the Kankakee (Appendix C, Table C-30).   Granite, of course, is the majority, but granodiorite is the second most frequent Hopewell Ware temper type (16.1%). Three samples (at Brems, Newton County, Schissler) are diorite tempered. Three samples are tempered with grog (one at Mud Lake, one at Schoon, and one at Amey). Gabbro is rare but is found at Goodall and Good's Ford. Only one sample tempered with quartz arenite sandstone is found at Brems. One gneiss tempered sample is also found at Brems. Lastly, limestone temper is found in one sample at Stillwell, and one untempered sample is found at Goodall.

Marshall County

Marshall County samples (Appendix C, Table C-31) are tempered mostly with granite (37.5%). However, three samples also contain grog temper (two from 12MR115 and one from 12MR78). Limestone is also found in two samples from 12MR115. Lastly, quartz arenite sandstone is combined with granite in one sample from 12MR115.

Inter-River Valley Hopewell Temper Type Discussion

The following table (Table 4-7) highlights the differences between river valleys by comparing the temper types and different combinations of temper types that were used to construct Hopewell-related ceramic vessels in these regions.

River Valley (n)	**Granite**	**Grog + Granite**	**Grog**	**Granite + Gabbro**	**Granite + Diorite**	**Granite + Amphibolite**
Muskegon (22)	17 (77.3%)	-	-	1 (4.5%)	1 (4.5%)	-
Grand (49)	36 (73.5%)	-	-	1 (2.0%)	-	1 (2.0%)
Kalamazoo (17)	14 (82.4%)	-	-	-	-	-
St. Joseph (13)	5 (38.5%)	-	2 (15.4%)	-	1 (7.7%)	-
Kankakee (31)	14 (45.2%)	2 (6.5%)	1 (3.2%)	-	1 (3.2%)	-
Marshall County (8)	3 (37.5%)	-	2 (25%)	-	-	-
Grand Total (140)	89 (63.3%)	2 (1.4%)	5 (3.6%)	2 (1.4%)	3 (2.1%)	1 (0.7%)

Table 4-7: Temper Types Arranged by River Valley or Region

Table 4-7 (cont'd)

River Valley (n)	Amphi-bolite	Quartz Arenite Sand-stone	Quartz Arenite + Granite	Mica Schist + Gabbro	Gneiss
Muskegon (22)	2 (9.1%)	-	-	-	-
Grand (49)	1 (2.0%)	-	-	-	-
Kalamazoo (17)	-	-	-	-	-
St. Joseph (13)	-	-	-	-	-
Kankakee (31)	-	1 (1.7%)	-	1 (3.2%)	1 (3.2%)
Marshall County (8)	-	-	1 (12.5%)	-	-
Grand Total (140)	3 (2.1%)	1 (0.7%)	1 (0.7%)	1 (0.7%)	1 (0.7%)

Table 4-7 (cont'd)

River Valley (n)	Limestone	Limestone + Granite	Limestone + Grog + Granite	Limestone + Grog	Limestone + Granite + Gabbro
Muskegon (22)	-	-	-	-	-
Grand (49)	1 (2.0%)	1 (2.0%)	2 (4.1%)	-	-
Kalamazoo (17)	-	-	1 (5.9%)	-	-
St. Joseph (13)	3 (23.1%)	-	-	-	1 (7.7%)
Kankakee (31)	1 (3.2%)	-	-	-	-
Marshall County (8)	1 (12.5%)	-	-	1 (12.5%)	-
Grand Total (140)	6 (4.3%)	1 (0.7%)	3 (2.1%)	1 (0.7%)	1 (0.7%)

Table 4-7 (cont'd)

River Valley (n)	Granodiorite	Diorite	Gabbro	Untempered
Muskegon (22)	-	1 (4.5%)	-	-
Grand (49)	3 (6.1%)	1 (2.0%)	2 (4.1%)	-
Kalamazoo (17)	1 (5.9%)	-	-	1 (5.9%)
St. Joseph (13)	-	-	1 (7.7%)	-
Kankakee (31)	5 (16.1%)	2 (6.5%)	1 (3.2%)	1 (3.2%)
Marshall County (8)	-	-	-	-
Grand Total (140)	9 (6.4%)	4 (2.9%)	4 (2.9%)	2 (1.4%)

There are twenty temper types or mixtures of different temper types present in the study region. The overwhelming majority of Hopewell samples are tempered with granite or granite mixed with another temper type (63.3%). Another important finding is that limestone and grog tempers are minority temper types in Hopewell-related samples. The total number of limestone tempered samples in the study region is twelve (only 8.6% of all Hopewell samples). Four apiece are found from sites in the Grand (3 from Spoonville) and St. Joseph valleys, two originate from sites in Marshall County, and one apiece in the Kalamazoo and Kankakee valley. No samples in the Muskegon valley contained limestone temper in this research.

Overall, only eleven total Hopewell samples (7.9% of all samples) in this research were grog tempered. Three samples apiece were from Kankakee and Marshall County regions, while two apiece were observed from samples in the Grand and St. Joseph valleys. One grog tempered sample from Armintrout-Blackman in the Kalamazoo valley was observed. No samples in the Muskegon valley were found to contain grog temper.

Several other broad observations are pertinent. First, amphibolite temper was observed only in the Muskegon and Grand River valleys. Gabbro was found from samples only in the Grand, St. Joseph, and Kankakee valleys. Two samples containing no temper (i.e., "sand-tempered") were observed in the Kalamazoo and Kankakee valleys. Diorite was observed only in the Muskegon, Grand, and Kankakee valleys. Unlike the Havana samples, which exhibited the use of various types of sandstones as a tempering agent, Hopewell samples only exhibited the use of quartz arenite sandstone as a temper type. In fact, only one sample from the St. Joseph and one from the Kankakee contained this temper type. Lastly, two minority types (gneiss and mica schist) were found only in the Kankakee.

Temper Size Indices (TSI)

Similar to the Havana samples' TSI results, very few clear patterns in temper size could be identified for Hopewell samples. No clear intra-site, inter-site, or interregional patterns emerged. Using TSI's to distinguish between Hopewell-related samples proved unsuccessful. In comparison to Havana samples, temper size indices for Hopewell samples were not markedly smaller and both constitute "coarse sand" in Stoltman's (1991) ordinal size class scale. The average temper size index for all Havana samples was 3.52, while mean temper size for all Hopewell samples was 3.44. This was a surprising finding since I originally assumed that the more "ceremonial" Hopewell Ware vessels would contain markedly smaller temper size particles (i.e., fine sand or medium sand size classes) (due to thinner walls and different functions) in comparison to more "utilitarian" Havana Ware vessels (which were expected to be comprised of course sand temper sizes).

This was not necessarily the case within the study region. In fact, average temper sizes for Hopewell-related vessels originating from mortuary/burial mound contexts rivaled (or even exceeded!) temper sizes for Havana-related samples from the same site. Additionally, more than half of the sites containing BOTH Havana and Hopewell samples (11 of 21) possessed larger Hopewell TSI's than Havana TSI's (see Table 4-8).

Site	Havana Samples Mean TSI	Hopewell Samples Mean TSI
Davis Swamp	3.59	3.65
Jancarich	3.71	3.65
Prison Farm	3.50	3.35
Battle Point	3.59	3.90
Lower Lake 1	3.45	3.65
Converse	3.56	3.57
Spoonville	3.57	3.36
Armintrout-Blackman	3.56	3.42
Mushroom	3.43	3.28
Moccasin Bluff	3.45	2.90
Sumnerville	2.95	3.15
Goodall	3.56	3.80
Amey	3.46	3.90
12JS3	3.30	3.70
Schoon	3.42	3.63
Good's Ford	3.49	3.40
Weise Mound	3.24	3.35
Newton County	3.74	3.33
Brems	3.18	3.28
Mud Lake	3.43	3.03
Stillwell	3.68	2.80
Average	**3.47**	**3.43**

Table 4-8: Mean Temper Size Indices for Sites Containing Both Havana and Hopewell Samples

Pyrotechnology: Hopewell Samples

Optical Activity

It was expected that the percentage of slightly active pastes would increase for Hopewell vessel samples, in comparison to Havana samples. In general, the data support this assumption (see Appendix C, Tables C32-C36), supporting the inference that Hopewell samples were fired better than Havana samples, presumably due to their ritual or mortuary significance. Excluding the Grand River valley (of which roughly half of the Havana samples were slightly active) and the St. Joseph valley, slightly active pastes for Hopewell samples increase in every other river valley/region.

In the Muskegon valley, 24% of all Havana samples from all sites contained slightly active pastes, whereas slightly active pastes increase to ~ 41% for all Hopewell samples. The biggest technological change within the Muskegon valley occurs at the Jancarich site, in which slightly active pastes accounted for only 19% of Havana samples, but increased to 85.7% of all Hopewell samples at the site. In the Kalamazoo valley, 17% of all Havana samples were slightly active, while 41% of Hopewell samples are slightly active. Similar to the Havana section results, slightly active pastes remain the *majority* within the Marshall County region.

There is a potential temporal consideration here as well. Most of the later Middle Woodland sites with Hopewell-related vessels have slightly active clays which comprise the majority of Hopewell samples at the site. Similar to the Havana section results, sites located in the lower Kankakee (e.g., Schissler, Schoon, Amey) and later sites elsewhere (e.g., Spoonville, Battle Point, Mushroom, Fennville) are comprised of pottery samples that were fired at relatively higher temperatures, perhaps reaching the 900°C threshold.

Paste Vitrification

As stated above, paste vitrification of the clay matrix occurs between 850° and 900°C. No sample in this research was completely vitrified, but several were partially vitrified, most frequently in separate portions of the sherd. Tables C-38 through C-43 in Appendix C display the percentages of paste vitrification present in Hopewell-related pottery vessels within the major river valleys and regions of this dissertation.

No samples (0%) in the Muskegon and St. Joseph River valleys contained samples with paste vitrification present. Only 4% (n = 2) of all samples in the Grand valley were partially vitrified, both from samples at the Converse site. The Kalamazoo valley Hopewell samples were partially vitrified in 17.6% (n = 3) of all samples. One sample each was recovered from the Armintrout-Blackman, Mushroom, and Fennville sites.

Similar to the Havana samples' results, samples with the highest percentage of samples with vitrified pastes originated from sites in the Kankakee River valley and the Marshall County region. Marshall county site samples were partially vitrified in 37.5% (n = 3) of all samples. Two samples from 12MR10 and one from 12MR115 were partially vitrified. This is an increase in comparison to Havana samples within the region, in which only 1 of fourteen total samples (7.1%) were partially vitrified.

For Kankakee sites, vitrified pastes were observed in 19.4% (n = 6) of all Hopewell samples. This is less frequent compared to Havana samples from the valley (28.5%). Overall, both Havana and Hopewell samples form the Kankakee indicate that pyrotechnology was more advanced in this river valley. A closer inspection of the data reveals an intra-river valley distinction within the Kankakee, as well. Whereas 25% of the upper-middle Kankakee site Hopewell samples were partially vitrified, only 9.1% of lower Kankakee site samples were vitrified. Interestingly, this is the converse of the results for the Havana samples from the valley.

Technical Styles: Morphology and Style

This section outlines the results from the analysis of the morphology and style variables of the Hopewell-related samples in this research. In general, Hopewell samples exhibit different (i.e., thinner or smaller) morphological and stylistic traits, compared to Havana samples.

Rim Thickness

Rim thickness values for Hopewell samples are thinner than those of Havana samples. Whereas the mean rim thickness for all Havana-related samples in this research was 8.89 mm, Hopewell samples' mean rim thickness was only 6.62 mm (see Table 4-9 below).

	N	Minimum	Maximum	Mean	Std. Deviation
Havana Samples	165	5.7	12.9	8.89	1.46
Hopewell Samples	73	3.2	10.3	6.62	1.60

Table 4-9: Mean Rim Thickness for All Havana and Hopewell Samples

When analyzing the mean rim thickness values for each site, several patterns emerged (Figure 4-10). Within the Muskegon valley, the Brooks Mound and Davis Swamp sites exhibit very similar means of 6.6 mm and 6.4 mm, respectfully. The Jancarich site, the earliest site in the valley, contains a thicker average rim thickness value of 7.56 mm. Sites in the Grand River basin exhibited more variability. First, the two sites which contained burial mounds, possessed the thinnest average rims at 5.9 mm for the Converse site and 5.5 mm for the Spoonville site. Habitation or short-term extraction/seasonal sites, such as Prison Farm, Lower Lake 1, and Battle Point, averaged 6.8 mm, 7.1 mm, and 8.0 mm rim thickness values, respectively.

The two Kalamazoo valley sites, Armintrout-Blackman and Mushroom, contained two of the top nine average rim thickness values in study region. Armintrout-Blackman averaged 8.3 mm, while Mushroom averaged 7.08 mm. Conversely, the five St. Joseph basin sites (including the two Galien River sites) were among the thinnest rim thickness values in this research. Of the thirteen lowest rim thickness values, five of these were from the St. Joseph valley and ranged from 3.78 mm to 6.77 mm. The only exception in the valley was the one Behner sample (7.6 mm).

The Kankakee valley results produced three groupings. The first contained the Stillwell (4.9 mm) and Brems (5.8 mm) sites. The second was comprised of the Schissler (7.0 mm), Newton County (7.0 mm), Schoon (7.1 mm), and Mud Lake (7.3 mm) sites. The Big Grape Island (12JS3) (8.5 mm) and Goodall (9.6 mm) sites make up the third grouping. Lastly, the two sites from Marshall County were very similar in rim thickness values and were most similar to the thin rim thickness values observed at the Stillwell and Brems sites in the Kankakee. 12MR115 (5.9 mm) and 12MR78 (5.1 mm) were two of the seven thinnest average rim thickness values in the research.

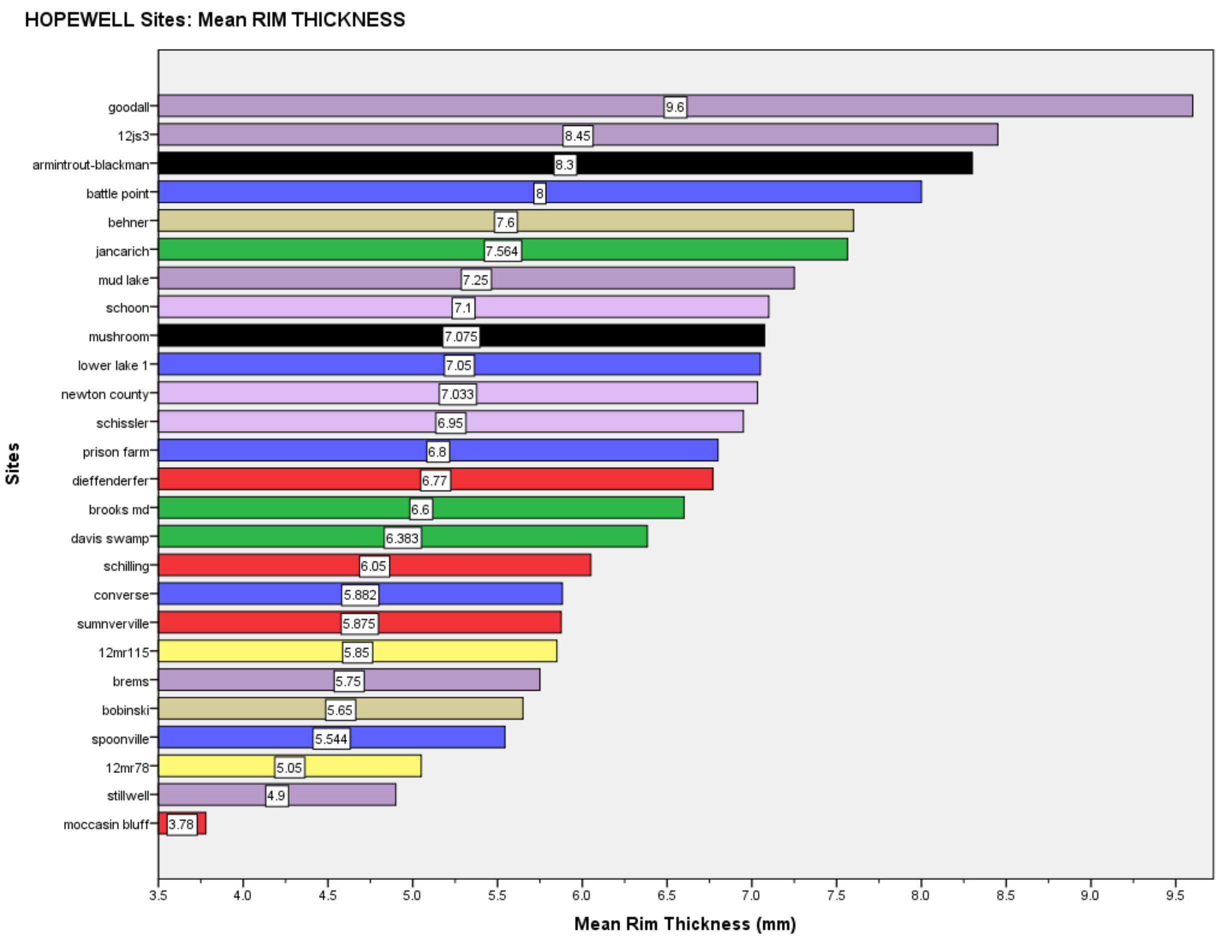


Figure 4-10: Bar Chart of the Mean Rim Thickness for all Hopewell-related Sites (*Muskegon River valley sites*; *Grand River valley sites*; *Kalamazoo valley sites*; *St. Joseph valley sites*; *Galien valley sites*; *Upper Kankakee valley sites*; *Lower Kankakee valley sites*; *Marshall County sites*)

Lip Thickness

Not surprisingly, average lip thickness for Hopewell samples was thinner than that for Havana samples. Whereas the mean lip thickness for all Havana samples in this research was 8.11 mm (1256.9 sum/155 total samples), Hopewell samples' lip thickness averaged 5.62 mm (421.18 sum/75 total samples).

The bar chart below (Figure 4-11) illustrates the mean Hopewell samples lip thickness for each individual site. Muskegon site samples exhibited a tight clustering: Jancarich (5.1 mm), Brooks Mound (4.9 mm), and Davis Swamp (4.8 mm). As for the Grand valley, the same two groups discussed above in the rim thickness section revealed themselves for lip thickness as well. The two mound sites, Converse (4.3 mm) and Spoonville (4.4 mm) clustered together well, while the non-mound sites of Prison Farm (6.4 mm), Lower Lake 1 (6.6 mm), and Battle Point (7.2 mm) formed the other group.

Another similarity with the rim thickness results discussed above was the relatively thick lip thickness values of Kalamazoo valley sites. Specifically, Armintrout-Blackman (7.0 mm) and Mushroom (6.8 mm) were among the fifth and seventh thickest average lips in the study. Conversely, the Marshall County sites of 12MR78 (3.8 mm) and 12MR115 (4.2 mm) exhibited the fourth and fifth thinnest average lip thickness values in the research.

The St. Joseph basin site samples (if we include the Galien River sites) exhibited a lot of variability, unlike the results for rim thickness above. In general, however, three groupings arose. The first comprised the Moccasin Bluff (2.6 mm) and Schilling (3.8 mm) sites, while the second included the Sumnerville (5.2 mm) and Bobinski (5.9 mm) sites. The third group consisted of the Behner (7.1 mm) and Dieffenderfer (7.5 mm) sites. The Kankakee sites, on the other hand, exhibited a significant amount of variability, so much so that groupings could not be distinguished. No geographic or temporal distinctions could be observed for Kankakee sites. Also note that the Goodall site lip thickness values are an aberration because one sample is a Brangenburg Plain rim (with a wide lip) and the other is a very thickly interior beveled rim with Hopewell-like decorations but morphology more closely resembling that of Havana Ware sherds.

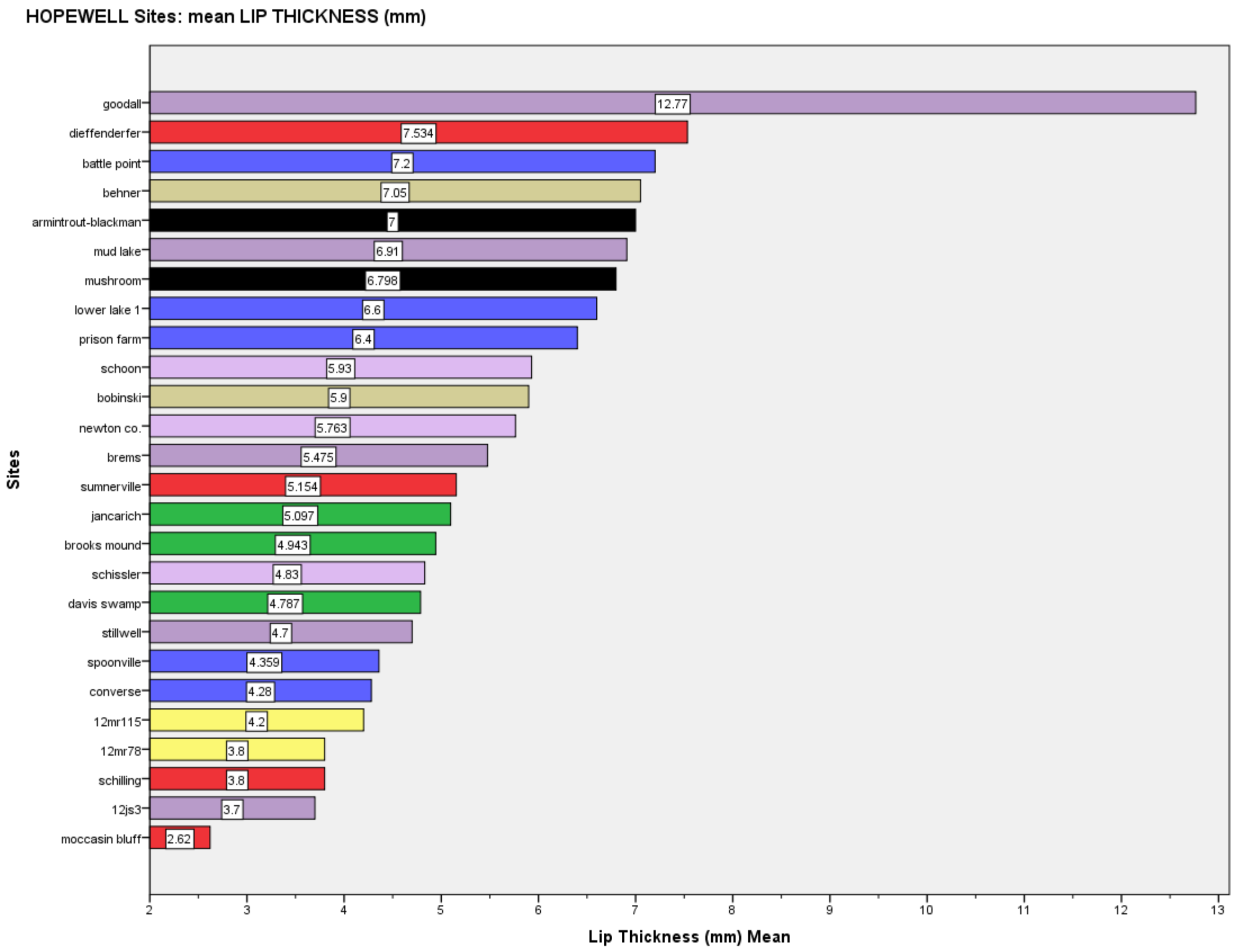


Figure 4-11: Bar Chart of the Mean Lip Thickness for all Hopewell-related Sites (*Muskegon River valley sites*; *Grand River valley sites*; *Kalamazoo valley sites*; *St. Joseph valley sites*; *Galien valley sites*; *Upper Kankakee valley sites*; *Lower Kankakee valley sites, Marshall County sites*)

Body Thickness

Hopewell samples' body thickness values were noticeably thinner, on average, than Havana samples. The mean body thickness for Hopewell samples was 6.53 mm, while the mean for Havana samples was 9.01 mm. When only Hopewell samples are examined within river valleys, several patterns emerge (Figure 4-12). The two Muskegon valley sites, Brooks Mound (7.2 mm) and Davis Swamp (7.1) contain the fifth and sixth highest average body thickness values. Grand valley sites display two groupings: one with Battle Point (8.6 mm) and Paggeot (7.7 mm) and the second with Lower Lake 1 (6.9 mm), Converse (6.4 mm), Boom Road (6.3 mm), and Spoonville (5.7 mm). Armintrout-Blackman (7.0 mm) and Mushroom (6.5 mm) in the Kalamazoo valley cluster tightly together. The two sites in the St. Joseph valley, Moccasin Bluff (6.2 mm) and Sumnerville (5.7 mm) also possess very similar mean body thicknesses and are the second and sixth thinnest average body thicknesses in the study.

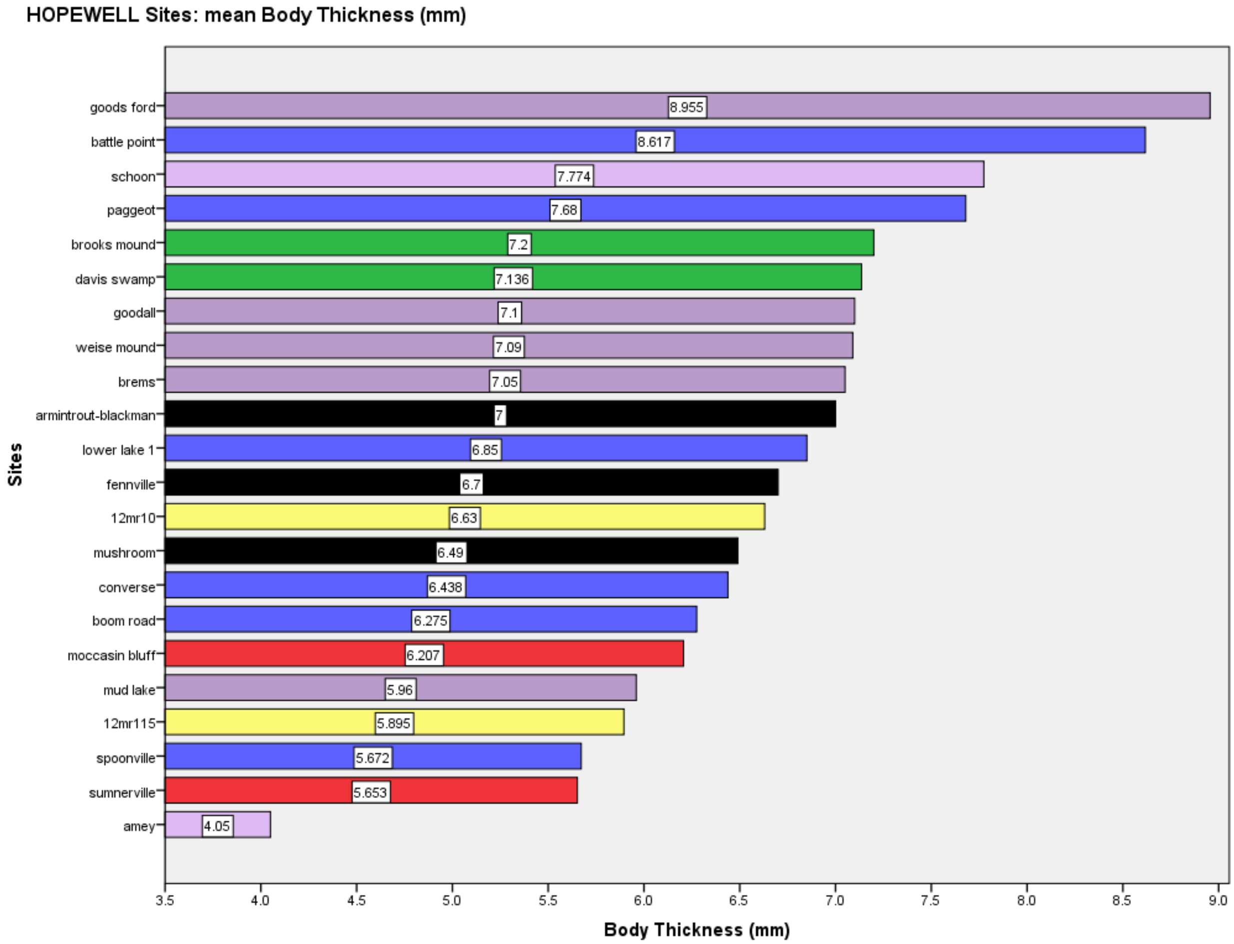


Figure 4-12: Bar Chart of the Mean Body Thickness for all Hopewell-related Sites
(Muskegon River valley sites; Grand River valley sites; Kalamazoo valley sites; St. Joseph valley sites; Upper Kankakee valley sites; Lower Kankakee valley sites, Marshall County sites)

Within the Kankakee, five sites place in the top nine of the highest mean body thickness values in the research: Good's Ford (9.0 mm), Schoon (7.8 mm), Goodall (7.1 mm), Weise Mound (7.1 mm), and Brems (7.1 mm). Two other Kankakee sites, Mud Lake (6.0) and Amey (4.1 mm), contain the lowest and fifth lowest average body thicknesses in the study. Lastly, 12MR10 (6.6 mm) and 12MR115 (5.9 mm) exhibit comparable mean body thicknesses in the Marshall County region of Indiana.

Lip Notching

Unlike Havana-related samples in this research, lip notching was insignificant for Hopewell-related samples. Only five Hopewell samples in this research contained interior lip notching. Two samples originate from Brooks Mound, one containing cordwrapped stick impressions on the interior lip and the other possessing top lip impression. An interesting correlation within Marshall County revolves around the almost identical stylistic similarity between two rim samples from 12MR78 and 12MR115, both being tool impressed on the top of the interior lip. The final sample with interior notching came from Newton County, which was cordwrapped stick impressed on the interior lip.

Visual Style Variables

Dentate Width

Dentate width for Hopewell samples was not as useful a variable as it was for Havana samples. Only 17 (12.1%) of all Hopewell samples were dentate stamped (Table 4-10), but the results mirror those of the Havana section. Specifically, there is generally an increase in dentate width from north to south. The Kankakee basin, Marshall County, and the St. Joseph basin regions exhibit the thickest dentate widths (at 1.21 mm, 1.3 mm, and 1.2 mm, respectively). Mean dentate width decrease gradually in the Grand (0.54 mm) and Muskegon (0.35 mm).

River Valley/Region	Site	Dentate Width (mm)
Muskegon	Davis Swamp	0.35
Grand	Converse	0.8
Grand	Converse	0.6
Grand	Converse	0.4
Grand	Spoonville	0.4
Grand	Spoonville	0.5
St. Joseph	Sumnerville	1.2
St. Joseph	Sumnerville	1.6
St. Joseph	Sumnerville	0.8
Galien	Bobinski	1.8
Kankakee	Mud Lake	0.3
Kankakee	Mud Lake	1.2
Kankakee	Mud Lake	0.8
Kankakee	Schoon	1.1
Kankakee	Schoon	2.8
Kankakee	Weise Mound	0.5
Marshall County	12MR10	1.3
		Mean = 0.97 mm

Table 4-10: Mean Dentate Width for All Hopewell Sites

Overall, the mean dentate width for all Hopewell samples is 0.97 mm, compared to the mean dentate width of Havana samples of 1.77 mm. These differences between ware categories were visually apparent and sometimes served as a reasonable and quick method of distinguishing between the two wares. Another observation is pertinent here: besides Bobinski and the one Schoon sample, all other Hopewell samples dentate widths are more similar to the Havana samples that appear to be temporally later.

Cluster Analyses

Utilizing SPSS, version 22.0 for Windows (SPSS, Inc. 2013), several different types of cluster analyses were performed on all of the samples (both Havana and Hopewell samples) in this research. Cluster analyses can be applied as an exploratory technique to yield the formation of a taxonomy (Hair Jr., Black, Babin, and Anderson 2010), but it was chosen in this research because it can also identify homogenous groups of cases (of pottery samples in this instance). As illuminated below, one cluster analysis confirmed the results of the petrographic analysis.

All continuous and categorical stylistic variables described in Chapter 3 were analyzed as part of the cluster analyses. Initially, a hierarchical cluster analysis was calculated, but results did not yield meaningful interpretations. After this unsuccessful test, the I ran a two-step cluster analysis, which was chosen because it is able to examine both metric and nonmetric data, identifies groupings by running pre-clustering first and then by hierarchical methods, and automatically selects the number of clusters. A log-likelihood distance measure was chosen (rather than the Euclidian distance) because the log-likelihood measure automatically uses a normal distribution for continuous variables and a multinomial distribution for categorical variables. It was assumed that the pottery sherds were independent or were from separate vessels (see sampling strategy discussion in Chapter 3). The two-step cluster analysis ultimately produced four separate groupings that correlated with similar groupings extracted from the petrographic analyses (Figure 4-13 and 4-14).

Model Summary

Algorithm	TwoStep
Inputs	70
Clusters	4

Cluster Quality

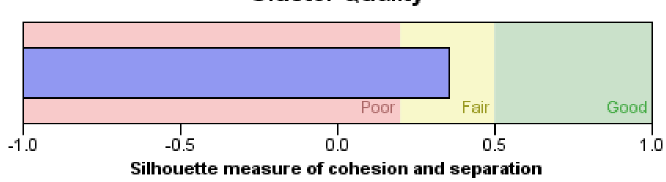
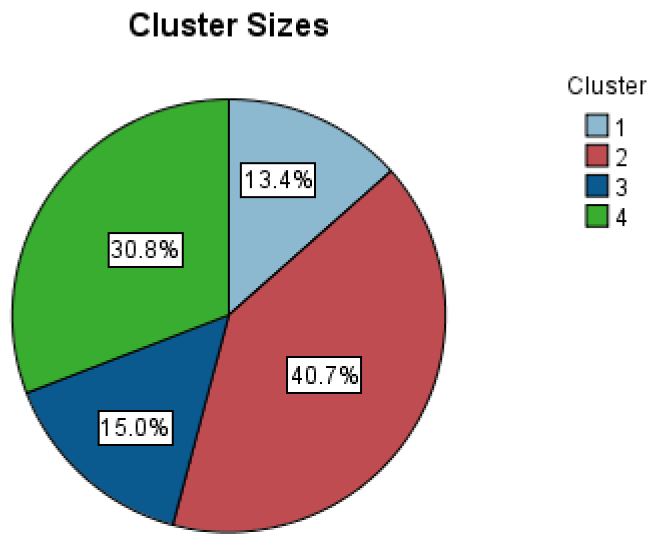


Figure 4-13: Two-Step SPSS Cluster Analysis Summary



Size of Smallest Cluster	68 (13.4%)
Size of Largest Cluster	206 (40.7%)
Ratio of Sizes: Largest Cluster to Smallest Cluster	3.03

Figure 4-14: Two-Step SPSS Cluster Analysis Clusters

The figures above show that four separate clusters were produced from the cluster analysis. When I compared these results to the petrographic results, several very interesting patterns emerged. The most interesting cluster, cluster #1, consists of sixty-eight total samples (13.4% of all samples) and can be described as representing a "**nonlocal Havana cluster**." Only five Hopewell-related samples were included in this cluster; 92.6% (n = 63) are Havana samples. Sixty-four of the sixty-eight samples (94.1%) placed in this cluster by SPSS were found in the petrographic analysis to be nonlocal/exotic Havana-related samples at their respective sites. In other words, cluster #1 entirely supports the ceramic petrography results, specifically the identification of nonlocal Havana samples with exotic compositions/recipes.

Cluster #3 (n = 76) is also composed almost exclusively of Havana-related samples: sixty-seven of the seventy-six total samples (88.2%). Only nine total Hopewell samples were included in this cluster and eight of them were found in non-mortuary contexts. Furthermore, only twelve samples in this cluster were determined by the petrographic analysis to be nonlocal. All other samples in this cluster were determined by the petrographic analysis to have been locally manufactured by the people from the residential community they are a part of (see Chapter 5 for definition of residential communities). Thus, if cluster #1 represents the "nonlocal Havana cluster," then cluster #3 could be said to represent a "**local Havana cluster**."

Another interesting aspect of cluster #3 is that three of the four total samples in this research that contained both interior and exterior dentate stamping were contained in this cluster. The petrographic analysis determined that all four of the interior-exterior dentate stamped samples were likely made by the same residential community (Goodall Residential Community: see Chapter 5).

The last two clusters, clusters #2 (n = 206) & #4 (n = 156), are relatively more difficult to interpret. However, it appears that the vast majority of the Hopewell samples in this research (134 of the 149 total Hopewell samples, or 89.9%), fall within these two clusters. It also appears that many Havana samples from middle-late Middle Woodland sites fall within the two clusters, as do most of the samples deriving from mortuary mound contexts (169 of the 220 total samples, or 76.8%). Overall, it appears that these two clusters contain samples that are generally not among the earliest samples and presumably those that played more of a role in the "ceremonial" sphere. The only observable differences between cluster #2 and #4 is that cluster #4 contains a slightly higher percentage of Hopewell samples (43% vs. 33%) and samples that originate from burial mound contexts (51.3% vs. 43.2%), whereas cluster #2 contains more samples containing thinner and temporally later Havana decorative traits and Hopewell samples more often originating from village or short-term encampment sites (i.e., non-mortuary contexts). Despite these negligible differences, there are not enough distinguishable traits between clusters #2 and #4 that would allow for separate and distinct descriptions of these clusters, as was possible for clusters #1 and #3 above.

Overall, however, the agreeability of the two-step cluster analysis for the stylistic data and the petrographic analysis essentially confirms the validity of the groupings that I identify in the next chapter. Again, in most cases, interpretations drawn from the petrographic data were confirmed or were strongly supported by stylistic data interpretations. These results were simultaneously utilized to identify and define the statistical boundaries of residential, sustainable, and symbolic communities discussed in the next chapter.

Conclusion

This chapter discussed the results borne out of the analyses of the stylistic, morphologic, and ceramic petrography variables described in Chapter 3. The description of the results for each variable was generally introduced in two major sections: Havana and Hopewell Ware-related sample sections. The choice to separate the two ware categories was due to observable differences in style and morphology. The results of a cluster analysis on all Havana and Hopewell samples' stylistic variables were then introduced to the reader. The results described in this chapter ultimately provided me with the relevant statistical background to identify and define the different types of communities within the study region, their geographic dispersion, and the mechanisms related to the spread of Havana-Hopewell in west Michigan and northwest Indiana. These topics are addressed in the following chapter.

CHAPTER 5 RESIDENTIAL COMMUNITY IDENTIFICATION

Introduction

This chapter uses the results discussed in Chapter 4 to draw conclusions regarding the identification and definition of residential communities, which are composed of members who share a common identity, who have coresidence or close residence, and have regular face-to-face interaction with one another (Carr 2006a; Mahoney 2000; Ruby et al. 2006; Varien 1999). Following an explanation of the process employed to identify residential, sustainable, and symbolic communities, this chapter then focuses on introducing new AMS dates as a means to define a new temporal framework. The tentative temporal framework attempts to rectify the slight temporal differences between phases defined for west Michigan and northwest Indiana. I subsequently employ the use of this tentative framework to identify residential communities, to document cultural changes through time, and to briefly highlight the mechanisms responsible for the spread of Havana-Hopewell throughout the study region.

Rather specific and complex mobility patterns and links between residential communities are documented in this chapter due to this research's methodology (see Chapter 3), which allowed for the identification of both diagnostic recipes and the most commonly used clays common to separate residential communities. This has ultimately allowed for very specific interpretations regarding each community's interaction and mobility patterns throughout the landscape, while informing on the types of mechanisms involved in the proliferation of Havana-Hopewell throughout the study region. These dynamics are in agreement with ethnographic and ethnohistoric data that detail the expectations of interaction and mobility patterns among small-scale/hunter-gatherer societies, as explained in various parts of this chapter.

Process for Definition of Residential, Sustainable, and Symbolic Communities

The identification and definition of residential communities involved the implementation of a strategic step-by-step procedure. The first step was to identify residential communities based on ceramic compositional and stylistic boundaries. This was accomplished by initially attempting to define the statistical parameters of the most commonly used clays (*paste*) and the *learned* recipe (*body*) that was used to make pottery at each site. As discussed in previous chapters, this involved the calculation of descriptive statistics, t-tests, and a cluster analysis. This approach proved to be a very successful one and is the focus of this chapter.

For each individual sample, it was determined whether or not they met the defined parameters. The samples that did were used to define the social boundaries of the residential communities. At this stage, the morphologic and stylistic analyses were incorporated with the compositional analysis in order to strengthen or weaken the arguments for the definition of these communities. In almost all cases, the initial definition of residential communities, which was originally based upon petrographic paste and body patterning, was substantiated by the stylistic and morphological data.

Lastly, the samples that did not meet the parameters of the most commonly used clay type and recipe represented the “outliers” from this initial process, and were then designated as “nonlocal.” These samples were then used to examine a site’s involvement in sustainable and symbolic communities by determining the geologic origin of their clays and temper types, and by searching for and identifying the engineers of their particular recipe. These sustainable and symbolic community connections are described in the following chapter.

New Accelerator Mass Spectrometry (AMS) Radiocarbon Dates and Temporal Model

After exploring the data patterns of all ceramics in this research and examining the available AMS dates, it became evident that the spread of Havana-Hopewell information, ceramic styles, and technology did not simply spread *in toto* throughout west Michigan but instead in varying intensities that that were temporally and geographically distinct. Therefore, it became necessary to define three tentative periods for the spread of Havana-Hopewell information and the rise of particular communities: 1) Early Communities, 2) Middle Communities, and 3) Transitional Communities.

The main purpose for the use of this framework was to rectify the slight temporal differences between phases defined for west Michigan and northwest Indiana so that relatively contemporary communities could be defined and compared. This allowed for the identification of communities, their interactions with other communities, and their participation in regional scale interaction networks. Therefore, rather than relying on normative types and the rather broad tradition and phase distinctions characteristic of culture-history, this research examined the *process* of information exchange and dynamic interaction networks within west Michigan and northwest Indiana by adequately identifying the intraregional and regional social boundaries of these communities within the study area for the first time.

Before a more complete discussion of the proposed temporal periods is addressed, however, new AMS dates collected as part of this dissertation and completed by Beta Analytic (www.radiocarbon.com) are discussed. Utilizing the CALIB Radiocarbon Calibration program (version 7.1) (Stuiver and Reimer 1993) (http://calib.qub.ac.uk/calib/), new AMS dates were calibrated with previous radiocarbon dates to yield the results shown in Figure 5-1. Table D-1 in Appendix D also lists all of these radiocarbon dates.

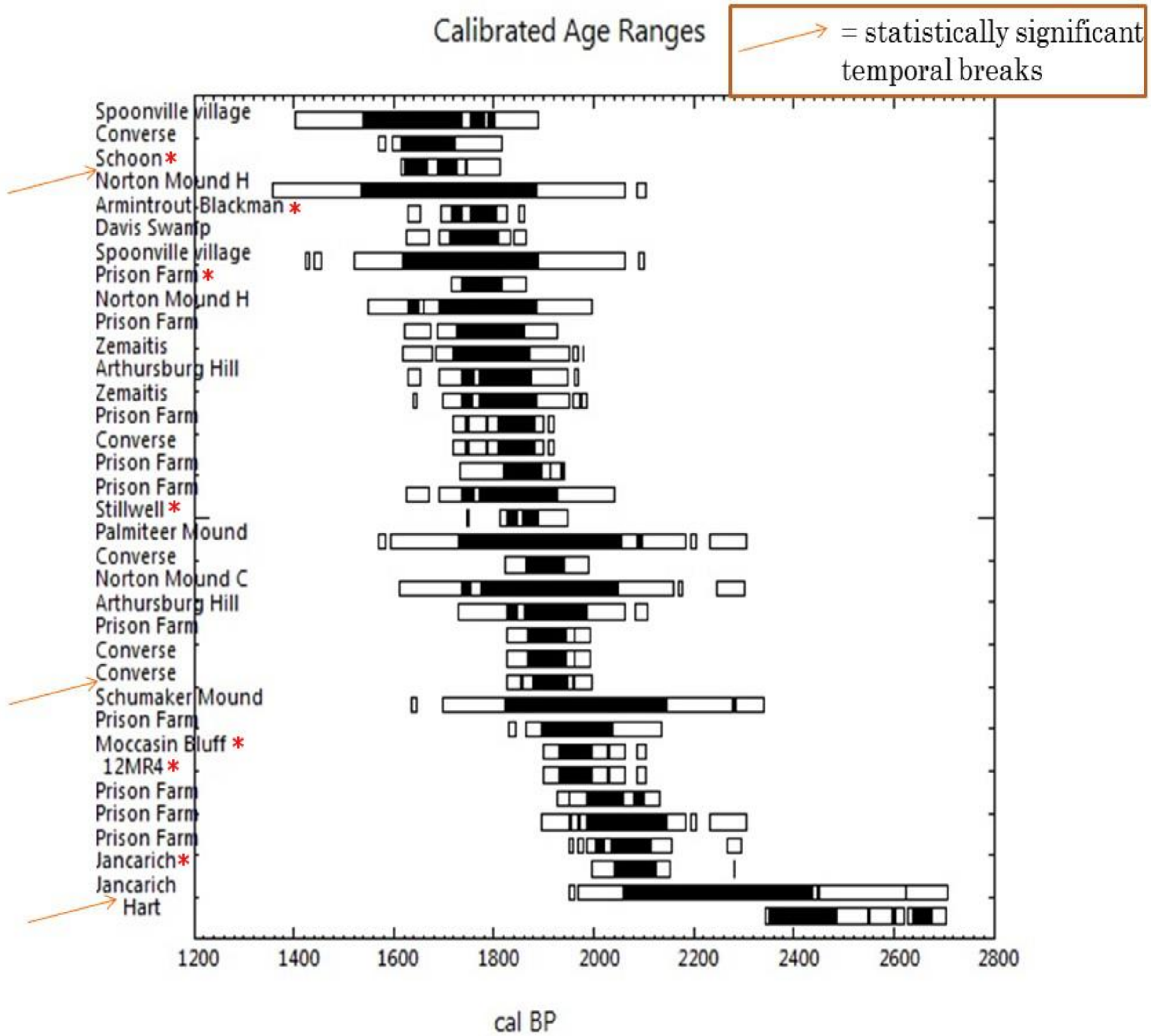


Figure 5-1: 1 and 2 Sigma Calibrated Age Ranges
(* = new radiocarbon dates provided in this research)

The new radiocarbon dates contained in Table D-1 in Appendix D and illustrated in Figure 5-1 above add to the preexisting conceptualizations of west Michigan and northwest Indiana temporal frameworks. In west Michigan, the very early Jancarich conventional date of 2110 ± 30 BP (Beta 327507) likely solidifies this site's early temporal placement. This date supports the other early date of 2260 ± 140 BP from the site. Together, these two dates suggest that the Jancarich site, along with the Prison Farm site in the Grand River valley, represent the earliest adoption of Havana-Hopewellian information and ceramic technology in west Michigan.

Two other sites yielding very early Middle Woodland dates include the 12MR4 and Moccasin Bluff sites, both with identical 2030 ± 30 BP conventional ages (Beta 327503 and 327505). The four additional AMS dates were drawn from Havana-related samples and roughly correspond to the period of time in which Havana-Hopewell ceremonialism was at its peak (Mangold and Schurr 2006). The Stillwell sample contains a conventional age of 1920 ± 30 with a 2 sigma calibration of Cal AD 20 to 130 (Beta 327500). The Prison Farm, Armintrout-Blackman, and Schoon conventional age ranges fall within the middle to late portion of the Middle Woodland period: 1850 ± 30 (Beta 327506), 1820 ± 30 (Beta 327504), and 1780 ± 30 (Beta 327502), respectively.

Utilizing the cumulative radiocarbon dates, this dissertation tentatively identifies three temporal periods, which encompass the previously identified phase designations commonly used by researchers (see Table 5-1). Additional t-test results (all at the 95% level) derived from CALIB strongly support the use of this three tier framework. All available dates listed in Table D-1 in Appendix D were tested against one another in order to determine if they derive from the same time period. Specifically, I began with the oldest radiocarbon date and tested it against the next oldest date. If these were determined to be statistically the same, the next oldest date was added to this group to test its significance against these samples. This process was repeated until a subsequent date produced a result that suggested that the group was statistically different. This last date, then, ended the group that was statistically the same up to that point and acted as the beginning date for the next temporal group. In all, three total Middle Woodland groups, correlating to my three tier framework (Table 5-1), were produced (Figure 5-1). The arrows in

Figure 5-1 illustrate the statistically significant break points for these three groupings. Note that the date from the Hart site is an Early Woodland date, is statistically different than all three Middle Woodland groupings, and is therefore disregarded for the purposes of this discussion.

The earliest Middle Woodland group consists of the two early Jancarich dates (M-1982, Beta-327507), three Prison Farm dates (Beta-113899, 113897, and an unknown Beta #), 12MR4 (Beta 327503), Moccasin Bluff (Beta 327505), Prison Farm (Beta-113898), and the Schumaker Mound (M-1938). Similar results were found for these same Prison Farm dates by Hart and Lovis (2007). CALIB determined that this group of nine total dates was not significantly different ($df = 8.0$, $t = 8.4$). This group correlates to the Early Communities period in this research, which is temporally defined as occurring between 150 B.C. and terminating at roughly A.D. 30 (Table 5-1). The 150 B.C. date was chosen because it roughly corresponds to the earliest Jancarich and Prison Farm dates and accommodates the earliest phases in the Kankakee. This period includes the previous Norton phase in west Michigan and the North Liberty, Stillwell, and early Goodall phases in the Kankakee (see Table 2-2 for a comparison of west Michigan and Indiana phases). It includes the use of a Havana-related pottery assemblage lacking Hopewell Ware-related types and includes the rise of the earliest Havana-related communities in the study region.

The second major Middle Woodland grouping produced by CALIB consisted of 22 radiocarbon dates (Figure 5-1), correlating to the proposed Middle Communities period (Table 5-1). It begins with the two earliest Converse site dates and terminates with the Norton Mound H radiocarbon date. This group of dates is not significantly different from one another ($df = 21$, $t = 26.4$) but is significantly different from the Early Communities group described above ($df = 1$, $t = 96.4$).

An interesting finding, however, was that the two earliest Converse dates (Beta-148361 and 153908) were not significantly different from either the earliest (Early Communities) group or this second grouping. However, these two dates derive from residue adhering to the earliest dated Hopewell Ware pottery vessels in the study region (Brashler 2003; Hambacher, Robertson, Brashler et al. 2003; see Table D-1 in Appendix D) and they, therefore, represent a logical starting point for the second group of Middle Woodland dates. The inception date of A.D. 30 chosen for this period strikes a fair balance between the median probability ages (A.D. 28 and A.D. 38) produced by CALIB for both of these early Converse Hopewell Ware dates. This period, then, ultimately witnessed the introduction and use of Hopewell Ware-related vessels in the study region and represents the height of both Havana and Hopewell participation in the study region. As explained below, although vessels (and dentate stamping) become thinner, recipes employed in the Early Communities period extend and persist into the Middle Communities period. The Middle Communities Period includes the previous late Norton and the early-middle Converse phases in west Michigan and the middle-late Goodall and early LaPorte phases in the Kankakee (Table 5-1).

Period	Temporal Range	West Michigan Phase(s)	Northwest Indiana Phase(s)
Early Communities	150 B.C. – A.D. 30	early-middle Norton	North Liberty, Stillwell, early Goodall
Middle Communities	A.D. 30 – A.D. 250	late Norton, early-middle Converse	middle-late Goodall, early LaPorte
Transitional Communities	A.D. 250 – A.D. 400	late Converse	middle-late LaPorte

Table 5-1: Proposed Middle Woodland Temporal Framework

The third and final Middle Woodland grouping produced by CALIB includes dates from the Schoon, Converse, and Spoonville sites, and correlates to the Transitional Communities period (Table 5-1). This set of three dates were not significantly different from one another (*df* = 2, *t* = 0.2) but they were significantly different from the Middle Communities grouping described above (*df* = 1, *t* = 22.5). This final Middle Woodland period represents the waning and eventual decline of Havana-Hopewell in the study region and is proposed to encompass the previous late Converse phase in Michigan and the middle to late LaPorte phase in the Kankakee. Two late radiocarbon dates from the Mushroom site (M-1427 and Uga-2347) would presumably be included in this time period as well, but conventional ages were unavailable to test this. However, dates of A.D. 265 and A.D. 410 for both would support this inference.

Lastly, I followed Hart and Lovis (2007) in utilizing CALIB to calculate the pooled means for the three statistically different Middle Woodland groupings, which are displayed in Figure 5-2. The pooled mean values of these temporal periods, along with the standard deviation, represent a more precise representation of the probable age or central tendency than individual ages (Hart and Lovis 2007). The pooled means calculated for each period are: 2063 ± 13.9 BP for the Early Communities group, 1895 ± 9.9 BP for the Middle Communities group, and 1774 ± 23.4 BP for the Transitional Communities group.

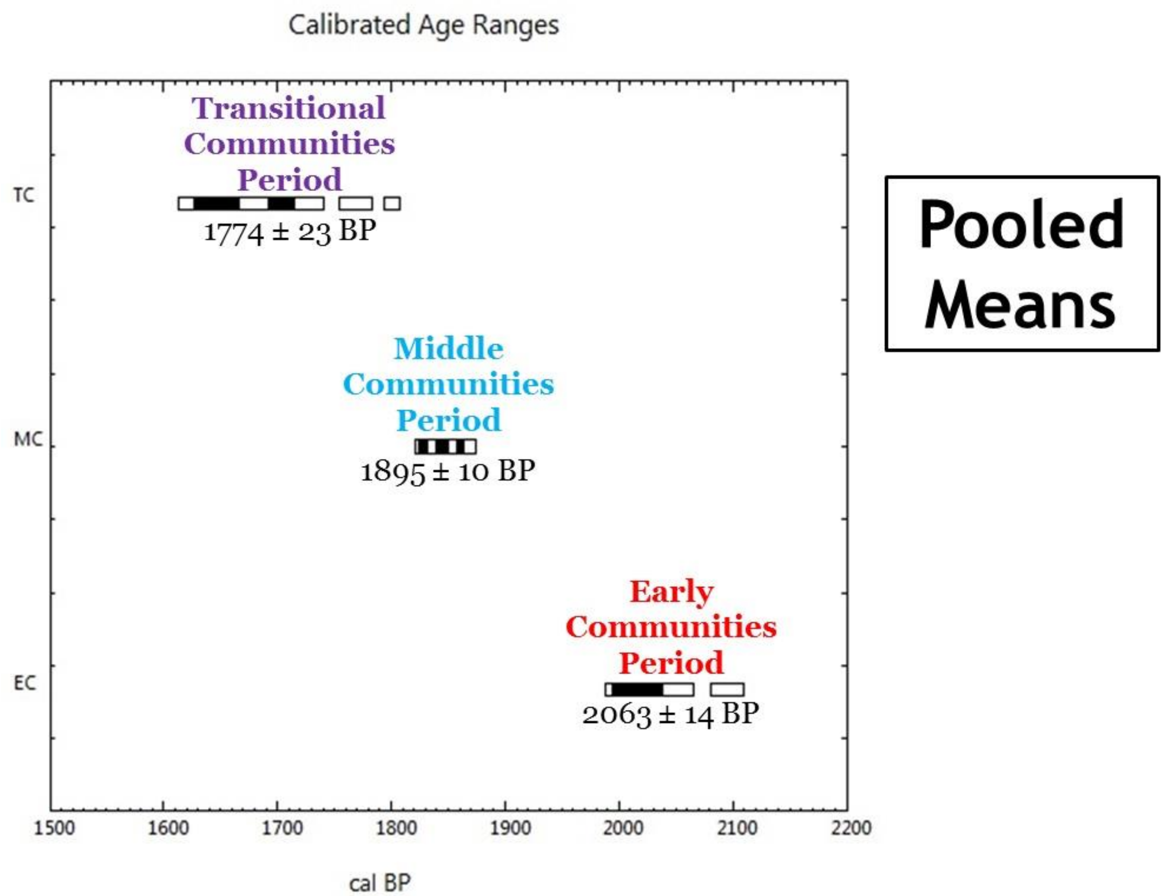


Figure 5-2: 1 and 2 Sigma Calibrated Age Ranges of Pooled Mean Values*
(* in Figure, EC = Early Communities Period, MC = Middle Communities Period, and TC = Transitional Communities Period)

Therefore, the results produced by the CALIB Radiocarbon Calibration program supported the designation of three Middle Woodland temporal periods. Importantly, these groups crosscut both west Michigan and northern Indiana regions, making a stronger case for the use of a uniform chronological framework for the study region. The use of a uniform temporal framework will also assist in creating archaeological cultural units that make more sense since they are not restrained by modern sociopolitical boundaries (such as state boundaries). Pre-Columbian people's behavior in the study region clearly did not conform to these arbitrary boundaries. The use of the new temporal framework proposed here has proven to be extremely useful in this research because clear temporal trends became readily apparent (as discussed in detail below and in Chapter 6 and summarized in Chapter 7), informing on changing cultural dynamics across space and time.

The remainder of this chapter will detail the parameters of each individual residential community, while a discussion of that community's involvements in sustainable and symbolic communities is reserved for Chapter 6. In general, the names of residential communities were drawn from the names of the largest or most representative site in each community and acted as a sort of "type site" for that community. Each section begins with a discussion of the general defining characteristics of each residential community and then delves into each individual site's results. Where I discuss individual sites, I add a reminder in the title header regarding probable site type and which time period(s) the site likely dates to (based upon available radiocarbon dates and/or pottery types) in parentheses. For example: Prison Farm (habitation, Early and Middle Communities periods).

EARLY COMMUNITIES PERIOD: RESIDENTIAL COMMUNITIES

Table 5-2 defines the names of each residential community and the sites included within those communities during the Early Communities period, while Figure 5-3 illustrates the body recipes for these communities, which appear to be geographically divided (Figure 5-4). Note that the recipe/body groupings in Figure 5-3 approximate the true statistical boundaries of each residential community (which are listed for each community). The Early Communities period represents the initiation and adoption of Havana information into west Michigan and the construction of primarily Havana-related pottery with its associated style and technology.

Residential Community Name	Sites in each Residential Community
1) Jancarich	Jancarich, Toft Lake, Sand Creek
2) Prison Farm	Prison Farm, Lower Lake 1
3) Stillwell	Stillwell, Mud Lake, 12MR217
4) Goodall	Goodall, Good's Ford, 12ST8, Brems, Big Grape Island, Lefty's Coho Landing
5) 12MR4	12MR4, 12MR5

Table 5-2: Residential Community Definition during Early Communities Period

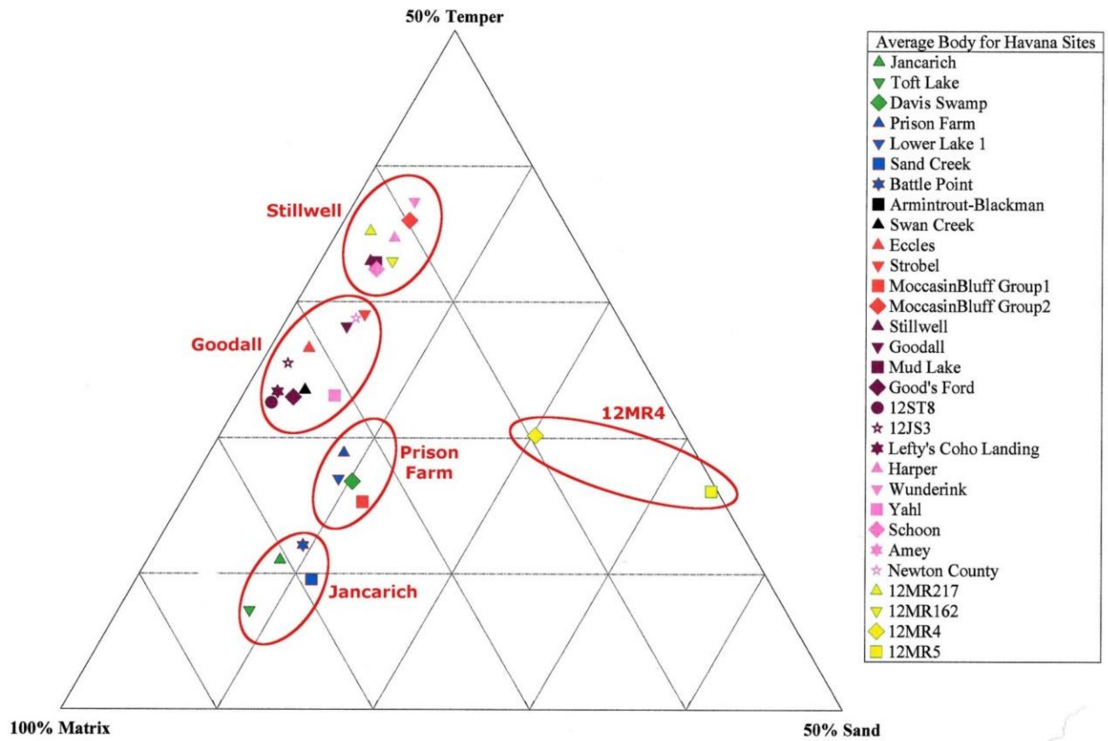


Figure 5-3: Earliest Residential Communities and their Mean Body Values

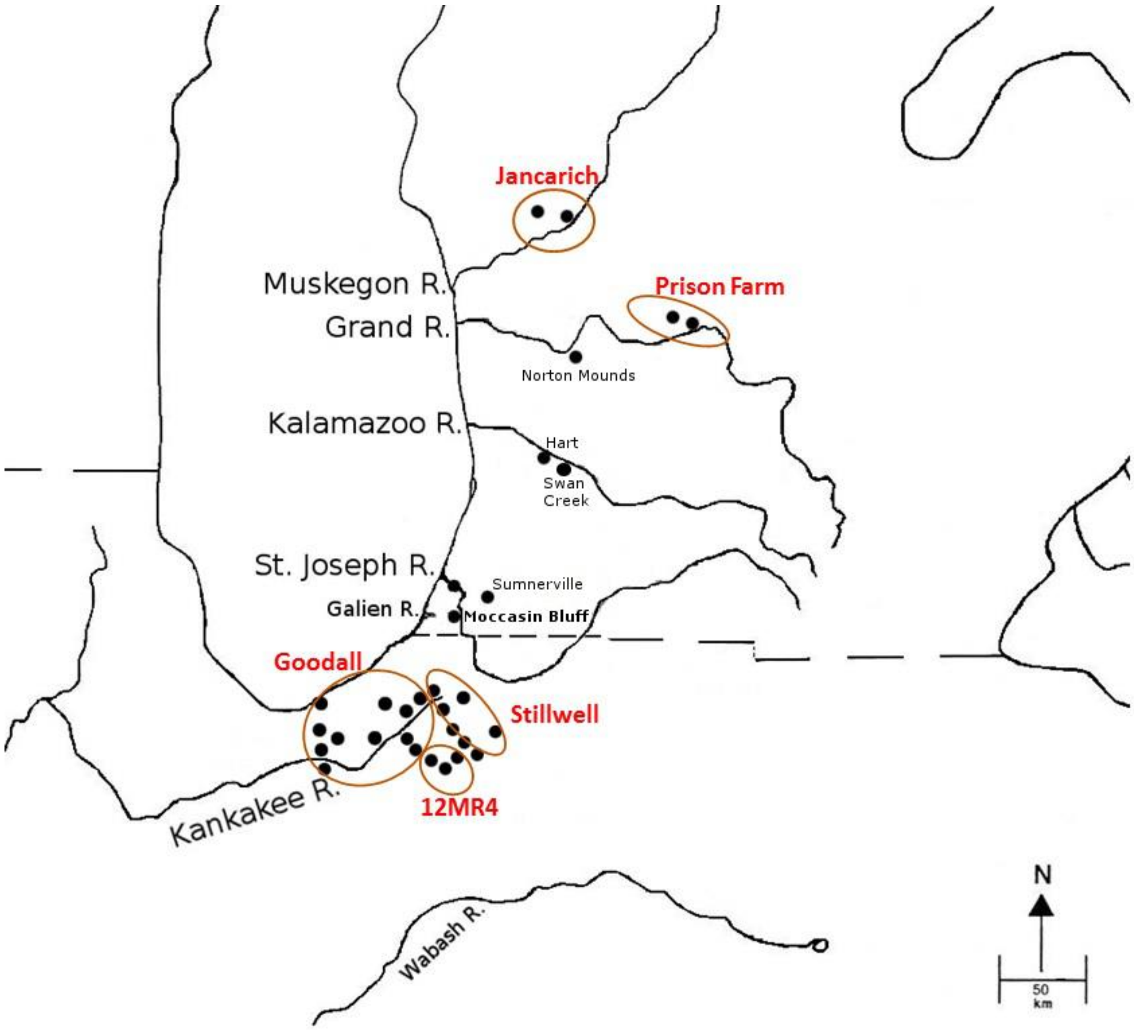


Figure 5-4: Geographic Location of the Earliest Residential Communities and Ancillary Sites

Residential Community #1: Jancarich Residential Community

This residential community includes the Jancarich and Toft Lake sites. Figure 5-5 below illustrates the body values that define this community. Samples within the circle designate the samples that were determined to be made by members of this community. Jancarich site samples within this circle were determined to likely be locally manufactured at the Jancarich site, while the two Toft Lake samples were determined to likely be imported from the Jancarich site and made by Jancarich site individuals (i.e., matching both the most commonly used clay and recipe of locally manufactured Jancarich site samples). (Refer back to Figure 5-3 above for comparisons of recipes unique to each residential community).

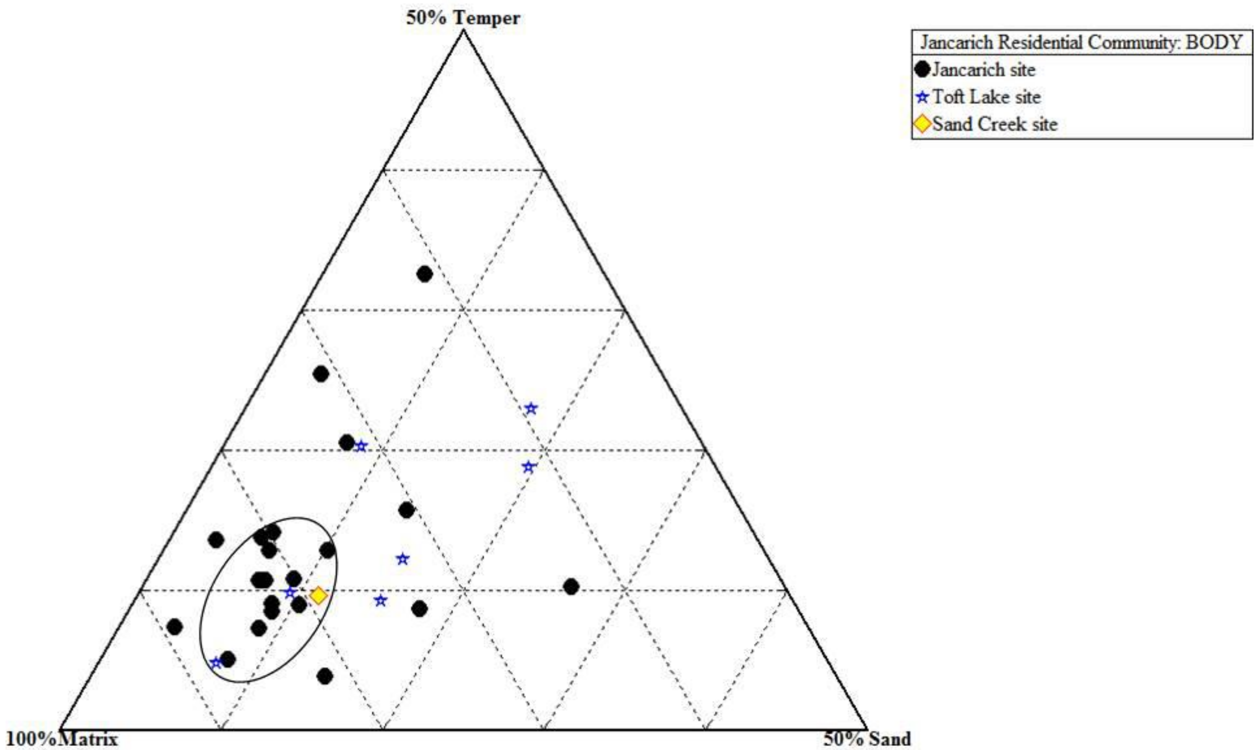


Figure 5-5: Body for Jancarich Residential Community

The Jancarich residential community contains several defining characteristics. The low percent of temper is especially diagnostic of this community since it is the lowest percent of any other residential community defined in the study region. As illustrated in Figure 5-5, the samples determined to be locally made by Jancarich residential community members were characterized by 4.8% - 14.2% temper and 5.6% - 11.2% sand. The dominant use of granite temper (88.9%) is also characteristic of this community. There is a rare occurrence of grog temper use at the Jancarich site as well.

Interestingly, the most commonly used clays differ mineralogically from the granitic rocks that were used to temper their pottery vessels because their pastes generally contain opaque and pyroxene grains. Regarding firing technology, this community possesses the lowest percent of paste vitrification in the study region (2.8%). Stylistically, the strong presence of burnishing and brushing on exterior surfaces characterizes this community.

Jancarich site
(habitation, Early and Middle Communities period) (n = 21)

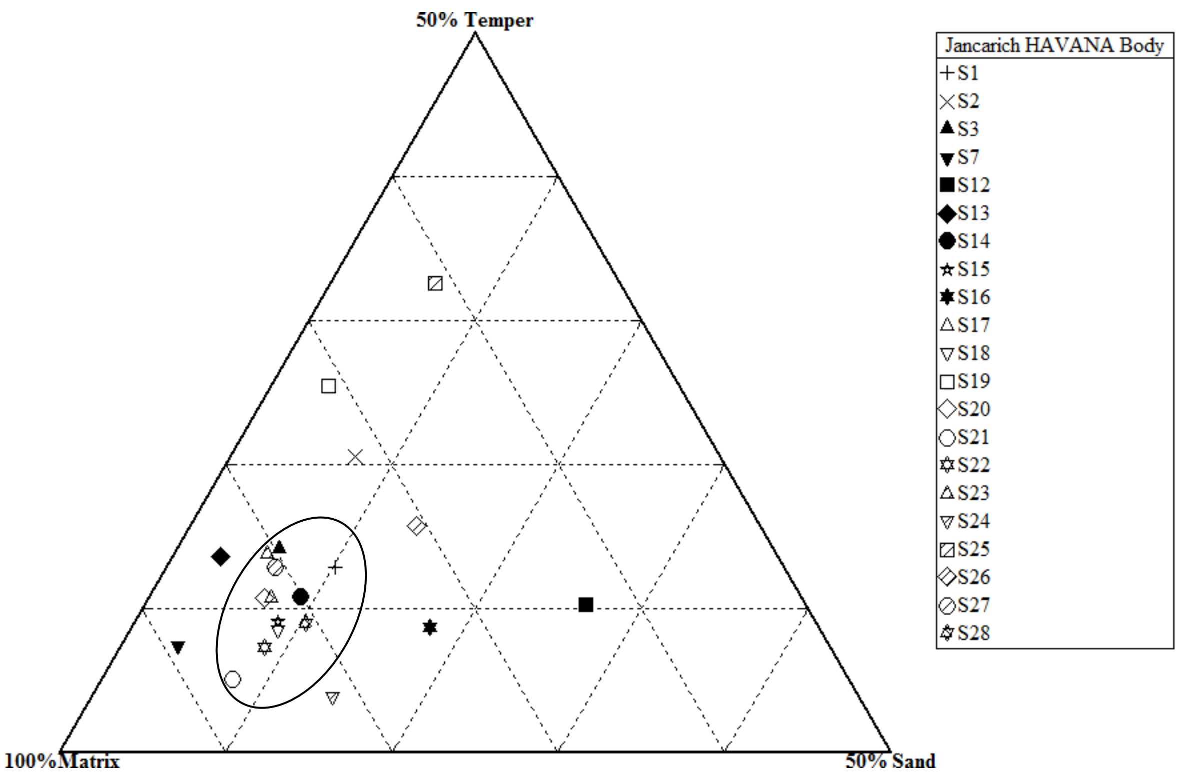


Figure 5-6: Jancarich Site Body (S1 = "Sample #1")

Seventeen of the Havana-related samples at Jancarich were likely manufactured by this community (Figure 5-6). Twelve of these were locally manufactured, containing diagnostic Jancarich clay and recipe parameters, as well as morphological traits. Five other samples were made by Jancarich community peoples with non-Muskegon valley clays (including clays from the Kalamazoo and Kankakee basins). An interesting finding was that all of the burnished and brushed samples at Jancarich (n = 10) were locally manufactured, cementing this surface treatment as a diagnostic of this site.

Toft Lake site
(short-term seasonal encampment, Early and Middle Communities periods) (n = 7)

Based upon the results, the Toft Lake site appears to likely represent an upland site that was part of the seasonal round of Jancarich community peoples. This situation is akin to and supports a similar hypothesis by Stretton, Chapman, and Brashler (2000) for the Grand River valley (i.e., the seasonal use of upland/hinterland sites). There are few elaborately decorated vessels present at the Toft Lake site, which is expected from a seasonal site such as this one. In contrast, there should be larger frequencies of utilitarian undecorated wares, which is supported by the high percent of cordmarked and smoothed-over-cordmarked surface finishes present on most of the sherds at the site.

Toft Lake's inclusion in the Jancarich residential community was determined by the presence of four samples that appear to have been made by Jancarich site potters. Sample #1 and Sample #2 are the most interesting cases since they match the most commonly used clay type at the Jancarich site, match the Jancarich site's body values, and are granite tempered like almost all of the Jancarich site samples. These samples support the inference that they were made at the Jancarich site and were imported (likely by the Jancarich community) to the Toft Lake site as part of a seasonal round, although other scenarios are possible.

Additionally, t-tests (.05 level) for all of the paste variables suggest there are no significant differences between these samples and the Jancarich site's most commonly used clays. Similarly, t-tests (.05 level) for all of the body variables suggest there are no significant differences between their recipes and the Jancarich site recipe. These results strongly suggest that these were probably made by the Jancarich residential community. Another interesting twist is that Sample #2 contains dentate stamping that could be more characteristic of Laurel designs (Brashler, personal communication 2013). If so, this could provide evidence of either Jancarich site inhabitants interacting with Laurel groups to the north or perhaps a Laurel group adopting Havana-Hopewell and creating relationships (e.g., intermarriage) with other Havana groups to the south.

Sand Creek site
(short-term encampment, Early Communities period) (n = 1)

The one sample from the Sand Creek site in the Grand River valley is a Naples Ovoid Stamped, barred variety, vessel (Figure 5-7), which is a very early Middle Woodland pottery type (Griffin 1952). For decades, the only other known Naples Ovoid Stamped sherd in Michigan originated from the Ada site in the Grand valley. This type, however, has very recently been discovered from two other Grand River valley sites: Norton Mounds and Connor Bayou (Brashler, personal communication 2013). The fact that all four of these ovoid stamped samples are from Grand River valley sites is certainly noteworthy and points towards an earlier and more common introduction of this early Havana type into west Michigan than previously believed. It also supports the hypothesis of the early introduction of Havana information and ceramic styles in this region, as implied by the extant radiocarbon dates.

The Sand Creek sample matches the compositional body signature and temper type (granite) of the Jancarich residential community. The clay is unusually silty and most closely resembles St. Joseph clays, but the combined presence of plagioclase, chert, and microcline in the paste, on the other hand, most closely resembles pastes from sites in the Kalamazoo River valley. In any case, this sample provides evidence of the southward movement of Jancarich community members or pots into either the Kalamazoo or St. Joseph valleys, and using a clay type common at sites in that region to construct this pot. Presumably, it was later deposited at the Sand Creek site. This particular sample represents one of the best cases of a Havana-related "copy" since this design is so rare in Michigan.

Figure 5-7: Naples Ovoid Stamped sample, Sand Creek site

Jancarich Residential Community Conclusions

The Jancarich residential community represents the very early introduction and adoption of Havana socioreligious information and ceramic styles into the Muskegon River valley, which is supported by an early AMS 2 sigma calibrated date of 200 B.C. – 50 B.C. in this research and a preexisting 2 sigma date of 790 B.C. – A.D. 20. The pottery collection at the Jancarich site certainly appears to be a local interpretation and adoption of Havana and Hopewell-like designs. In fact, several samples exhibit a mixture of both Havana and Hopewell Ware designs.

The results provide tantalizing evidence that the earliest introduction of Havana information and technology into the Muskegon River valley included contributions from the

Kankakee valley and Prison Farm community (see Chapter 6). In fact, there is evidence of early Havana Ware stylistic influences present at the Sand Creek site and early symbolic community involvement at the Sumnerville Mounds site in the St. Joseph valley. The likely use of these mounds by Kankakee communities documented in this project cements this proposed relationship with Kankakee peoples.

However, the establishment of the Jancarich community was likely not due to a migration of an entire Kankakee-derived population to the Jancarich site region. An important finding was that interaction between Jancarich and the Kankakee was two-way (discussed in more detail in Chapter 6), likely involving intermarriage, which does not appear to support the theory that a wholesale migration from the Kankakee is responsible for the introduction of Havana-Hopewell into west Michigan. It is probable that a resident population was already present. When we consider this in conjunction with the other results from this section, especially the presence of vastly different recipes for both the Jancarich and Kankakee residential communities, migration as the sole mechanism for the initiation of Havana-Hopewell into west Michigan seems extremely unlikely. This conclusion will become more and more apparent in relation to other west Michigan communities as we discuss the remaining results in this chapter and in the following chapter.

Instead of migration, it is more likely that the Jancarich site served as a locale for community Havana integration and interaction among willing participants in order to create and maintain social ties and a shared identity. Considering its location next to various mound complexes (e.g., Brooks, Parsons, Palmiteer, and Schumaker), socialization, intermarriage, and the simultaneous use of these mounds probably functioned as mechanisms of group integration between the Jancarich and other residential communities (especially the Goodall and Spoonville communities: see Chapter 6 and Table 6-3). Therefore, based upon these conclusions, the most likely mechanism responsible for the establishment of this residential community is due to interaction and selective adaptions resulting in *diffusion* of Havana information, pottery styles and technology. In fact, as explained below, diffusion appears to be the most apt explanation for the initial spread of Havana for all of the earliest communities in the study region. Despite abundant evidence for short-term travel or family visitation occurring within and between regions, none of the unique residential community recipes were supplanted by recipes from other residential communities. In other words, these unique recipes persisted geographically and temporally.

Lastly, the Toft Lake site represents an upland site that was likely part of the Jancarich community's seasonal round and may have been shared with the Prison Farm residential community in some capacity. Another interesting finding from this site was related to the possibility that this residential community may have also had relationships or were culturally affiliated with populations located further to the north and east, such as Laurel populations. This is somewhat speculative, however, in the absence of Laurel ceramic data and is therefore best left for future study.

Residential Community #2: Prison Farm Residential Community

This residential community includes the Prison Farm and Lower Lake 1 sites, and the relatively later addition of the Davis Swamp site during the Middle Communities period. Figure 5-8 illustrates the body values characteristic of this community. Percent temper for locally manufactured vessels ranges from 12.9% - 23.6%, while percent sand ranges from 6.1% - 16.1%. Temper size indices (TSI) are very average in relation to the larger temper sizes for other very early Havana sites. TSI's are very similar for these two sites: Prison Farm (3.5) and Lower Lake 1 (3.45).

There is a higher frequency of mafic temper type use compared to the Jancarich residential community. Four total samples at Prison Farm possess mafic temper, while two at Lower Lake 1 contain mafic temper. Additionally, the Lower Lake 1 site has three samples that contain grog temper, which portends a potential relationship with the Jancarich site to the north. The Prison Farm residential community generally exhibits high percentages of active clay matrices (67.6% or 25 of 37 total samples). Low percentages of paste vitrification are also characteristic of this community (5.4% or 2 of 37 total samples).

This residential community possesses some characteristic morphologic and stylistic traits as well. Relatively thin average lips are present at both sites: Lower Lake 1 (7.65 mm) and Prison Farm (7.35 mm). Conversely, a very thick average body thickness is also characteristic with Prison Farm containing the largest average body thickness (11.2 mm) in the study region. The Lower Lake 1 site presents a more complicated case due to its distinct average body thickness of 7.67 mm. As will be discussed in more detail below, this can be attributed to the simultaneous signature of both the Prison Farm and Jancarich residential community signatures at the site. Lastly, a high percent of cordmarking, smoothed-over-cordmarking, and noding also characterize the Havana Ware-related samples from this community.

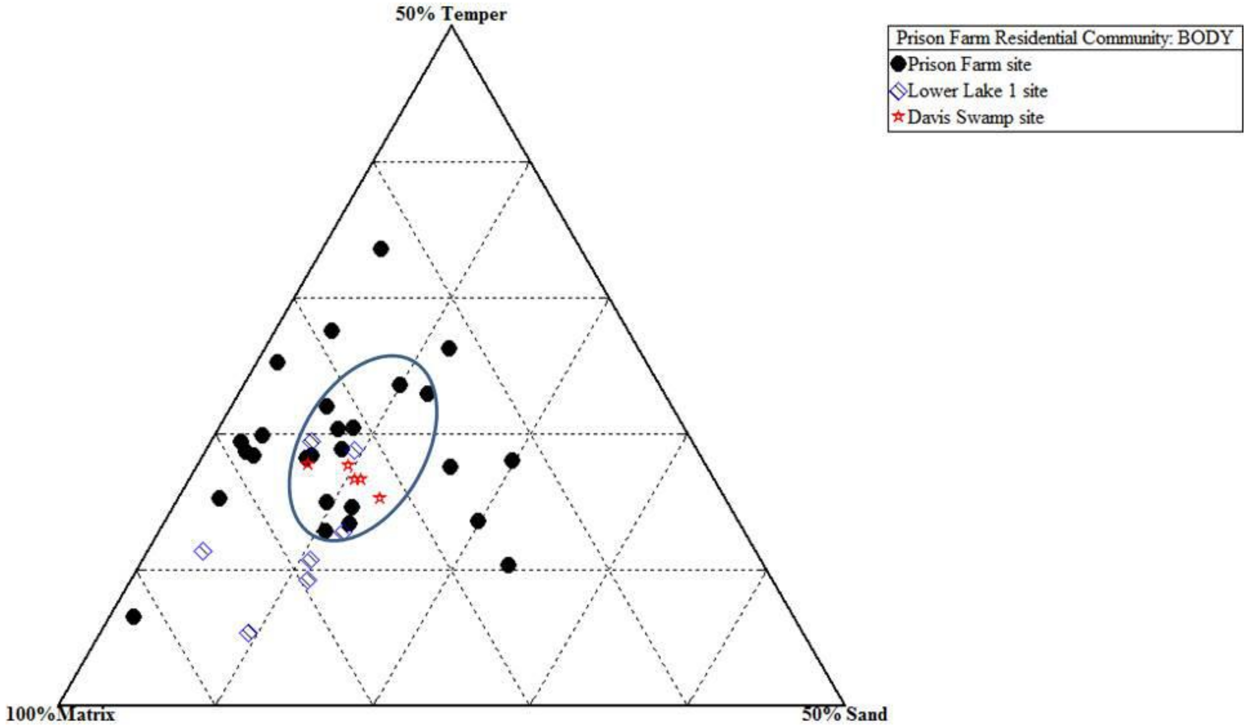


Figure 5-8: Body for Prison Farm Residential Community

Prison Farm site
(habitation, Early and Middle Communities periods) (n = 25)

Fifteen total Havana samples from the Prison Farm site were found to be made by the Prison Farm residential community. Nine of these were determined to be locally manufactured utilitarian vessels (i.e., possessing the Prison Farm site's most commonly used clay and recipe). Four additional vessels possessed Prison Farm recipe values but were made with Kalamazoo River valley clays. Likewise, two other samples contained Prison Farm recipe values but these implemented the use of the Jancarich site's most commonly used clay type in the Muskegon valley. These two cases present good evidence of intermarriage, or the sharing of ceramic information between the two communities, or Prison Farm individuals using clays from other river valleys to construct various vessels.

Lower Lake 1 site
(seasonal encampment, Early and Middle Communities periods) (n =7)

The choice to place the Lower Lake 1 site in the Prison Farm residential community was partially for the sake of convenience and because it is located in the Grand River basin, the "core area" of the Prison Farm site. In actuality, it could have just as easily been placed in the Jancarich community. There is no recipe that is unique to this particular site; instead, it was found that two of the Havana samples at the Lower Lake 1 site were likely made by members of the Prison Farm community, while Jancarich community members probably constructed five other samples. Figure 5-9 illustrates the two major groupings that correspond to these communities. Therefore, the data suggest that Lower Lake 1 was likely a location shared between members of the Prison Farm and Jancarich residential communities. This site probably represents a shared effort by both communities to maintain sustainable community relationships with each other (further detailed in Chapter 6) through the seasonal scheduling of this region or by meeting at this place for various intercommunity interactions.

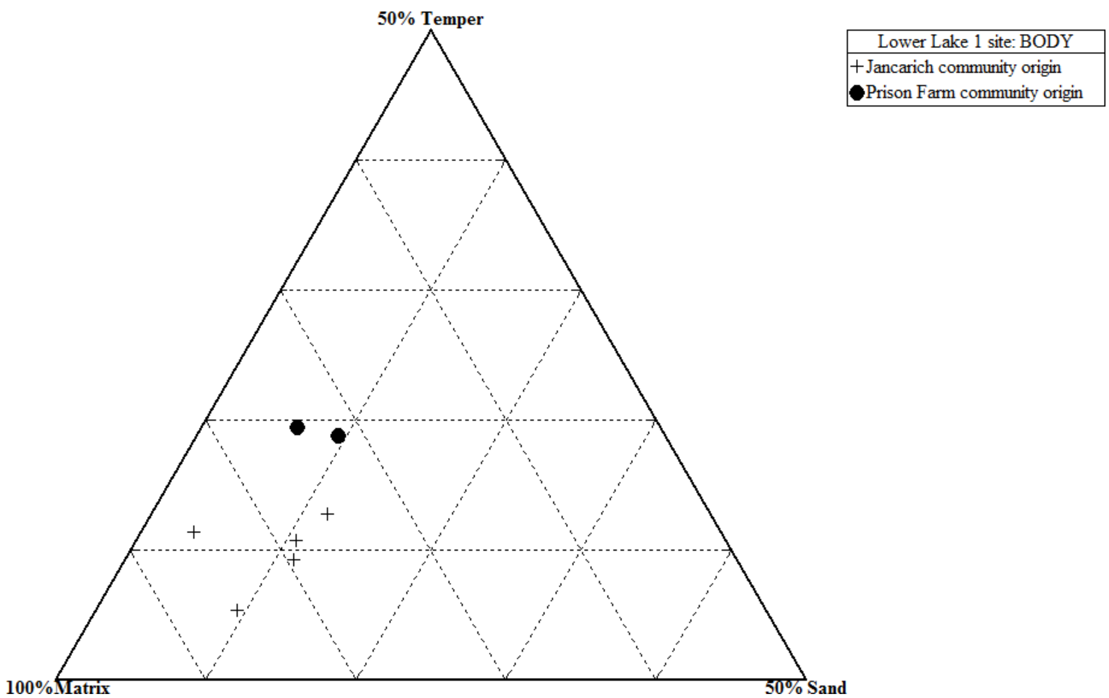


Figure 5-9: Body for Lower Lake 1 site samples

As illustrated above, the two most densely tempered samples match Prison Farm community recipe values, while the other four samples directly below it are more characteristic of Jancarich community recipes. Interestingly, the morphological variables from these two groupings support these compositional distinctions. Samples # 7 and 8 were determined to be made by the Prison Farm community. Sample #7 was the only sample at the site to fall within the range of cordage twists per centimeter at the Prison Farm site, while Sample #8 was the only sample at the site which had a rim thickness within the range of Prison Farm's average rim thickness. Sample #8 was also found to have been made with the most commonly used clay type at the Lower Lake 1 site.

There are three grog tempered samples at the Lower Lake 1 site, all of which match the recipe of the Jancarich community. Recall that grog temper is not present at Prison Farm but is encountered in small frequencies at the Jancarich site. All three of these samples were within the body thickness ranges of the Jancarich site and were made with the most commonly used clay that is diagnostic of the Lower Lake 1 site. Aside from these three samples, one additional sample was found to be directly imported from the Jancarich site and matched the average rim thickness and cordage twists per centimeter present in the cordage used to cord mark the pots at Jancarich.

One unusual finding related to this site was that mean rim and body thickness and orifice diameter are smaller than Prison Farm (and Davis Swamp) site values. In general, the morphological variables are more similar to Jancarich values than Prison Farm. These smaller values could either point towards the more frequent use of the site by the Jancarich community or suggest that smaller vessels were being made at this site. The latter could possibly hint towards a different type of function or different type of activity being practiced at this particular site compared to activities occurring at the Prison Farm site.

Prison Farm Residential Community Conclusions

Along with the Jancarich residential community, the Prison Farm residential community represents the earliest infusion of Havana information, objects, and ceramic style and technology into west Michigan. These two communities are distinct, however, and likely had different historical influences and perhaps different origins for the adoption of Havana. The Prison Farm community has left numerous Prison Farm-constructed vessels at the Moccasin Bluff site in the St. Joseph valley. It is also likely that they had some sort of relationship with Saginaw Valley peoples, based upon the site's proximity to that region and the stylistic similarities with ceramic collections from sites in that region (see Fischer 1972 for examples of Schultz site ceramics). Future research is needed to better address this hypothesis, however.

Thus, the Prison Farm community's sphere of influence for the adoption of Havana was likely linked more towards the south and east. This contrasts with the Jancarich residential community, which is stylistically distinct from Prison Farm and likely represents an adoption of Havana information and technology by more northerly-located groups, perhaps by those more culturally related to Laurel-like groups. Laurel-like designs were found at both the Toft Lake and Jancarich sites and this community probably had a stronger relationship to Laurel-like groups further to the north, although evidence for interactions with the Prison Farm community is also unmistakable (e.g., at the Lower Lake 1 site).

The Buffer Zone: The Kalamazoo and St. Joseph River Valleys

Before the third residential community is identified, the results from the Kalamazoo and St. Joseph valley sites during the Early Communities period and their implications for the community origin for sites located in these valleys warrants discussion here. Garland and DesJardins (2006) point out that the Kalamazoo is more culturally affiliated with west Michigan Havana-related groups but refer to the St. Joseph valley as the "Goodall periphery," highlighting the more frequent cultural affiliation with the Goodall region, despite evidence for relatively less frequent interaction with people in west Michigan. This research generally agrees with these assessments but was able to illuminate more specific relationships between the two regions and provide new information that was not available to previous scholars.

Based upon the results of this research, it is probably more useful to conceive of both the St. Joseph and Kalamazoo valleys as shared "**buffer zones**" and/or travel regions in which Havana information was widely shared and proliferated. There is no evidence for a separate and unique residential community inhabiting either of these two river valleys. Excluding samples from the Sumnerville Mounds complex, results from all early Middle Woodland Kalamazoo and St. Joseph River valley pottery samples strongly suggest that this region was being utilized by all residential communities in this research and that it likely acted as a shared "buffer zone" between west Michigan and northern Indiana populations. The sites in these two river basins also could have acted as nodes of interaction or travel between west Michigan groups and upper-middle Kankakee River valley groups. Various risk reduction strategies common to these types of small-scale societies (Halstead and O'Shea 1989; Ingold 1987; Kelly 1995; Spielman 1986; Whallon 2006) could have been employed, such as intermarriage, information exchange/informational mobility, seasonal scheduling of resources, (seasonal?) visitation among friends and relatives (network mobility), or the reciprocal exchange of food or other material resources (resulting in the creation of "social storage"). Early on, these activities likely centered on the use of the Moccasin Bluff and Rock Hearth sites in the St. Joseph valley and the Kalamazoo valley sites of Hart and Swan Creek (Figure 5-10). Thus, it is primarily within these two river valleys that frequent travel, interaction, gift-giving, and the use of this buffer zone likely occurred, allowing for the initial proliferation of Havana information and the long-term survival of these populations.

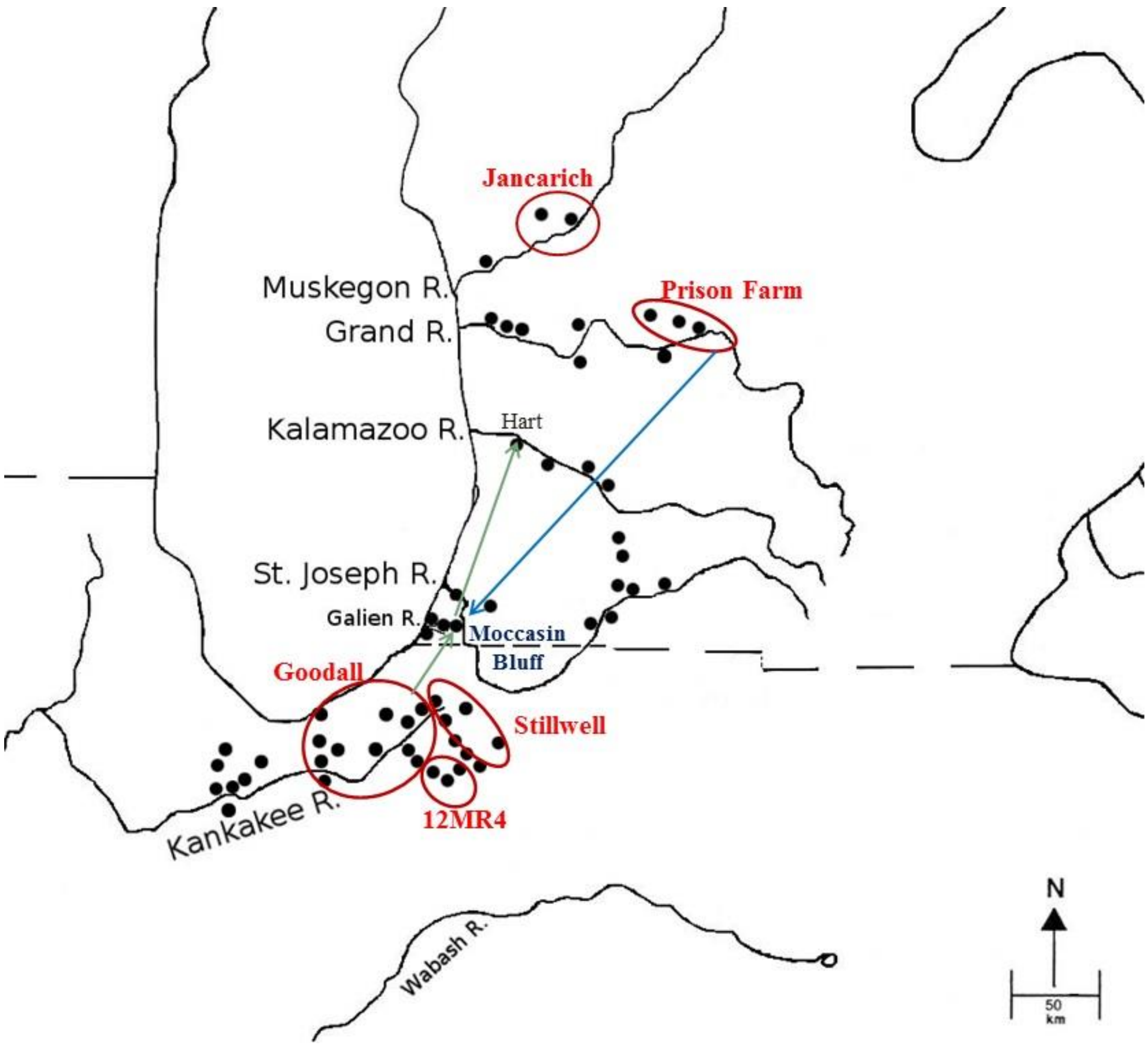


Figure 5-10: Community Connections Observed during Early Communities Period

The frequency of the number of distinct recipes unique to different communities is greatest in this region, which could have facilitated the spread of Havana into west Michigan. It is imperative to point out, however, that the very distinct recipes present between these two regions precludes migration as the mechanism for the spread of Havana into Michigan. Although the evidence suggests that there was a high degree of mobility occurring between these two regions in the Kalamazoo and St. Joseph valleys, distinct recipes unique to individual residential communities remained distinct through time in spite of these relatively frequent interactions.

The four most important sites in the proposed buffer zone during this time period are the Hart and Swan Creek sites in the Kalamazoo valley and the Rock Hearth and Moccasin Bluff sites in the St. Joseph valley. Based upon the stylistic, morphologic, and compositional signatures present at these sites, it appears the earliest movement and Havana influence into west Michigan occurred via the Lake Michigan coast region and/or the use of the mouths of these two river valleys. This contrasts with the relatively later use of the Portage-Thornapple Corridor during the Middle Communities period, which is exemplified at sites such as Simpson, Eccles, and Strobel. Despite Garland and DesJardins' (2006) comments to the contrary, the Portage-Thornapple corridor appears to have been used for travel, interaction, and/or seasonal use somewhat later than the region encompassing the Hart, Swan Creek, Moccasin Bluff, and Rock Hearth sites. This is explained in more detail later in the Middle Communities section.

Hart site
(habitation, Early Communities period) (n = 9)

The Hart site is important because of its very early Middle Woodland Havana component. It is suggested here that Hart represents one of the initial movements of Havana-related peoples into west Michigan from the Kankakee River valley. Interestingly, samples made by Stillwell or Goodall communities included clay types originating from the Kankakee valley, the Moccasin Bluff/Behner region, and the Hart site vicinity itself. This provides evidence that there could have been an actual ephemeral movement of Kankakee individuals to the Hart site.

Overall, samples at Hart were found to have probably been constructed by members of the Stillwell (n = 3), Goodall (n = 4), and Prison Farm (n = 2) residential communities. It appears that most of these vessels were not constructed at the Goodall, Stillwell, or Prison Farm community regions, suggesting the potential seasonal use of the Kalamazoo valley region as a buffer zone. Seven of the nine Hart site samples contained Kalamazoo or St. Joseph valley clays. The only two imports at Hart originated from the Stillwell community and matched that site's most commonly used clay and recipe.

Hart Sample #1 is particularly interesting because it has a most commonly used clay type from either the St. Joseph or Kalamazoo River valley, but was likely made by the same Goodall community potter and perhaps with the same tools as Sample #1 from the nearby Swan Creek site (Figure 5-11). This Swan Creek site sample matched the Goodall community recipe and was therefore likely made by Goodall residential community members. Interestingly, dentate width and node circumference for Hart Sample #1 is most similar to the Swan Creek sample.

There is also evidence of Prison Farm individuals who were utilizing the Hart site. Two samples at Hart were likely made by Prison Farm community members. One is the only solely granite tempered sample at the Hart site, which contrasts with the multiple use of gabbro and amphibolite temper types at Hart. This evidence provides a means for the initial introduction of Havana information to Prison Farm community members. Although somewhat speculative, people from the Stillwell and/or Goodall communities could have come into contact with Prison Farm people who were then Early Woodland culturally, which could have subsequently led to the adoption of Havana socioreligious ideas, the sharing of resource extraction zones, and/or intermarriage between these people. But again, there is no evidence that Prison Farm community members settled in or intensively occupied the Kalamazoo or St. Joseph River valleys. It appears that movement through this area was ephemeral in nature, and was done presumably to establish exogamous marriage relationships, for interaction purposes, for risk buffering, or for seasonal use of a shared buffer zone.

Figure 5-11: Swan Creek S1 (upper left) and Hart S1 (right)

Swan Creek site
(short-term encampment, Early Communities period) (n = 1)

As stated above, the data suggest that the one sample from the Swan Creek site was likely made by Goodall community members who imported this vessel from the Kankakee. It is almost identical stylistically to Hart site sample #1 and was could have been constructed with the same tools (Figure 5-11). Based on these results, it is suggested that Swan Creek is similar to the Hart site because it also could represent the initial movement of Havana-related peoples into west Michigan from the Kankakee valley. It also appears that the region of the most intensive northward movement by Kankakee peoples into west Michigan ended in the Kalamazoo valley and dramatically decreases in frequency north of that.

Moccasin Bluff site
(habitation, Early and Middle Communities periods) (n = 30)

At Moccasin Bluff, there is strong evidence of frequent northward and southward movement from people originating from both west Michigan and the Kankakee valley. Unlike the Kalamazoo valley sites described above, however, the Moccasin Bluff site was more intensively occupied by numerous communities based upon the high densities of cultural material present at the site and the fact that numerous vessels in this research were found to have been imported directly from the Kankakee and west Michigan. It is important to point out that a most commonly used clay type was identified at the Moccasin Bluff site but there is a large amount of variability in recipes and clay types present at the site. In other words, no grouping could be identified as a separate local recipe unique to a separate Moccasin Bluff residential community.

Instead, there is a wide array of different groupings that correspond to recipes of other residential communities in the study area. In fact, all samples were 1) found to probably be imports from other residential communities, or 2) probably made by people from these communities with the most commonly used clay type at the Moccasin Bluff site. Most of the community signatures originate from the Stillwell, Goodall, and Prison Farm residential communities but evidence for a relatively light Jancarich community involvement at the site is present too.

Based upon these results, the Moccasin Bluff site is tentatively designated as the earliest known locale for the most intense level of interregional interaction between west Michigan and Kankakee valley groups and the site could represent the central hub for the beginnings of the spread of Havana into west Michigan. It is strategically located in a prime area for this purpose because of its location within a buffer zone between west Michigan and northern Indiana populations and due to its close proximity to the Lake Michigan coast, which could be used for travel to the mouths of the major river valleys in west Michigan. An interesting theory that may have relevance here is that Moccasin Bluff could have functioned as a type of "pilgrimage site" (see Carr 2006d) for western Michigan populations who intended to indoctrinate and immerse themselves in Havana-related culture. The long distance travel involved in such an excursion would add additional importance since distance is often equated with supernatural or sacred power among indigenous and small-scale societies (Helms 1976, 1988). The distance traveled and the subsequent interactions occurring at the Moccasin Bluff site could have led to the acceptance and adoption of certain Havana-related ideas as well as pottery styles and technology (Carr 2006d). A large amount of interregional mound ceremonialism could have been conducted in tandem with these activities as well. In this scenario, the nearby Sumnerville Mounds could have functioned as a "hinge" between these west Michigan and Kankakee groups. Mound complexes, in this instance, would be located along the edges of the corporate group territories of these two groups and served as contexts for intergroup interaction, integration, and negotiation (Clay 1991).

The results from the Moccasin Bluff site seem to support this type of a dynamic situation. Six total samples were determined to have a Stillwell residential community origin. Three of these were imports from this community (matching Stillwell community body/recipe, containing ARF's in their paste, incorporation of both grog and granite temper, and possessing thicker lips than rims). Three additional samples were determined to have been made by members of the Stillwell community (i.e., matched recipe) but with the most commonly used clay at the Moccasin Bluff site, suggesting that they were likely made by Stillwell peoples at the Moccasin Bluff site.

Nine additional samples matched the body values of the Goodall residential community. Six Havana samples were determined to be likely imports directly from this community, while three Havana samples were found to have been manufactured by Goodall peoples but with the Moccasin Bluff site's most commonly used clay. Sample #34 (Figure 5-12) presented an interesting case because it is a noded rim that contained both exterior and interior dentate stamping over a cordmarked surface. These decorative traits are extremely rare in the study region and were observed only in the Kankakee. In fact, there are only three other sites (one sample apiece) that had interior-exterior dentate stamping: Watson, Newton County, and Amey. All three were also determined to have been manufactured by Goodall community peoples.

Figure 5-12: Moccasin Bluff Sample #34

One unexpected outcome from the Moccasin Bluff analysis was the revelation of a relatively strong Prison Farm community presence at the site. Thirteen total samples at Moccasin Bluff, the most from any residential community, appear to have a Prison Farm community origin and all are stylistically more similar to the "cruder" utilitarian Prison Farm samples (i.e., strong presence of cordmarking, noding, interior cordmarking, cord wrapped exterior lips, etc.). None of these, however, represent imports from the Prison Farm site, a fact which seems to lend support to the pilgrimage theory outlined above. All represent samples that were likely made by Prison Farm peoples during travel to the Moccasin Bluff site (eight were made with the Moccasin Bluff site's most commonly used clay and five were made with Kalamazoo River valley clay). This aligns with one expectation of a potential pilgrimage situation defined by Carr (2006); specifically, pilgrims may manufacture utilitarian and ceremonial artifacts at pilgrimage sites that contain styles and recipes diagnostic of the traveling community but with local raw materials (i.e., clay) from the vicinity of the pilgrimage site. It is also important to point out that a potential pilgrimage could have also simultaneously played a dual role in the collection of information about the environment and resources within the buffer zone region. Planning movements that accomplish multiple objectives, frequently revolving around subsistence concerns, is a common practice among foraging groups (Kelly 1995; Lovis and Whallon 2016; Whallon, Lovis, and Hitchcock 2011).

There are also two samples that have a likely Jancarich residential community origin. Both samples have perthite in their pastes and match the Moccasin Bluff commonly used clay, suggesting they were made at the Moccasin Bluff site. Evidence supporting a Jancarich community origin for its construction includes the fact that their recipes match the body values of the Jancarich community, are burnished like so many Jancarich samples, and possess morphological traits more similar to Jancarich vessels than Kankakee vessels. As discussed above in the Jancarich community section, the diffusion of Havana information by the Jancarich community is the most likely explanation for the presence of Havana in the Muskegon valley. In this case, potential pilgrimage and/or intermittent travel to the Moccasin Bluff site and the surrounding region by Jancarich peoples intending to interact with other Havana-related peoples in west Michigan and northern Indiana represents one mechanism by which Havana information, technology, and style was selectively adopted and fused into preexisting cultural practices.

Lastly, three Hopewell samples provide evidence of a relatively later temporal use of the site during the Middle Communities period. One was made by the Goodall community with a St. Joseph valley clay, while another was made by the 12MR4 community with a Kankakee valley clay. The final sample was most likely manufactured by the Spoonville community with the most commonly used clay at the Moccasin Bluff site.

Rock Hearth site
(short-term encampment, Early and Middle Communities periods) (n = 8)

The Rock Hearth site provides evidence, along with Hart and Swan Creek, of the transient movement of Havana groups from the Kankakee into west Michigan. Seven of the eight total Havana samples examined from the Rock Hearth site matched the recipe of the Goodall residential community. Six of these were made with clay from the Rock Hearth site, while one sample was likely made with Kalamazoo River valley clay and brought back to and deposited at Rock Hearth by Goodall community members. Lastly, one sample was likely made with Rock Hearth clay by Stillwell community peoples.

Again, a region used as a buffer zone or an area of seasonal mobility from the Kankakee to the Moccasin Bluff and Rock Hearth sites and then perhaps into the Kalamazoo valley via the Hart and Swan Creek sites is evident. It is likely that Rock Hearth became important slightly after the Hart and Swan Creek sites were used, however. This is based upon the relatively smaller morphological traits at Rock Hearth. It is still relatively early though and likely was inhabited during the late Early Communities period or the early Middle Communities period. Therefore, the Rock Hearth findings support the notion that Moccasin Bluff and the surrounding area acted as an important region that allowed for the spread of Havana into west Michigan.

Residential Community #3: Stillwell Residential Community

This residential community includes primarily the Stillwell and Mud Lake sites in the upper Kankakee River valley and the 12MR217 site in Marshall County, Indiana. There is also strong evidence for later occasional logistical forays into Marshall County (at 12MR162 and 12MR10) and in the lower Kankakee (Harper and Wunderink). Since 12MR162, 12MR10, Harper, and Wunderink appear to represent relatively later occupations or short-term use areas (based upon ceramic traits), this section focuses primarily on the earlier Stillwell, Mud Lake, and 12MR217 sites. Harper, Wunderink, 12MR10, and 12MR162 are discussed in the following Middle Communities section.

The mean percent temper of locally manufactured samples from this community is the highest of any other community in the study region, averaging between 30.5% and 37.4%, while percent sand averages between 2.1% and 4.8% (Figure 5-13). An extremely weathered gabbro temper type was identified only at the Stillwell and Mud Lake sites and is assumed to originate from this region. Gabbro temper, in general, is mostly an upper and middle Kankakee valley phenomenon: 80% of all gabbro tempered samples in the study region come from this area. The total lack of sandstone temper types present at Stillwell community sites is also noteworthy because it is most common at other sites in the Kankakee and St. Joseph valleys.

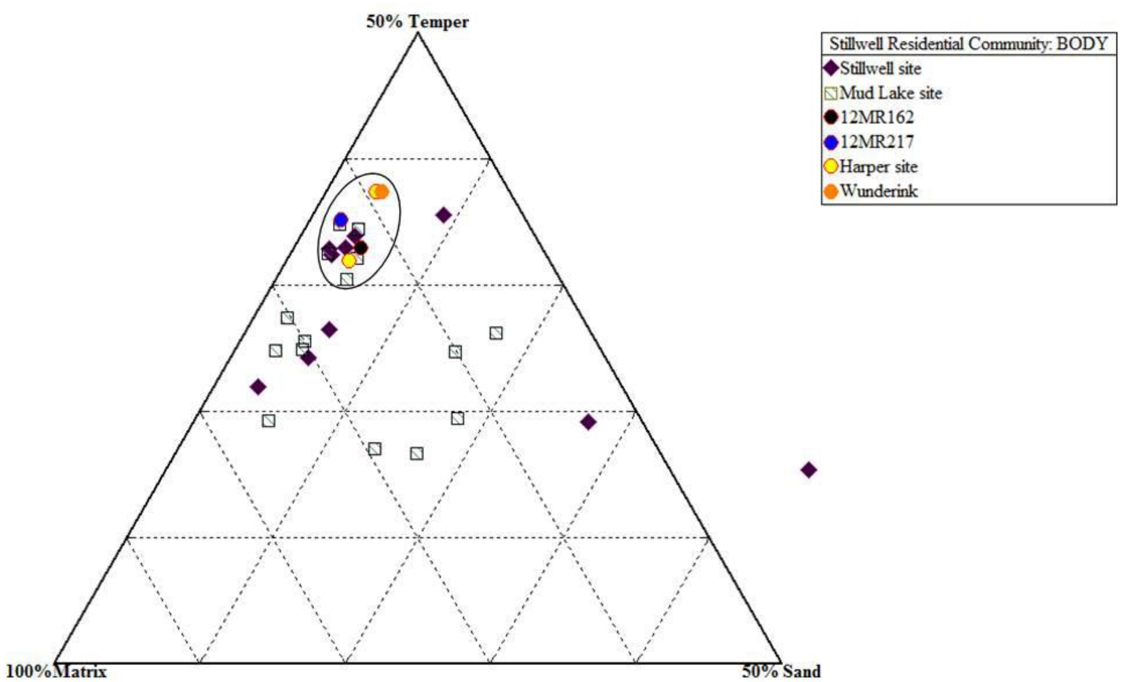


Figure 5-13: Body for Stillwell Residential Community

Another especially diagnostic trait is the presence of ARF's in the clays used at these sites, which is present in 57.1% of all samples from this community. Biotite mica is most commonly observed in clays in the upper and middle Kankakee (51.7%). Other rare natural inclusion occurrences in pastes include sandstone, of which two of the three total samples in the study region are found at Stillwell and Mud Lake, and intraclast grainstone, which is found only at Mud Lake. The presence of epidote in pastes is also diagnostic of this community (51.6%) and contrasts with the low percent present in Goodall community samples (10.5%). Roughly 38.5% of all pastes in this community are vitrified, which suggests a slightly more advanced pyrotechnology by people in the upper Kankakee compared to west Michigan.

There are some morphological traits that are unique to this community as well. The Stillwell community contains the highest percent of interior lip notching in the study region at 71.4%. The next closest is the Goodall community at 55.6%. Beveled interior lips are also very common at Stillwell community sites (71.4%). For most samples, lip thickness exceeds rim thickness. In fact, large lip thickness values are unique to this community with a mean of 10.42 mm, while average rim thickness is 9.89 mm. Body thickness averages 9.51 mm. Thick dentate width (mean of 1.86 mm) is also diagnostic.

Stillwell site
(habitation, Early and Middle Communities periods) (n = 10)

Ten samples were available for study from this site, four of which were determined to probably be locally manufactured by Stillwell site peoples. One additional sample was found to have likely been manufactured by Stillwell people but with an exotic clay most likely from the St. Joseph River valley, based upon the presence of muscovite and hornblende in the paste, which are more common in the St. Joseph valley. Therefore, this sample most likely was made by Stillwell community members in the St. Joseph valley and was later deposited at the Stillwell site.

Mud Lake site
(mound, habitation, Early and Middle Communities periods) (n = 15)

This site is included within the Stillwell residential community primarily because of the presence of Stillwell community signatures. Six samples from Mud Lake were determined to have been manufactured by Stillwell site peoples. There is also evidence for a significant Goodall residential community presence at Mud Lake as well and it is likely that these two communities were closely related and interacted frequently at this site.

12MR217 site
(habitation, Early Communities period) (n = 1)

This site likely represents the initial movement of Stillwell community members into the Marshall County region, a pattern which continued later as evidenced by the 12MR162 and 12MR10 site results. One Sister Creeks sample was available for study from 12MR217. It was determined that this sample was likely imported directly from the Stillwell residential community. The characteristic Stillwell recipe and the presence of ARF's in the paste strongly support this conclusion. The body thickness (9.45 mm) is very similar to both Mud Lake (10.04 mm) and Stillwell (9.1 mm) site averages and it is gabbro and granite tempered. Recall that gabbro is most common in the Kankakee. All of these facts strongly support 12MR217's placement in the Stillwell residential community. It is possible that this site was used by this community as a short term encampment or for logistical purposes.

Residential Community #4: Goodall Residential Community

This residential community includes the Goodall, Good's Ford, 12ST8, Brems, Lefty's Coho Landing, and Big Grape Island sites. Somewhat later temporal use of the Strobel, Eccles, Yahl, and Schissler sites also characterizes the territorial expansion of this community, but this is discussed in more detail in the Middle Communities section. The body values of the Goodall community range from 16.8% - 29.6% temper and 1.8% - 7.6% sand (Figure 5-14). The temper percent range was uncomfortably large because other residential community recipes did not share a similarly wide range. In fact, samples containing below 20% temper were initially outside the statistical parameters of Goodall recipes. However, it became apparent that samples containing between 16.8% and 20% temper, as long as they still contained 1.8% - 7.6% sand, overwhelmingly matched the morphological and stylistic parameters of Goodall residential community sites. Therefore, it became necessary to extend the percent temper range in this instance to accommodate the 16.8% - 20% range and designate these as locally manufactured Goodall community vessels as well.

The percent of ARF's present in clay types is also diagnostic of the sites in this community, representing the highest percentage at 61.4% of all samples. The relatively low percent of epidote in pastes (10.5%) contrasts with the high percentages present in the Stillwell community and in the lower Kankakee valley. Furthermore, chert natural inclusions under the petrographic microscope were orange-brown in color for samples within the Good's Ford and Goodall site region, which contrasted with the more general grey color of chert elsewhere. Diorite and gabbro temper is relatively common in samples in this community, especially at the Goodall and Good's Ford communities. The only occurrence of quartz arenite temper in the Kankakee is found at two Goodall community sites: Goodall and Brems.

Stylistically, this community is characterized by the common occurrence of dentate stamping, which represents the main decorative trait of the community. Lip thickness is greater than or equal to rim thickness for many samples, especially at the Good's Ford site. Goodall site and Good's Ford site mean lip thickness is almost identical (8.3 and 8.2 mm, respectively). This community also possesses the second highest percent of lip notching in the study region at 55.6%. In general, body thickness is smaller compared to Stillwell community values, averaging 8.14 mm. Lastly, the high frequency of beveled interior lips at the Good's Ford and Goodall sites is another characteristic trait.

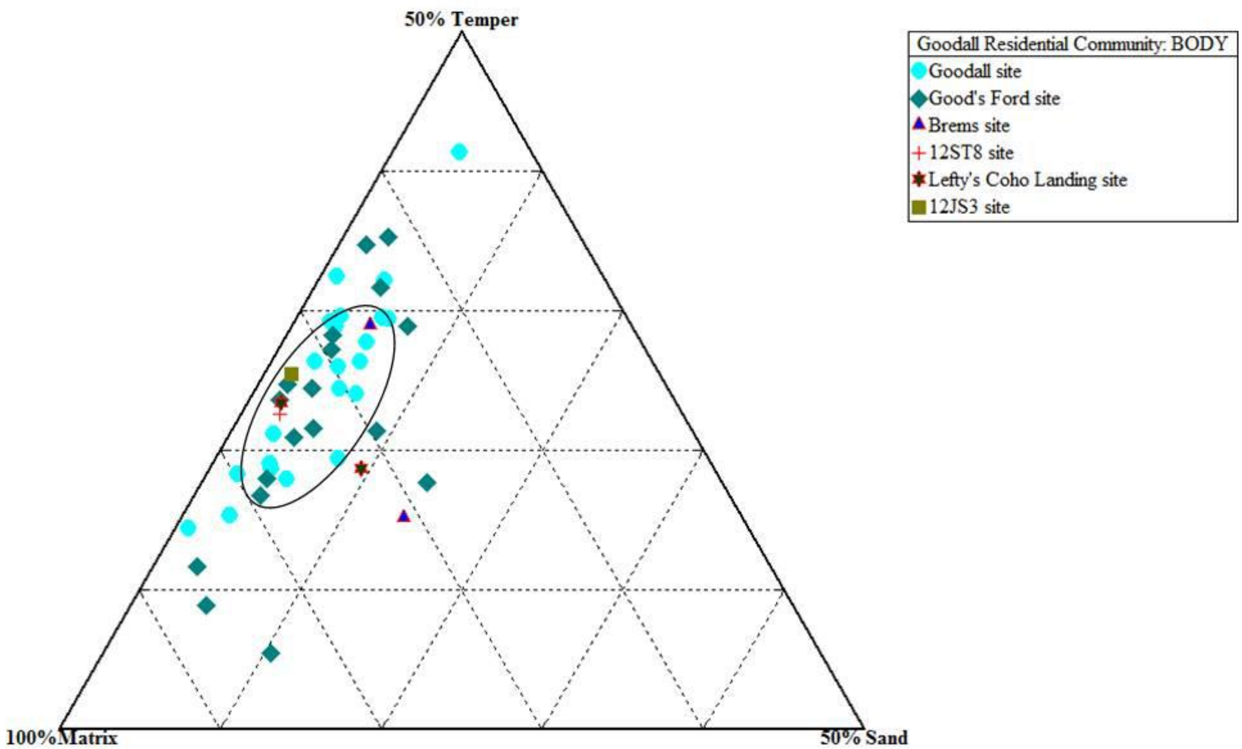


Figure 5-14: Body for Goodall Residential Community

Goodall site
(mound, habitation, Early and Middle Communities periods) (n = 22)

Seventeen of the twenty-two total samples from the Goodall site were determined to match the most commonly used clay and recipe at the site. There were two groups of locally manufactured samples, however. The first group (n = 11) contained between 29.6% and 24.1% temper. The second group included most of those samples that contained 18.3% - 20% temper, which is more similar to many Good's Ford site samples.

Good's Ford site
(habitation, Early and Middle Communities periods) (n = 18)

Eleven of the eighteen total samples from the Good's Ford site were found to have been made by the Goodall residential community. Eight of these were locally manufactured at the Good's Ford site (i.e., possessing the most commonly used Good's Ford clay and recipe). Three additional samples matched the local recipe, style, and morphological traits of the Goodall community but were likely made with clays in the St. Joseph valley. The lack of ARF's in the paste and the cumulative presence of muscovite, chert (grey in color), hornblende, and quartzite all point toward the likely origin of the clay lying in the St. Joseph.

12ST8 site
(short-term encampment, Early Communities period) (n = 1)

A Havana Cord-Wrapped Stick sample with a vertical rim and flat lip was attained for study from the 12ST8 site. The paste includes ARF's, has a large SSI (1.8), and matched the Goodall community's most commonly used clay type. The recipe also matches the Goodall community body values. This sample was therefore designated as a likely import from the Good's Ford or Goodall site and probably provides evidence for the seasonal use of the 12ST8 vicinity by this community.

Brems Site
(habitation, Early and Middle Communities periods) (n = 2)

Another site that was likely within the sphere of the Goodall residential community's seasonal round or within its social boundaries was the Brems site. Two total samples, a Sister Creeks Punctate and a Havana noded cordmarked sample, were found to have probably been manufactured by Goodall community members. The Sister Creeks sample was made with a silty loessic clay from the Kankakee, while the recipe matches Goodall recipes. It is tempered with granodiorite, which is more common in the Kankakee than anywhere else in the study region, the lip has a slight interior bevel, and the rim thickness (10.25 mm), lip thickness (7.25 mm), and TSI (4.0) are all large. The morphologic, stylistic, and petrographic traits of this sample document the use of the Stark County area by Goodall community residents during the earliest portions of the Early Communities period (North Liberty or Stillwell phase in Indiana).

The Havana noded and cordmarked sample was also likely made by Goodall members in the Stark County area but appears to have been made slightly later, probably during the early Middle Communities period based upon morphology (e.g., a moderately everted rim, thinner rim and lip), style, and petrographic data (e.g., smaller TSI of 3.0). Diagnostic Kankakee traits possessed by this sample include a thicker lip (9.88 mm) in relation to the rim (8.55 mm), granodiorite temper, and an orifice diameter (24.0 mm) that is very close to Goodall (22.7 mm) and Good's Ford (21.3 mm) site means. These two samples, along with the 12ST8 results described above, likely document the seasonal or transient use of the Stark County region by Goodall community members during the Early Communities and early Middle Communities periods and support the two sites' inclusion in the Goodall residential community.

Big Grape Island (12JS3) site
(habitation, Early and Middle Communities periods) (n = 1)

One Havana-related sample with a vertical rim shape and a flat lip was examined from the Big Grape Island site. This Naples Dentate Stamped and Cordwrapped stick impressed sample clearly matches the paste (with ARF's) and body (with gabbro and granite temper) values of the Goodall residential community and is therefore designated as an import from this community. The thick rim (10.85 mm) and lip (9.35 mm) values, as well as the relatively large orifice diameter (24.0 mm) and dentate width (2.7 mm) all mirror Goodall site mean values and point toward the use of the Jasper County region by Goodall community members during the Early Communities period.

Lefty's Coho Landing site
(seasonal encampment, Early and Middle Communities periods) (n = 2)

The relatively early use of Porter County by the Goodall residential community is evident at the Lefty's Coho Landing site. Both Havana-related samples from this site were likely manufactured by Goodall peoples. One sample matched both the clay and recipe values of the Goodall community, contained epidote and ARF's in its paste, and was tempered with granodiorite. This suggests that this sample was likely an import from the Goodall community. The second sample matched the recipe for the Goodall community but the clay type was more similar to St. Joseph valley clays. It lacked ARF's and the higher percent of silt and sand suggests that it was not collected from the Kankakee. Thus, it was determined that this sample was probably made by Goodall residential community members with a St. Joseph valley clay, and later deposited at the Lefty's Coho Landing site.

Furthermore, both of these samples' large temper size (3.7 and 3.8) and thick bodies (10.5 mm and 11.1 mm) suggest an early temporal placement (i.e., Stillwell or early Goodall phases) and therefore an early use of this region by the Goodall community during the Early Communities period. The use of this site location and the Lake Michigan shoreline could have been a part of the early use of the eastern coast of this lakeshore by Kankakee individuals traveling north into west Michigan.

Goodall Residential Community Conclusions

The geographical extent of the Goodall residential community appears to have been more expansive than that of the Stillwell community. The Goodall and Good's Ford sites appear to be the most intensively utilized locations for community members. Evidence for the likely short-term and/or seasonal use of surrounding regions is also apparent in Stark County at the 12ST8 and Brems sites and in Jasper County at the Big Grape Island site. The likely use of the Lake Michigan coastline at Lefty's Coho Landing seems to support the theory for a very early northward mobility pattern potentially involving the use of the Galien basin region and the Moccasin Bluff, Rock Hearth, Hart, and Swan Creek sites.

Residential Community #5: 12MR4 Residential Community

This residential community was rather unique and included the 12MR4 and 12MR5 sites. The body values include 13.0% - 22.1% temper and 14.9% - 33% sand, while paste values are characterized by 24.7% - 40% sand and 7.9% - 9.2 % silt. The percent sand really distinguishes the body and paste values for this community. As can be seen from Figure 5-15, the difference between the *body* for the two sites is the percent of sand present in their pastes. 12MR5, which is likely a bit later than 12MR4 (based upon thinner/smaller morphological and stylistic traits), still retains the same amount of temper, but is characterized by a slightly sandier clay type. These Marshall County pastes are characterized by the presence of quartzite (77.8%), microcline (88.9%), and epidote (77.8%). The rare occurrence of micaceous sandstone and a general sandstone type as natural inclusion types in these clays is also characteristic of this community.

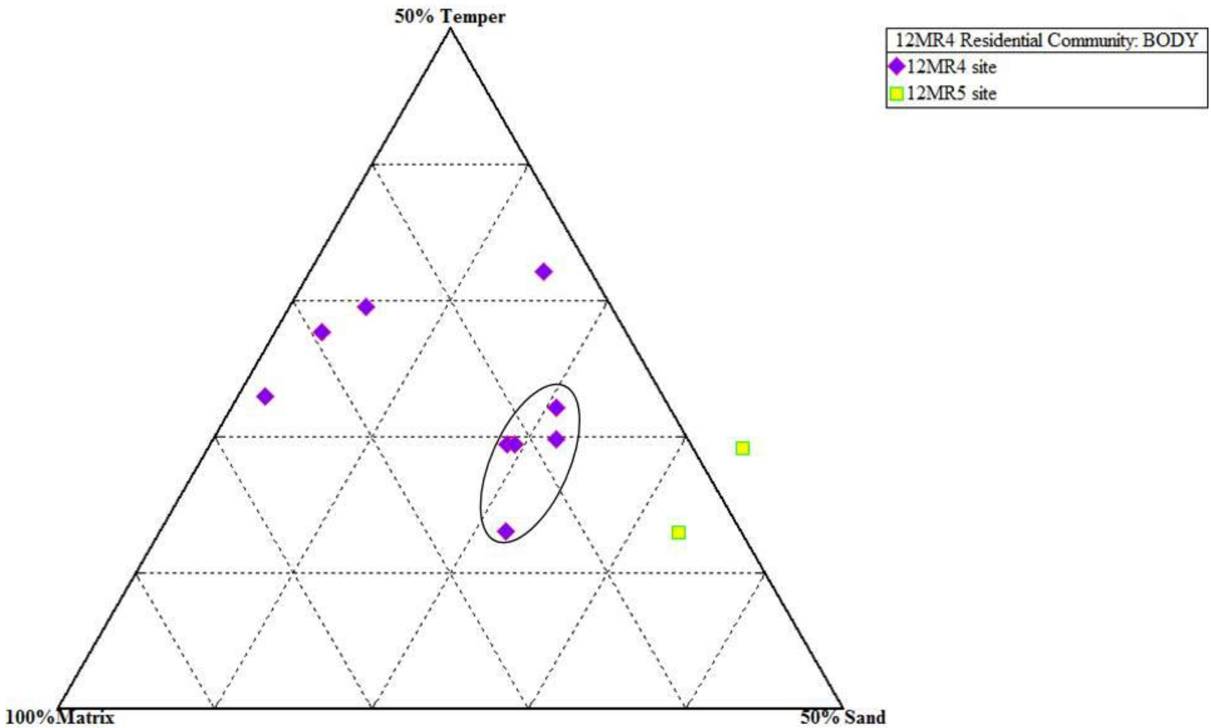


Figure 5-15: Body for 12MR4 Residential Community

Pyrotechnology is another important diagnostic trait of the 12MR4 community. Eight of nine total Havana samples (88.9%) contained slightly active pastes, rather than entirely active pastes. This is the only early Middle Woodland community in the study region with such high percentages of slightly active pastes. Despite this, only one sample was partially vitrified, which suggests a pyrotechnology revolving around quick firings occurring at slightly higher temperatures than other communities: between 700°C and 850°C, the latter of which designates the "vitrification point" (Rice 1987: 431). This community is also characterized by the use of microgranite temper and gneiss temper. Arkose sandstone temper is also present, while the presence of granite temper is the lowest in the study region (23.1%). Additionally, the 12MR4 site has the largest temper size index of any site in the study region (4.09).

Morphologically, this community exhibits amongst the largest averages for rim thickness (9.44 mm), lip thickness (8.56 mm), and body thickness (9.9 mm). Vertical rims with flat lips dominate rim samples from these sites. One last stylistic trait unique to this community is the relatively frequent use of slip, which is present on 54.5% of all samples from 12MR4 and 12MR5.

12MR4 site
(habitation, Early Communities period) (n = 10)

The 12MR4 site represents the type site for the 12MR4 residential community and likely arose during the Early Communities period, based upon the AMS date discussed earlier in the chapter and the early Havana pottery styles present at the site. Six of the ten total samples at the site were most likely locally manufactured (i.e., most commonly used clay + local recipe). Although one other sample did not contain the local recipe of the 12MR4 community, the distinctive style and morphology of this sample suggested that it was made by 12MR4 peoples. The only other explanation is speculative but it could have been made by a Stillwell community member with 12MR4 clay who copied 12MR4 design patterns or used pottery tools at the 12MR4 site to do so. This scenario could potentially provide evidence of intermarriage between the two communities or the presence of an intermarrying woman who adopted the accepted design patterns of her new community but still retained the recipe of her former community. A rather intense cultural relationship between these two communities is evidence, as described later in this chapter. Two other samples appear to have been made by 12MR4 community members with likely Kankakee valley clays.

One last sample contains 23% temper, a number which borders the upper range of the 12MR4 recipe. The sample is the only one at the site that contains ARF's in its paste and is the only interior beveled sample as well, two clear Kankakee traits. It is likely that this sample was made by 12MR4 site peoples with Kankakee clay, and provides evidence of Goodall community stylistic influences to the 12MR4 community and continuing participation in a sustainable community with one another.

12MR5 site
(habitation, Early and Middle Communities periods) (n = 2)

Based on the relatively smaller morphological and decorative traits of the two samples at this site, the 12MR5 site likely represents a somewhat later occupation of this region by the 12MR4 community during the middle to late Goodall phases. In general, the clays are sandier, on average, than any other site in this research. The next closest, however, is the 12MR4 site, which suggests that this is a geological characteristic of this area or perhaps the purposeful selection of very sandy clays by this community.

Both samples are slipped, gneiss tempered, and lack ARF’s in their pastes. The percent temper used and the presence of slipped surfaces, which likely were technological carryovers from the earlier 12MR4 site occupation, support this site’s inclusion into the 12MR4 residential community. Additionally, the only other gneiss tempered sample in this research project was found at 12MR4. Therefore, persistence of a distinct 12MR4 recipe and (pyro-) technology, which are two variables expected to be relatively more resistant to change (Carr 1995a, 1995b), is present at this site. An expected temporal change resulting in smaller morphology and changing style is present as well.

12MR4 Residential Community Conclusions

The inception of the 12MR4 residential community appears to have included a Havana-related influence from the Goodall and Stillwell communities early on during the Middle Woodland period. The next chapter reveals that samples from 12MR4 that were AMS dated to B.C. 110 – A.D. 50 were likely imported from the Goodall residential community, while another sample was probably made by 12MR4 peoples in the upper Kankakee. Also explained in the Stillwell site section in Chapter 6 is that two additional samples from the Stillwell site were likely imported from the 12MR4 community. This evidence for early sustainable community contact with the Goodall and Stillwell residential communities likely accounts for the introduction of Havana information, technology, and style into this part of Marshall County.

However, the data once again preclude migration from the Kankakee as the primary mechanism for the introduction of Havana into this community. Instead, the most likely explanation for the spread of Havana into this region was through diffusion of select Havana-related ideological and technological traits. As was the case with the Jancarich community, the large numbers of Havana-related *copies* at 12MR4 strongly suggest the incorporation of culturally selected Havana traits that were incorporated into a preexisting decorative repertoire and ideological practice. For instance, many vessels possess odd combinations of Havana decorative motifs not seen in the Kankakee or elsewhere in the study region, such as alternating perpendicular rows of sometimes different decorative patterns (Figure 5-16) or two different sized rows of the same decorations (e.g., dentate stamping). Furthermore, the fact that the 12MR4 site's recipe and pyrotechnology persists through time and is later found at the nearby 12MR5 site provides additional support for the construction and maintenance of a separate 12MR4 community identity in relation to surrounding communities. This communal persistence is seen in the Middle Communities period as well (see below).

Figure 5-16: Sample #4 from 12MR4 site

MIDDLE COMMUNITIES PERIOD: RESIDENTIAL COMMUNITIES

This section describes the second proposed temporal period, the Middle Communities period (Table 5-3), and the proposed developments occurring during this period. This period is suggested to have encompassed the late Norton/early-middle Converse phases in Michigan and the middle-late Goodall/early LaPorte phases in Indiana. It represents the height of both Havana and Hopewell participation in the study region, and the construction of both Havana and Hopewell Ware-related (oftentimes thinner walled) pottery vessels. It also appears that regional and interregional interactions became more expansive and more frequent in comparison to earlier communities.

Residential Community Name	Sites in each Residential Community
1) Jancarich	Jancarich, Toft Lake, Sand Creek
2) Prison Farm	Prison Farm, Lower Lake 1, *Davis Swamp*
3) Stillwell	Stillwell, Mud Lake, 12MR217; *12MR162, Harper, Wunderink; Watson, Newton County, 12MR10*
4) Goodall	Goodall, Good's Ford, Brems, 12ST8, Lefty's Coho Landing, 12JS3; *Strobel, Eccles, Simpson, Yahl, Schissler; Watson, Newton County, Behner, Bobinski*
5) 12MR4	12MR4, *12MR5, 12MR78, 12MR115*
6) Spoonville	***Spoonville, Battle Point, Boom Road, Armintrout-Blackman***

Table 5-3: Residential Community Definition during Middle Communities Period
(***bold-italics*** denote a new community, while new sites providing evidence of previous Early community expansion and persistence are *italicized*)

Residential Community #6: Spoonville Residential Community

This community (Figure 5-17) appears to have arisen during the Middle Communities period and includes the Spoonville, Battle Point, and Boom Road sites in the lower Grand valley, as well as the likely seasonal use of the Armintrout-Blackman site in the Kalamazoo basin. The data suggest that it is likely that this community represents an offshoot from the Jancarich residential community located north in the Muskegon River valley. The body values for the locally manufactured samples from this community match only the diagnostic Jancarich community recipe. The percent temper for locally manufactured samples for the Spoonville residential community range from 8.1% to 16.9%, while sand spans from 2.3% to 10.2%.

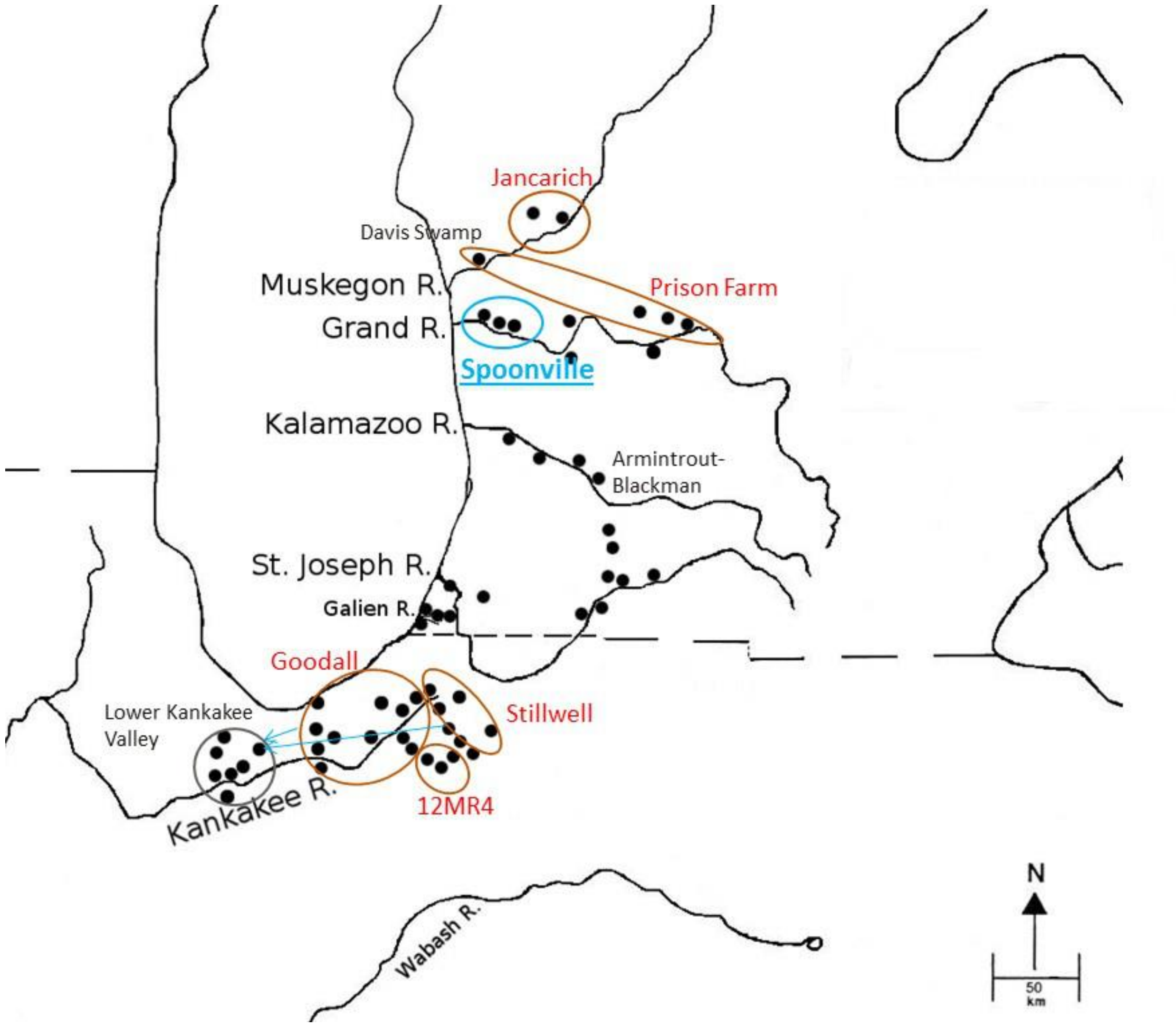


Figure 5-17: Residential Communities, Ancillary Sites, and Community Connections Observed during the Middle Communities Period

When considering all samples from both Jancarich and Spoonville, the stylistic and morphological variables' means are very similar. No other two communities in this research share so many similarities. Mean rim thickness at Spoonville is 8.27 mm while the Jancarich mean is 8.45 mm. Lip thickness mean at Spoonville is 6.68 mm while Jancarich's mean is 6.8 mm. Mean body thickness is actually larger at Spoonville (9.8 mm) than at Jancarich (8.5 mm). The ratio of lip shapes is almost identical at both sites as well. Spoonville samples are characterized by 30% flat, 50% round, and 20% beveled interior lips, while Jancarich is characterized by 30% flat, 30% round, 20% beveled interior, and 20% wedged lip shapes. Rim shapes support the somewhat later temporal placement of Havana-related samples at Spoonville in relation to Jancarich. At Spoonville, one sample has a pronounced everted rim and three have inverted rims, two rim profiles that usually characterize later Middle Woodland pottery vessels.

There are other variables which support a very strong connection to the Jancarich community. At Spoonville, mean node height (1.8 mm), node distance from the top of the lip (20.7 mm), node circumference (30.9 mm), dentate stamp width (1.87 mm), and percent voids (4.2%) are almost identical to Jancarich means of 1.5 mm, 21.6 mm, 33.6 mm, 1.9 mm, and 4.8% respectively. There are also two samples that contain a burnished surface finish at Spoonville, which is diagnostic of the Jancarich community.

Some differences between the two communities can be explained by expected temporal changes in design and technology. For example, Spoonville is characterized by a higher frequency of Havana samples with slightly active clay matrices (43.8%) than Jancarich (19%). Spoonville also has an average temper size index of 3.57, which is slightly smaller than Jancarich's mean of 3.71. Both of these are expected from samples from sites that are slightly later in time. The Spoonville site is also characterized by a relatively high percent of mafic temper types in which 50% of samples contained either gabbro or diorite temper. The Spoonville community is also characterized by the near complete lack of ARF's in the pastes. In fact, Spoonville, Battle Point, and Boom Road contain zero percent ARF's, while Armintrout-Blackman possesses only two samples that contain ARF's in their pastes. Lastly, the frequency of Hopewell-related samples at Spoonville far exceed that observed at the Jancarich site

Thus, the data suggest that it is likely that the mechanism for the inception of the Spoonville residential community revolved around the fission of one group (e.g., one or two extended families) from the Jancarich community. Another possible explanation is that Jancarich community members simply incorporated the Spoonville and Battle Point site locales in the lower Grand River valley as part of their seasonal round. However, the sheer density of cultural material and the presence of three burial mounds at the Spoonville site point towards a more intensive long-term use of the site that would seem to preclude the mere seasonal use of this region by the Jancarich community. The continuation of the Jancarich recipe at Spoonville community sites and the similarity of technical style variables that are resistant to change (e.g., percent temper, rim and lip thickness, body thickness, lip shape ratios, dentate width) (Carr 1995a, 1995b) between these two sites support the inference here of fission as the mechanism for the rise of this particular residential community.

When considered in light of the different means for variables at Spoonville sites that are expected to be due to temporal changes (e.g., rim shape, smaller orifice diameter, smaller temper size index, higher percent of slightly active clays), it seems more likely that fission from Jancarich is a better explanation rather than the movement or intensive seasonal use of the lower Grand valley by Jancarich community peoples. It is likely that the new Spoonville community maintained close contact with its parent community through time, based upon the occasional difficulty in distinguishing between the recipes and styles of these two communities and the presence of both communities' signatures at sites within both communities.

Additionally, recipes and t-tests for many of the morphological variables likely preclude the possibility of a Spoonville community origin from elsewhere. There are significant differences (.05 level) between Spoonville and Prison Farm for rim thickness, orifice diameter, and cord twists per centimeter. There are also significant differences (.05 level) between Spoonville and the Lower Lake 1 and Converse sites for body thickness. Kankakee community presence, meanwhile, is relatively minor in comparison to interactions with more closely located communities and the general lack of ARF's and diagnostic Kankakee recipes in the Spoonville community does not support a migration of Kankakee peoples into the Grand River valley. Below, each site included in the Spoonville community is discussed, focusing initially on Havana samples manufactured by members of that community and ending with a discussion of Hopewell samples (if present) at each site. Nonlocal samples (i.e., statistical outlier samples) indicating regional interaction networks are discussed in the following chapter.

Spoonville site
(habitation, mound, Middle and Transitional Communities periods)
(n = 28: 14 Havana samples + 14 Hopewell samples)

Seven of the fourteen total Havana-related samples at the Spoonville site were determined to have been made by Spoonville community members. Six of these were locally manufactured at the Spoonville site, while one was made with a clay from the Kalamazoo valley. An interesting aspect of this site is that there appears to have been the frequent use of two distinct clay types. One is an alluvial source that is not unlike other alluvial sources in the Grand River valley, while the second source is a loessic source. The latter perhaps points towards the slightly more frequent use of loessic clays through time (although the number of later Hopewell samples constructed of loessic clay types is minimal as well). Half of the Spoonville community-made samples at the site contained the alluvial source, while the other half contained the loessic source. Despite the differential use of clay types, all of these Spoonville-made samples contained the same or similar recipe and morphological traits.

Hopewell-related samples at Spoonville suggest the more frequent participation of nonlocal communities, in relation to Havana samples. The data suggest that only five of the fourteen Hopewell samples at Spoonville were likely manufactured by the Spoonville community. Interestingly, only one of these appears to have been constructed at the Spoonville site, whereas three were likely made with a Kalamazoo valley most commonly used clay and one with a Muskegon valley commonly used clay.

Battle Point site
(habitation, Middle and Transitional Communities periods)
(n = 11: 4 Havana + 7 Hopewell samples)

The Battle Point site mirrors the results from the Spoonville site results. Two Havana samples at this site were indistinguishable from locally manufactured Spoonville site samples, which suggests the probable use of this site location by Spoonville community peoples. This is unsurprising considering the close proximity between the two sites. The Battle Point site also shares the same sustainable community involvement as the Spoonville site (as discussed in Chapter 6). Seven total Hopewell samples were examined from the site as well, all of which were probably locally manufactured by Spoonville community peoples (matching the diagnostic paste, body, and morphological traits), solidifying the placement of the Battle Point site within this community.

Boom Road site
(habitation, Middle and Transitional Communities periods) (n = 2 Hopewell samples)

A Hopewell Zoned, Dentate stamped sherd and a Hopewell zoned sherd were both determined to have likely been manufactured by Spoonville community members, although a Jancarich community origin cannot be ruled out. However, based upon the cumulative presence of diagnostic Spoonville community signatures, such as recipe, pyrotechnology, body thickness, and geographical proximity to the Spoonville site, it is most likely that these were manufactured by Spoonville community members. Both implemented the use of Grand River valley clay based upon paste composition, natural inclusion types, and sand size indices. The Boom Road site, therefore, likely represents the seasonal use of this immediate location by Spoonville residential community members.

Armintrout-Blackman site
(habitation, Middle and Transitional Communities periods)
(n =22: 18 Havana + 4 Hopewell samples)

Upon investigation, it became clear that the Armintrout-Blackman site likely represents the frequent seasonal use of the Kalamazoo valley by Spoonville residential community members and, therefore, is included in this community. Twelve of the eighteen total Havana-related samples from Armintrout-Blackman were likely been manufactured by the Spoonville residential community (Figure 5-18). Eleven of these are illustrated on the ternary diagram as two seemingly separate groupings distinguished by percent temper: eight samples containing over 10% temper and three containing less than 10% temper. Although the latter three samples' percent temper is more similar to that of the Jancarich community, the morphological variables support the inclusion of these samples in the Spoonville community.

Another sample contained ARF's and epidote in its paste, which strongly suggests a Kankakee valley origin for the clay. The recipe, on the other hand, is diagnostic of the Spoonville community, implying that this sample was made by Spoonville community members while in the Kankakee. One other sample was made with a Kalamazoo basin most commonly used clay based upon the presence of potassium feldspar, microcline, plagioclase feldspar, chert, and hornblende in its paste. This sample is the only sample at the site with an interior beveled lip, which occurs in equal frequencies at the Jancarich and Spoonville sites. However, the morphological variables are more Spoonville-like so this sample was determined to be made by this community with a most commonly used clay type common at Kalamazoo valley sites. Lastly, four Hopewell-related samples from the site were examined as well. Two were determined to have likely been constructed by Spoonville community members with a commonly used clay likely originating from the vicinity of the Armintrout-Blackman site.

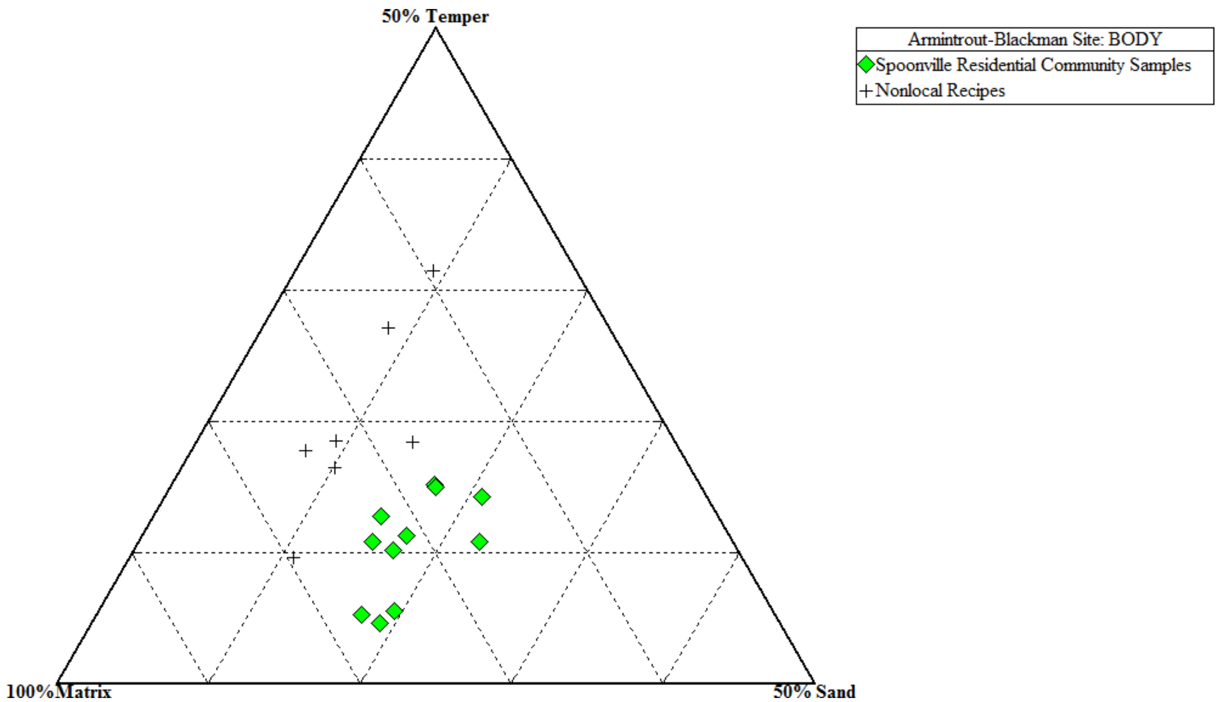


Figure 5-18: Body for Armintrout-Blackman Site Havana Samples

Spoonville Residential Community Conclusions

The results suggest that the Spoonville community likely fissioned off from the Jancarich community, but it appears that they still continued to draw upon the far reaching contacts of its parent community. As discussed in Chapter 6, most interactions occurred with the Prison Farm community, which could have provided a potential incentive for the Spoonville split from the Jancarich community. Although speculative, Jancarich community members could have continued interactions with other more northerly located groups (e.g., Laurel), while Spoonville could have spread south into the Grand valley in order to be closely located to the Prison Farm community and/or the increasing degree of Hopewell ceremonialism occurring in the Grand valley at this time. The results from the Converse site, described below, seem to lend support for this proposal, as there was an increasing intensification of Havana-Hopewellian ceremonialism at the Converse site during the Middle Communities period. The opportunity to more fully immerse themselves in Havana-Hopewellian culture through interactions with Prison Farm individuals and others at Converse and within the Grand valley could have acted as a potentially strong attraction for the Spoonville community. More research is needed to better test this hypothesis, however.

The Converse Site: The Locus of Havana-Hopewellian Intensification
(habitation, mound, Middle and Transitional Communities periods)
(n = 28: 7 Havana + 21 Hopewell samples)

The Converse site presents an unusual case in this research. Similar to the way in which the Moccasin Bluff site probably acted as the initial locale for the spread of Havana into west Michigan, the Converse site results suggest that the site acted as a primary locale for the *intensification* of Havana-Hopewellian ceremonialism and the sharing of Hopewell-related information in west Michigan. As was the case with the Moccasin Bluff site, there is no unique or diagnostic recipe present at the Converse site. Instead, there appears to have been many different people from all residential communities present during this time period and contributing to the activities at this site. Converse may also have functioned as a pilgrimage location for more southerly populations, similar to the Moccasin Bluff site during the Early Communities period for west Michigan peoples. Thus, a more intense level of participation and ceremonialism appears to have been attained at this time.

Brashler (2003) provided evidence that several of the Hopewell Ware-related samples from the site predate and/or are contemporary with the Havana samples at Converse. Furthermore, the fact that the Havana and Hopewell-like samples at the site are similar morphologically, in relation to the earliest Havana pottery elsewhere, implies that they are contemporaneous and were simultaneously constructed as part of the heightened Havana-Hopewell ceremonialism occurring at this time. The smaller average rim, lip, and body thickness values at the site in relation to pottery samples elsewhere, on the other hand, also point towards a temporal change in technology. As such, the earliest Havana-related ceramics at this site likely were manufactured in conjunction with the initial introduction of Hopewell into west Michigan during the Middle Communities period. This section describes the results from both the Havana and Hopewell-related samples from the Converse site.

Seven total Havana-related samples from the Converse site were examined in this research. Five of these samples matched the percent temper range diagnostic of either the Prison Farm or Goodall residential communities. After further inspection of the morphological and stylistic data, it was ultimately determined that three of these were probably made by Goodall community members. Two of these were likely made in the Grand River valley, probably near the Converse site, while one was likely made in the Kalamazoo valley. Another sample, on the other hand, was likely made by Stillwell community peoples with Grand valley clay.

The remaining three Havana samples were found to have been probably made by Grand River valley communities (i.e., Prison Farm and Spoonville) and represent their participation with Kankakee peoples in the further spread and adoption of Havana-Hopewell in Michigan. Two samples were determined to have been made by Prison Farm community members with probable Grand River valley clay. One sample was made by either the Jancarich or Spoonville residential community. Unfortunately, the data did not allow a more specific determination for this sample but we could speculate that a Spoonville community origin is more likely because of the rise of this latter community in the Grand valley during this time.

Twenty-one Hopewell-related samples were also investigated from the Converse site. Eleven (or 52.4%) of these samples were determined to have likely been manufactured by Goodall community members. Seven of these appear to be direct imports from the Kankakee, while three were probably made with a Grand River valley clay and one with a Kalamazoo valley clay.

Four additional Hopewell samples were likely made by Jancarich community peoples with Grand River valley clay types. Interestingly, only two samples appear to have been made by the Spoonville community, one with a Grand valley clay and the other with a Kalamazoo basin clay. Another interesting finding was an almost nonexistent Prison Farm Hopewell Ware-related presence at Converse. Only one sample from the Converse village was determined to have been made by the Prison Farm community (with a Grand valley clay). Lastly, one dentate rocker stamped sample appears to have been made by the 12MR4 community with a Grand valley clay. This points towards an increasing northward presence of this latter community through time.

Lastly, clear stylistic and mortuary influences from Ohio (Brashler 2003; Halsey 2000) also appear to be present at this site but a definite Ohio relationship could not be confirmed in this research due to the absence of Ohio ceramic samples. The study of Ohio-derived (as well as Saginaw valley-derived) pottery would go a long way towards approximating the true vastness of interaction networks operating at this time. With that said, two Hopewell samples (one tetrapodal based plain sherd and a plain rocker stamped sherd) could not be assigned to any residential community in this research. In fact, these samples both contained unusual buff colored pastes and matched neither the most commonly used clays or diagnostic recipes of any community. Additionally, two other Hopewell samples that I defined as being Goodall community-made above did not exactly match the most commonly used clay or recipe of the Goodall community. These designations were "best educated guesses," but it is possible that all four samples could derive from outside of the study region.

In conclusion, a relatively large influence from the upper Kankakee valley is present at the Converse site. Four of the seven total Havana samples and eleven of the twenty-one total Hopewell samples at the site were probably made by upper Kankakee communities (i.e., Goodall and Stillwell communities), which suggests a continuing influence from the Kankakee during a time in which Havana-Hopewell ceremonialism was intensifying. The presence of so many non-west Michigan recipes and/or clay types at the site is noteworthy and a bit surprising. This is not the case at any other site in west Michigan (besides perhaps Moccasin Bluff).

Therefore, the data suggest that the degree of mobility and interaction amongst and between communities in the study region was increasing and that the Converse site played a key role in the intensification of Havana-Hopewell ceremonialism in west Michigan. I still contend that this does not represent wholesale migration of Hopewell peoples from Indiana, Illinois, or Ohio because the recipes of the original west Michigan residential communities are not replaced by community signatures from elsewhere (see below). More than any other site in west Michigan, this site provides the best evidence for an ever increasing expansion of interaction networks occurring during the Middle Communities period, or even the possible annual or seasonal movement of Kankakee peoples into west Michigan for symbolic and/or sustainable community means.

Temporal Persistence of the Earliest Residential Communities

There is abundant evidence for the temporal persistence of all of the earliest residential communities during the Middle Communities period. The data support the inference that the rate of interaction between separate residential communities increases over time, culminating in vast interaction networks observed during this period. The results from the Hopewell samples, along with the later Middle Woodland Havana samples, in this research contributed significantly to the following interpretations.

Jancarich Residential Community

Interestingly, the recipe, node height, node distance from the top lip, and cordage width employed to construct Havana samples by the Jancarich residential community is applied in the construction of Hopewell samples. Conversely, changes in morphology occurring in Hopewell samples include rim, lip, and body thickness, as well as orifice diameter: Hopewell vessels are simply thinner and smaller than Havana samples. The Jancarich residential community continues through time as evidenced by their participation in mortuary ceremonialism at and the likely construction of the Brooks, Parsons, Palmiteer, and Schumaker mound complexes in the Muskegon valley. For example, in this research, two Hopewell-related samples (Figure 5-19) from the Brooks Mound site were likely manufactured by Jancarich community members. Both appear to have been locally manufactured at the Jancarich site (matching the Jancarich site's most commonly used clay and recipe) before being interred in Mound A (sample #1) and Mound D (sample #2). At the Jancarich site, itself, at least three Hopewell-related samples were made by Jancarich community members.

Figure 5-19: Brooks Mound Sample #1 (center) and Sample #2 (left and right)

Prison Farm Residential Community and use of the Davis Swamp site

The Prison Farm community continued to play an integral (but diminishing) role in the continuing practice and further spread of Havana-Hopewell into west Michigan. Although it is clear that this community persisted throughout the region temporally, it also appears that Prison Farm community signatures decrease in frequency beginning in the Middle Communities period. The reason for this is unclear but I speculate that stronger ties and eventual immersion into the Saginaw valley region of east Michigan could explain this.

Regardless, this section focused on the persistence of this community's diagnostic traits through time. In addition to the presence of Prison Farm diagnostic traits seen at other sites in the study region (see Chapter 6), temporal persistence is supported by a Hopewell Zoned Plain Rocker Stamped vessel at the Prison Farm site that was most likely made by Prison Farm community members (based on recipe, rim and lip thicknesses, and rim and lip shapes that fall within the statistical parameters of the Prison Farm community) with a clay most likely originating from the Grand River valley (based upon natural inclusion types and sand size indices). Concerning Prison Farm residential community (including Davis Swamp and Prison Farm sites) Hopewell samples, there is no discernable change in the recipe of the Prison Farm manufactured Hopewell samples in relation to Havana samples. However, as is the case for the later Havana-related samples, Hopewell samples exhibit smaller/thinner morphological traits compared to the earlier and thicker Havana samples.

Further evidence for the temporal persistence of the Prison Farm community is evident at the Davis Swamp site (Cal A.D. 90 to 260/Cal A.D. 290-320 [Beta 231474]). Davis Swamp is located within the lower Muskegon River valley (see Figure 1-1) and was likely used seasonally by Prison Farm members, perhaps to move closer to Jancarich residential community members for purposes of interaction, the sharing of seasonal territories, and/or to further cement previous sustainable community relationships that have been documented in this dissertation. Based upon results from five Havana-related samples from the Davis Swamp site, the recipe (see Figure 5-8) and the quantitative morphological variables diagnostic of the Prison Farm community appear to be present at the Davis Swamp. In addition to containing extremely similar body/compositional recipe values, temper size indices (TSI) from Davis Swamp (3.59) closely mirror those from Prison Farm (3.5) and Lower Lake 1 (3.45). The use of mafic temper types observed at Prison Farm and Lower Lake 1 is also seen in four of the five Havana-related samples at Davis Swamp.

Relatively thin lips observed at Davis Swamp (6.99 mm) approximate Lower Lake 1 (7.65 mm) and Prison Farm (7.35 mm) values. While Prison Farm contains the largest average body thickness (11.2 mm) in the study region, Davis Swamp (9.98 mm) has the fourth largest and is certainly within the statistical range of the Prison Farm site. Lastly, a high percent of cordmarking, smoothed-over-cordmarking, and noding also characterize the Havana Ware-like samples from Davis Swamp, Prison Farm, and Lower Lake 1. All of these considerations strongly support the inclusion of the Davis Swamp site into the Prison Farm residential community and the relatively later temporal use of the Muskegon River valley by this community.

There is an interesting distinction between the Havana and Hopewell samples from the Davis Swamp site that became apparent, however. None of the five Havana-related Davis Swamp samples provided evidence of any type of interaction occurring with the Jancarich community to the east in the Muskegon valley (Chivis 2012). Of these five samples, none appear to have been made at (different pastes) or by (different body values) inhabitants of the Jancarich residential community; all five were constructed by Prison Farm community members.

In contrast, many Hopewell Ware-related samples at Davis Swamp appear to have been constructed by members of both the Jancarich and Prison Farm communities (four apiece), while two other Hopewell samples were made by Spoonville members. This could indicate the intentional interaction and sharing of Hopewellian ceremonialism and pots amongst these three communities, while the more utilitarian Havana samples were reserved for more mundane and personal uses amongst primarily Prison Farm community peoples.

A relationship between the Spoonville and Prison Farm communities is apparent at the Lower Lake 1 site as well. Two Hopewell samples from the site were examined, one likely manufactured by members of the Prison Farm community, while the other appears to have been an import from the Grand Valley by the Spoonville community.

12MR4 Residential Community and Use of 12MR78 and 12MR115

The 12MR4 community persists through time as evidenced at the 12MR78 and 12MR115 habitation sites, and its recipe is observed at other sites throughout the region as well (see Chapter 6). Although Hopewell vessel morphology (primarily the construction of smaller and thinner vessels) changes in relation to the earlier Havana samples (see Chapter 4), several diagnostic 12MR4 community traits are passed onto 12MR78 and 12MR115 vessels. The most diagnostic trait that is passed on is the unique pyrotechnology of the 12MR4 residential community: slightly active pastes occur in five of six (83.3%) total Hopewell samples from 12MR78 and 12MR115. Recall that the 12MR4 community was the only early Middle Woodland community in the study region with such high percentages of slightly active pastes, with eight of nine total Havana samples (88.9%) containing the trait.

Although Hopewell samples at 12MR78 and 12MR115 contained less percent of sand (15.4% - 22.3% sand) than Havana samples, many other diagnostic 12MR4 community traits are passed on. These include the frequent use of slip on vessels (five of six samples), the lighter colored exterior color of vessels, the application of interior lip notching, the lack of granite temper use as the dominant temper type (most are tempered with grog, limestone, or a combination of both, and one is tempered with sandstone), and temper size (Hopewell temper size is only slightly smaller [3.73] than Havana samples from 12MR4 community sites [4.0], which is partially due to the use of grog and limestone temper (which almost always produce smaller temper size particles in relation to grit temper types).

At 12MR115, four of the five Hopewell samples were found to have been manufactured by the 12MR4 residential community with a Marshall County clay (matching natural inclusion types of Marshall County clays). At 12MR78, the one Hopewell Rim examined was also found to have been manufactured by 12MR4 community members with a Marshall County clay (probably near the site). Interestingly, this sample is nearly identical in recipe, temper type (grog), style, morphology, pyrotechnology, and paste characteristics to one sample at 12MR115 (see Figure A-13 in Appendix A). The two rim samples are so similar that it is entirely possible that they were constructed by the same potter, which provides additional evidence for the inclusion of both of these sites into the 12MR4 residential community and the temporal persistence of this community through time. In addition to expansion of the 12MR4 community at 12MR78 and 12MR115, it becomes apparent that this community expands its interaction networks throughout the region, especially into west Michigan (see Chapter 6 for further discussion), which strongly contrast with Havana samples during the Early Communities period in which zero Havana samples from the 12MR4 community were recovered from sites in west Michigan.

Goodall and Stillwell Residential Community Expansion and Temporal Persistence

Evidence for the continuance of the Goodall and Stillwell communities in the upper-middle Kankakee is reflected by the presence of Stillwell and/or Goodall community diagnostics observed on late Havana and Hopewell pottery samples at the Mud Lake, Stillwell, Goodall, Good's Ford, Brems, and Big Grape Island sites. Thus, it appears that both of these communities continued to use their original upper-middle Kankakee valley "homeland."

However, another important finding in this research was related to the Stillwell and Goodall communities' expansion into adjacent regions, especially 1) into the lower Kankakee River valley and Marshall County; and 2) the use of the Portage-Thornapple Corridor as a relatively new region of interaction between west Michigan and northwest Indiana populations. Regarding the first issue, Mangold and Schurr (2006) point out that sites during the Goodall phase are located mostly in the upper Kankakee valley. During the late Goodall and LaPorte phases, however, there was an expansion of people out of the upper and central Kankakee and into adjacent areas. A movement to the lower Kankakee valley during the Middle and Transitional Communities periods is strongly supported by the data in this research project. Another interesting finding was that this expansion occurred with the simultaneous incorporation of thinner dentate stamping into their decorative repertoires.

Similar to the diminishing number of Prison Farm community samples constructed during this time period, Stillwell residential community samples also appear to decrease through time, especially in west Michigan. For example, Hopewell samples at Stillwell community sites, such as Stillwell and Mud Lake, appear to be predominantly manufactured by Goodall community peoples. Only 1 sample at the Mud Lake site appears to have been locally manufactured by the Stillwell community: all six other Hopewell samples were likely made by Goodall community members. There is an apparent movement of Stillwell peoples into the lower Kankakee and Marshall County, however. Regarding the Marshall County region, vessels manufactured by Stillwell community peoples are significantly more prevalent than they are for the Goodall community (see below).

Although there are Stillwell community manufactured vessels present in the upper and lower Kankakee, it is unclear whether the Goodall and Stillwell communities merged during this time to form a unified community or simply traveled together and simultaneously occupied the same sites or adjacent sites in the lower Kankakee. At the Schoon, Watson, Schissler and Newton County habitation sites, for example, the overwhelming presence of pottery samples manufactured by members of both of these communities suggests the potential merger of these two communities or the cohabitation of site locales. Other lower Kankakee sites exhibit evidence of one or the other community. Wunderink and Harper have a stronger Stillwell community presence for example, while the Yahl habitation site is more Goodall community in character. The close proximity of all of these lower Kankakee sites to one another, at the very least, points to the mutual sharing of this region by both of these communities and brings to mind the need to practice the network and informational mobility types discussed by Whallon (2006). The following is a more detailed discussion of these findings.

Lower Kankakee Sites with Both Stillwell and Goodall Residential Community Signatures

Newton County
(habitation, Middle Communities period)(n = 11: 8 Havana + 3 Hopewell samples)

Eight Havana-related samples were studied from the Newton County region. Although the exact location of the site is unknown, it is likely that they originate from the Willow Slough State Fish and Game Area (Mangold, personal communication 2013). Five Havana samples and one Hopewell sample were determined to have been manufactured by Goodall community members with a lower Kankakee site clay, while one Havana sample was also made by Goodall members but with an unidentified clay.

The presence of the Stillwell community is evident in two Havana samples, one made with lower Kankakee clay and the other with an unusually silty Kankakee clay. Again, it is possible that members of these two separate communities were traveling together and/or merging into one community. At the very least, the sharing of information was likely occurring between these communities and it is certainly possible that they were coordinating the seasonal use of this region. Lastly, two Hopewell samples likely represent imports from outside the study region, containing unknown paste and body combinations. It is likely that they were manufactured by an unknown community from outside the study area or by the Amey residential community that appears to have emerged during the Transitional Communities period.

Watson site
(habitation, Middle and Transitional Communities periods) (n = 7 Havana samples)

Seven total Havana samples were studied from this site. Similar to the Schoon and Newton County sites, the Watson site exhibits evidence of site-use by both the Stillwell and Goodall communities. Five samples were likely manufactured by individuals from the Goodall residential community. None are imports: they all were probably made at or near the Watson site with lower Kankakee valley clays. One sample, an interior-exterior dentate stamped rim, was tempered with sub-arkose sandstone and granite temper. The only other sub-arkose tempered sample in this research was recovered from the Rock Hearth site and was found to have been probably manufactured by the Goodall community as well. Other interior-exterior samples from the Moccasin Bluff and Newton County sites were all found to have likely been manufactured by the Goodall community.

Only one sample from the site appear to have been manufactured by the Stillwell community. This was probably made with a lower Kankakee clay near the site. One somewhat unexpected result was the presence of one sample at Watson that was likely an import from the 12MR4 residential community. The body thickness (9.65 mm) of this sample nearly matches the 12MR4 site mean body thickness (9.51 mm), while the paste and body values mirror those seen from the 12MR4 site.

Schissler site
(habitation, Middle Communities period) (n = 2: 1 Havana + 1 Hopewell sample)

Similar to the Yahl site, the Schissler site also likely represents a Goodall and Stillwell residential community shared location in LaPorte County for the purposes of visitation and/or as part of a seasonal round. One Havana Zoned body sherd was examined in this research. Although the clay is unusually silty, it contains no ARF’s and includes epidote and biotite in the paste, which suggests a lower Kankakee origin. The recipe matches that of the Goodall community with a lower Kankakee valley clay.

This sample also has a very thick zone line (8.2 mm), which is a decorative trait that is a lot more common in the Kankakee rather than in west Michigan. It is also very thick (11.2 mm). Both the zone line and body thickness suggests an early use of this site region, perhaps as early as the late Stillwell or early Goodall phase. It is included in the Middle Communities section because it likely represents one of the earliest uses of this region by this community and could have portended the subsequent travel and interaction in the lower Kankakee valley by the Goodall community. Thus, this sample provides evidence for the earliest known Middle Woodland use of the lower Kankakee by the Goodall community.

A slightly later temporal use of this site locale by the Stillwell community is evidenced by one Hopewell Zoned Plain Rocker Stamped and Punctated (circular) rim. The recipe matches that of the Stillwell residential community and the lip thickness of 4.83 mm is very similar to the Stillwell site mean of 4.7 mm. The clay appears to have originated from the Kankakee valley, containing sandstone in its paste which is only observed in the Kankakee valley and at the 12MR115 site. However, the presence of other natural inclusions, primarily muscovite, quartzite, and hornblende, suggest a more likely Kankakee origin (rather than Marshall County).

Lower Kankakee Sites with Stillwell Residential Community Signatures

Wunderink site
(seasonal encampment, Middle Communities period) (n = 1 Havana sample)

One Naples Dentate Stamped rim was available for study from this site (Figure 5-20). The dentate width (1.2 mm) is characteristically thin for this time period. The paste for this sample is very much like those in the upper Kankakee valley, minus the lack of ARF's. Epidote in the paste supports, at a minimum, a Kankakee origin for the clay. The body values firmly support this sample's placement in the Stillwell community, containing 37.4% temper and 3.8% sand. It is tempered with granodiorite, which is most common in the Kankakee and has a temper size index of 3.7, which is almost identical to the Stillwell site's mean of 3.68. Rim thickness (9.65 mm) is very similar to the means from the Stillwell (9.8 mm) and Mud Lake (9.95 mm) sites.

Considering the available evidence, it is likely that this sample represents an import from the Stillwell community in the upper Kankakee. As such, this site probably was used by this community as part of their seasonal round and/or as a strategic location intended to interact and visit (i.e., network mobility) with the Goodall and/or other communities located further west.

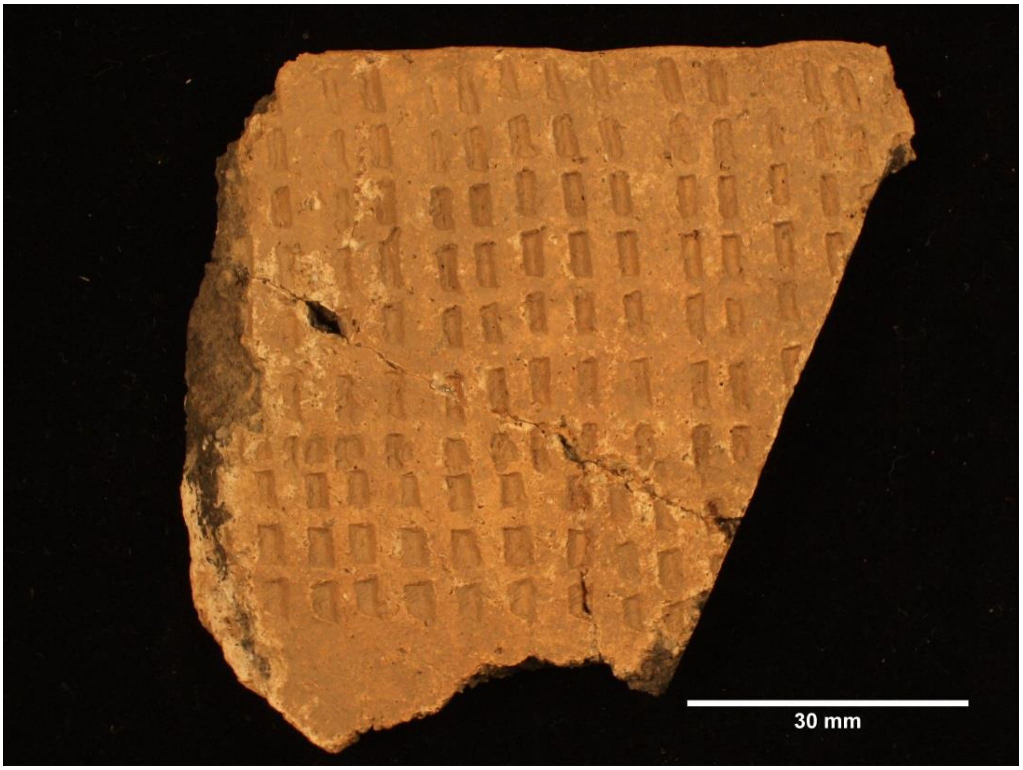


Figure 5-20: Sample #1, Wunderink site

Harper site
(habitation, Middle and Transitional Communities periods) (n = 2 Havana samples)

The Harper site is very closely located to the Wunderink site and the results support a similar function for this site: the strategic use of this region for participation in regional interaction networks with the Goodall and/or other more westerly located peoples or as part of their seasonal round. Two Naples Dentate Stamped samples, with thin dentate stamping widths (0.4 and 0.9 mm), were examined. Both of these match the body values of the Stillwell community, are granodiorite tempered, and have a large temper size index (3.7 and 3.8) that matches the mean Stillwell site TSI (3.68). The clay types of both, meanwhile, are almost identical and match the paste values of the upper Kankakee Stillwell and/or Goodall community, and also include epidote and muscovite in their pastes (Kankakee clay diagnostics). Based upon the preponderance of the evidence, a similar conclusion to the Wunderink site is attained: both of the Harper site samples likely represent imports from the Stillwell community.

Lower Kankakee Sites with Goodall Residential Community Signatures

Yahl site
(habitation, Middle Communities period) (n = 1 Havana sample)

One Havana Cordwrapped Stick rim containing a beveled interior lip was examined from the Yahl site. This was determined to have likely been manufactured by Goodall community individuals with a silty clay likely near the Yahl site. The lack of ARF's, the presence of epidote and quartzite in its paste, and the relatively large sand size index (2.0) that is characteristic of lower Kankakee clays (see Chapter 4) supports a lower Kankakee origin. Meanwhile, the body values (23.1% temper, 5.9% sand) fall within the range of the Goodall community. The vertical rim and beveled interior lip combination is more common at the Good's Ford site (a Goodall community site) than at both the Stillwell and Mud Lake sites. The rim and lip thickness (10.95 mm and 10.07 mm) is more similar to Stillwell and Mud Lake sites but does fall within the statistical range of the Goodall and Good's Ford sites. The above evidence strongly supports a Goodall community origin for this sample, which could suggest that this site was used by these people as part of their seasonal round and/or for visitation purposes with other communities.

Continued Use and Expansion into Marshall County by the Stillwell Residential Community

Beginning with the Stillwell community's earlier use of the Marshall County region at 12MR217, a similar but later temporal use of this region appears to have continued at 12MR162 and 12MR10 (Figure 5-21). A shared sustainable and symbolic community between Stillwell and 12MR4 communities is discussed in Chapter 6, providing an impetus for the Stillwell community to inhabit sites near the 12MR4 community. Interestingly, there are no sites in Marshall County that appear to have been occupied predominately by the Goodall community like there were for the Stillwell community (at 12MR10, 12MR162, 12MR217). There are only two Goodall community imports present at Marshall County sites at the very early 12MR4 site (see above).

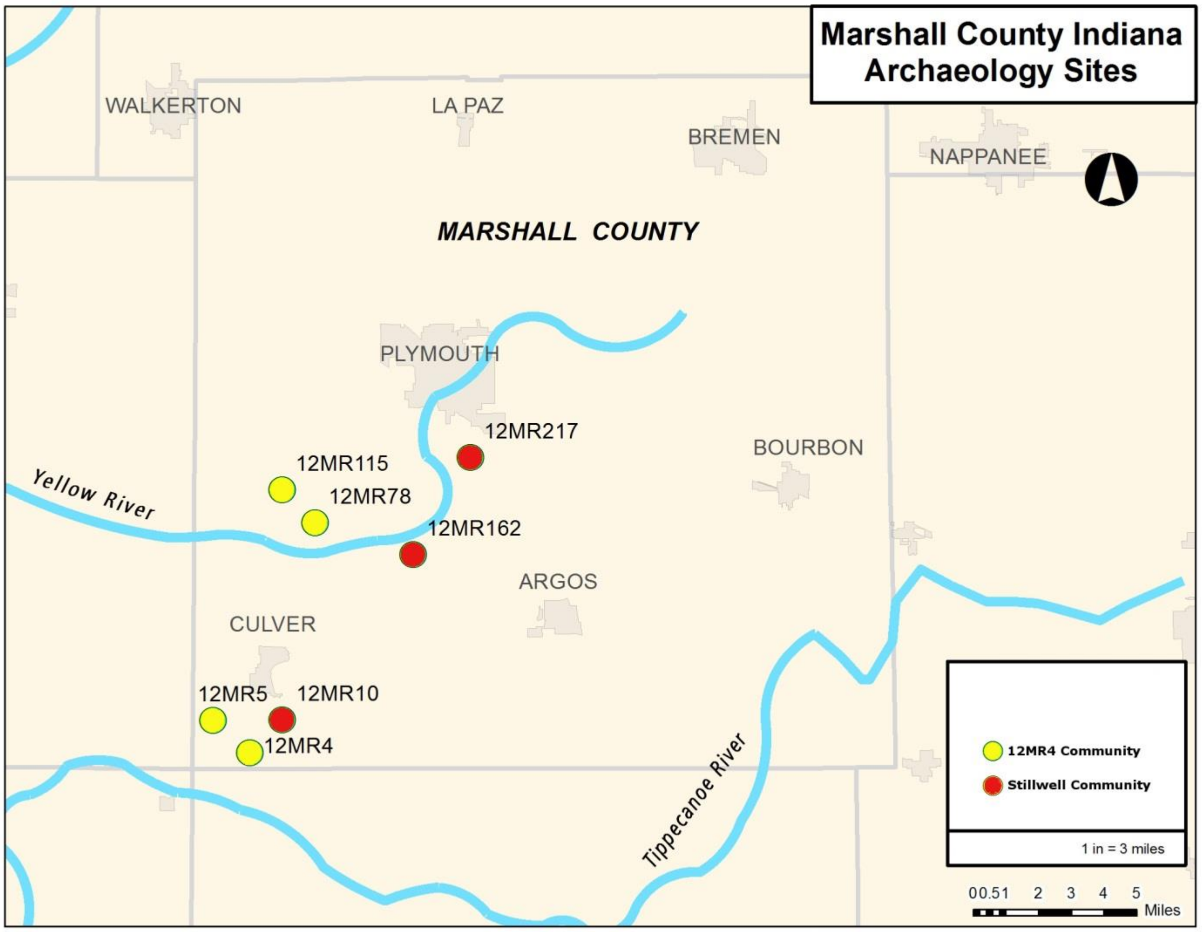


Figure 5-21: Stillwell Residential Community-Affiliated Sites vs. 12MR4 Residential Community Sites in Marshall County, Indiana

12MR162 site
(seasonal encampment, Middle Communities period) (n = 1 Havana sample)

One Naples Zoned Dentate Stamped sherd was examined from 12MR162. Again, there appears to have been a change in style and morphology at this time, which is supported by the overall smaller morphological and stylistic variables characteristic of samples from later time periods. The dentate width of this sample is only 0.6 mm, which is expected from later Middle Woodland pottery vessels (Mangold 1981). Although body thickness (7.4 mm) is barely within the statistical range of the Stillwell community, this sample contains a very thick zone line (6.8 mm) that is common in the upper Kankakee region. Furthermore, the characteristic upper Kankakee paste values present in this sample and the presence of ARF's and biotite in the paste strongly support an upper Kankakee origin. Since the body values (33% temper and 4.6% sand) fit comfortably within the Stillwell community body values, it is relatively safe to assume that this sample was imported directly from the Stillwell community heartland in the upper Kankakee. The use of this site was likely short-term and for logistical and/or visitation purposes and fits well within the proposed expansion of this community into Marshall County and the lower Kankakee.

12MR10 site
(seasonal encampment, Middle Communities period) (n = 2 Hopewell samples)

Another site that fits within this expansionist model is the 12MR10 site, which provided two Hopewell samples (Hopewell thin Dentate and Hopewell Plain sherds) available for study. Both of these were found to have been manufactured by the Stillwell community with a Marshall County clay. Again, the use of the Marshall County region by the Stillwell community is supported by the results from 12MR10. 12MR10 and 12MR162 both provide evidence of the cooperation and nearby occupation of sites within this region by both the Stillwell and 12MR4 residential communities.

Portage-Thornapple Corridor Utilization

As described above, evidence for the earliest Middle Woodland travel into west Michigan supports the use of the Lake Michigan eastern shoreline and, presumably, the subsequent use of the major river valleys to penetrate the interior portions of west Michigan or the inland use of the Moccasin Bluff/Hart/Swan Creek sites. This region appears to have been used during the Middle Communities period as well, as evidenced at the Behner and Bobinski sites in the Galien River valley. Two samples, one sample apiece from Bobinski and Behner, both appear to have been imports from the Kankakee and were manufactured by the Goodall residential community (i.e., possessing Goodall community recipe and Kankakee clay parameters).

In addition to this more westerly region, an additional interior portion of Michigan appears to have become an important interaction and/or buffer zone through time. Garland and DesJardins (2006) demonstrate that the Portage-Thornapple Corridor region (Figure 5-22) was an important location for exchange and interaction between west Michigan, Kankakee, and likely Ohio-derived peoples. The location of this movement and interaction centered on the use of the Strobel, Eccles, and Simpson, Schilling, and Dieffenderfer sites (among others) within the Portage-Thornapple Corridor which very well could have been "the locus of the most intensive interaction during the Middle Woodland" (Garland and DesJardins 2006: 257) in the study region.

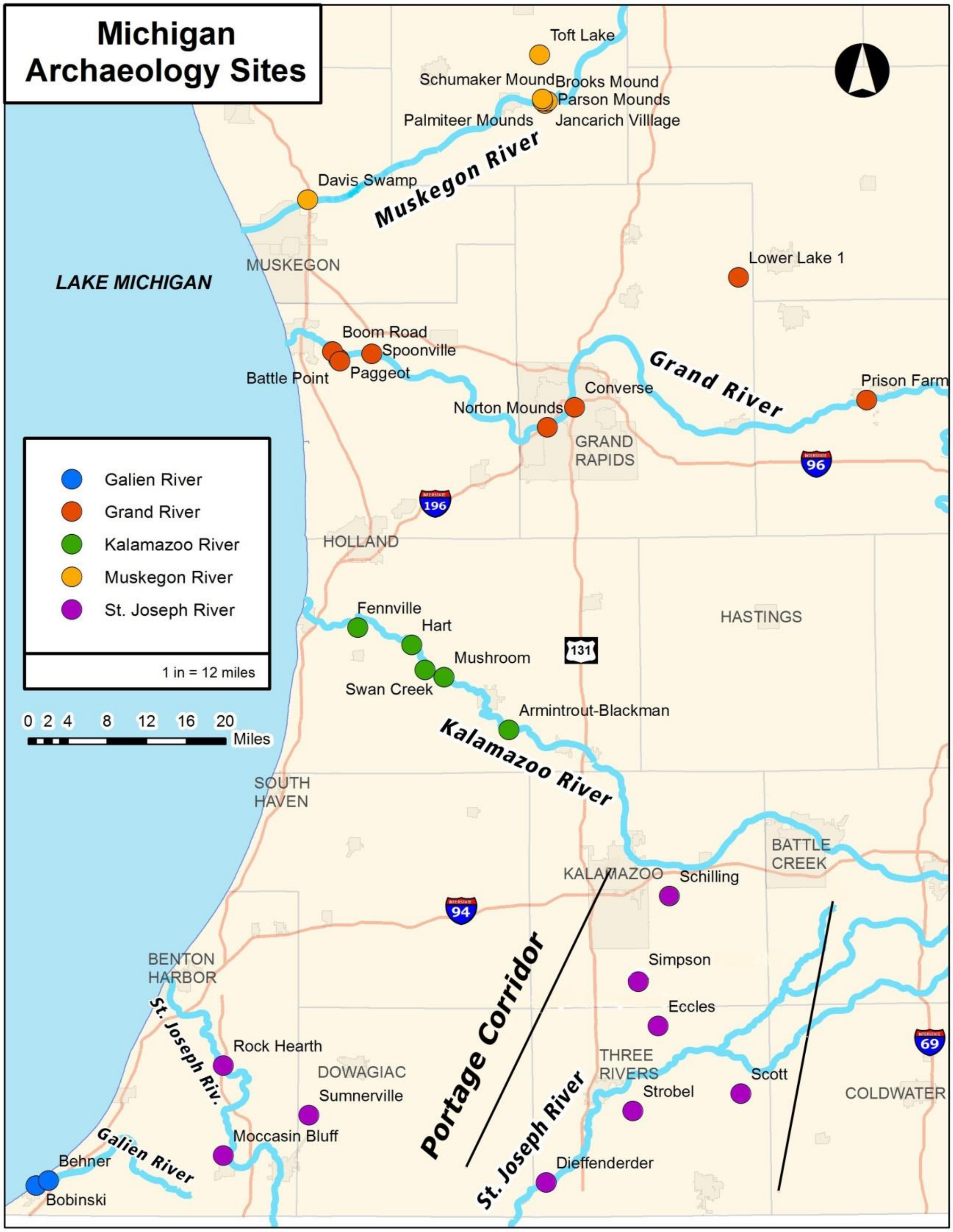


Figure 5-22: Portage-Thornapple Corridor

The results of this research strongly support this hypothesis, but a more precise definition of the temporal use of this region is proposed. Specifically, it is suggested that this region became popular *after* the initial use of the eastern Lake Michigan shoreline region by Kankakee peoples. Also, this movement into west Michigan may have begun in the lower St. Joseph valley near the Moccasin Bluff region for Kankakee peoples before a corresponding move into the Portage-Thornapple Corridor. The use of this corridor correlates to the time period in which Kankakee peoples were expanding out of the upper and central Kankakee, were manufacturing Hopewell Series vessels, and were applying thinner dentate stamping motifs on their Havana and Hopewell vessels. This thin dentate stamping is seen at various sites within the Portage-Thornapple Corridor, as illustrated in the discussion to follow. Additionally, within the Portage-Thornapple Corridor region, there is evidence for more frequent movement north by Kankakee (and probably Ohio) peoples and pots rather than southward bound travel by west Michigan peoples.

Lastly, although this study did not include Ohio samples, it is tantalizing to envision the movement of Ohio-related peoples through this region as well, which could have led to the subsequent fluorescence of Havana-Hopewell participation and adoption, as seen at the Converse site and throughout west Michigan. This certainly constitutes an important future research topic. Despite the lack of ceramic samples from Ohio in this research, other lines of evidence, primarily lithic evidence and ceramic evidence from other projects, certainly support a relatively strong Ohio Hopewell influence (Beld 1993b: 7-8; Brashler 2003; Brashler, Laidler, and Martin 1998: 175; Garland and DesJardins 2006). Below, the results from Portage-Thornapple Corridor sites are described.

Strobel site
(seasonal encampment, Middle Communities period) (n = 5 Havana samples)

Five Havana-related body sherds were sampled from the Strobel site, which exhibited remarkably uniform paste and body values (Figures 5-23 and 5-24). Based upon these data, it was fairly clear that all five were likely manufactured by the Goodall residential community. Although the percent temper of three of these border both the Stillwell and Goodall body values, the mean thin dentate width (1.3 mm), body thickness (8.79 mm), and cord width (0.3 mm) are more characteristic of the Goodall community. The presence of muscovite and hornblende in the paste of these samples suggest either a Kankakee or St. Joseph valley clay origin, while the paste (Figure 5-23) strongly suggests a Kankakee origin. Thus, it is most likely that these samples were imports from the upper Kankakee (i.e., made with upper Kankakee clay), suggesting the actual movement of Goodall people and pots into the Portage-Thornapple Corridor.

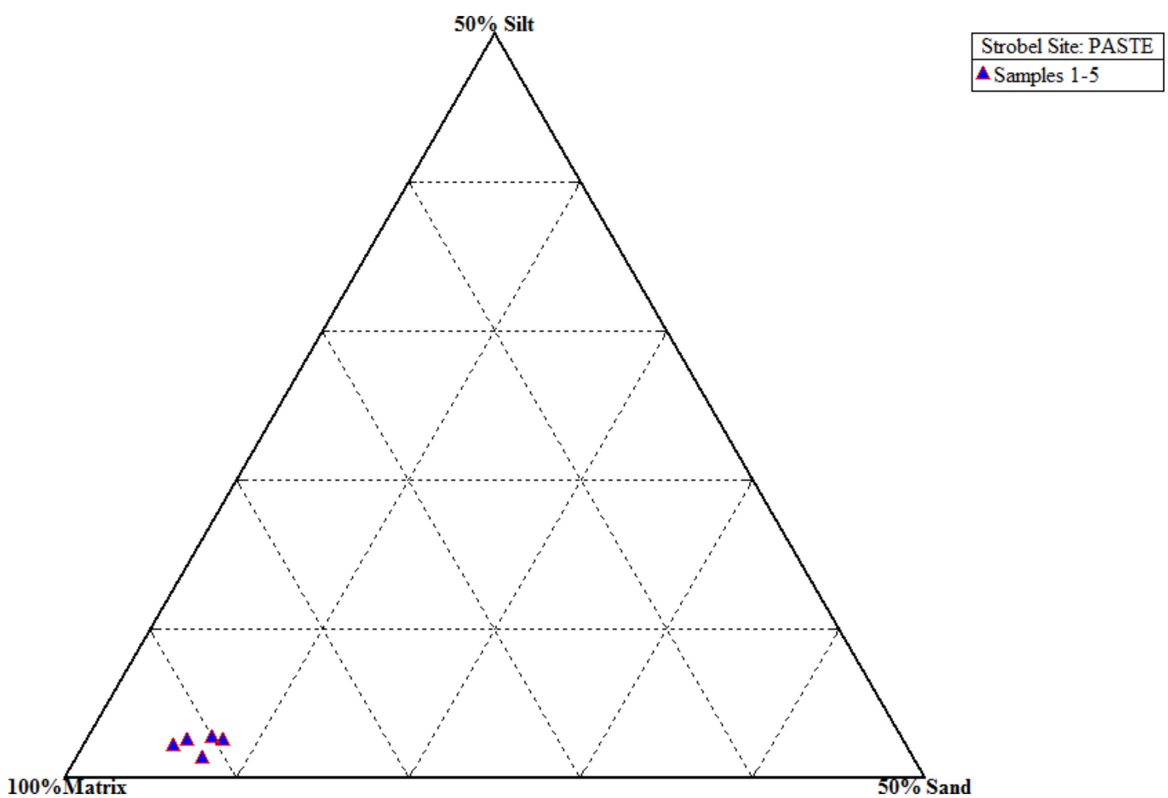


Figure 5-23: Strobel Site Paste

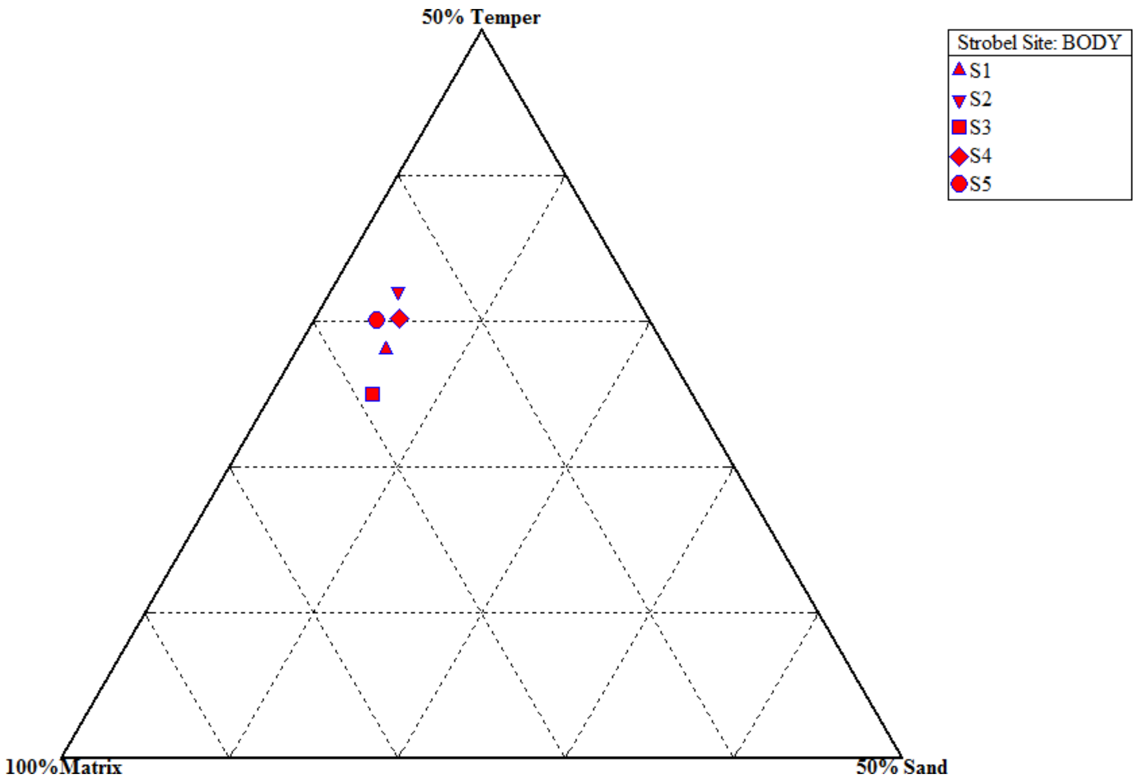


Figure 5-24: Strobel Site Body

Eccles site
(habitation, Middle Communities period) (n = 4 Havana samples)

Four Havana samples from the Eccles site were examined and all four suggest a Goodall community origin. Three are likely imports from the Goodall community itself, having the presence of ARF's, as well as the characteristic paste and body values of this community. The thin rim, lip, and body thicknesses (6.2 mm, 4.5 mm, 6.58 – 7.73 mm, respectively) supports the later temporal placement of these samples. In fact, the site has the thinnest average Havana sample body thickness (7.2 mm) of any site in the study region. In contrast, two dentate stamped samples from the site contain unusually thick dentate stamps (2.7 mm) for this time period. This thick dentate width is most similar to the means from Kankakee or Kankakee-affiliated sites, such as Swan Creek (3.1 mm), Hart (2.8 mm), Big Grape Island (2.7 mm), or Goodall (2.3 mm).

This actually lends further support for the Eccles samples' designation as Goodall community-made.

Lastly, one sample was likely made with a clay from the Grand River valley, based upon the paste parameters of this sample and the presence of pyroxene in its paste. Although the percent temper is similar to both Goodall and Prison Farm communities, the most likely creators of this vessel originated from within the Goodall community. This is based upon the thin body (7.73 mm) of this sample, which is unlike the means of either the Prison Farm (11.2 mm) or Davis Swamp (10.0 mm) sites. The body thickness does, however, fall within the statistical range of both the Goodall and Good's Ford sites. Therefore, it is tentatively suggested that this vessel was manufactured by Goodall community people who traveled into the Grand valley and used the clay in that region.

Simpson site
(habitation, Middle Communities period) (n = 7 Havana samples)

Unlike the Strobel and Eccles sites, the Simpson site results were difficult to assess and place within an easily understood context. There is a lot of variability present in the paste (Figure 5-25) and body values of the seven total samples examined from the site. Additionally, the samples that did appear to match the paste and/or body of one specific community did not match the morphological or stylistic parameters of that community. This lack of correspondence between petrographic, morphological, and stylistic variables is extremely rare in this research. In fact, it is not present at any other site in the study region (except at the Dieffenderfer site, another Portage Corridor site; see below), a fact which adds further uncertainty to these site's results.

Needless to say, this lack of correlation could perhaps suggest that these samples were manufactured by peoples from outside the study region. Samples are also characterized by a relatively small mean temper size index of 3.16, which is more like Hopewell Ware samples and suggests a relatively late temporal placement of these samples, probably falling within the late Middle Communities or perhaps early Transitional Communities period (middle to late Converse phase in west Michigan or the early LaPorte phase in Indiana).

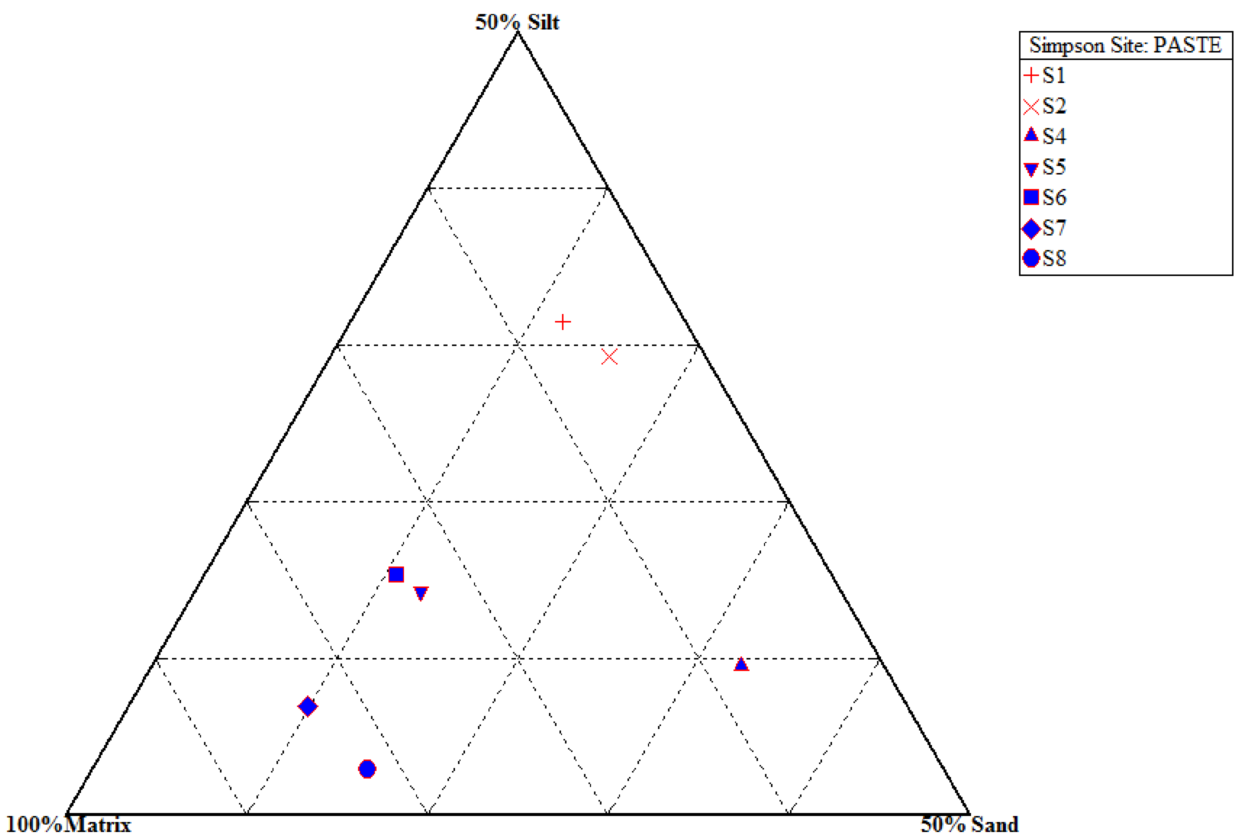


Figure 5-25: Simpson site: Paste

With this in mind, it is best to discuss individual samples based upon the three separate paste groupings at the site (Figure 5-25). Group 1 consists of sample #'s 1 and 2, group 2 consists of sample #'s 5 and 6, and group 3 consists of sample #'s 7 and 8. Group 1 is characterized by very silty clays (31.5% and 29.3%) unlike any other paste (Havana or Hopewell) grouping in the research project. The paste also contains an extremely odd and densely packed combination of natural inclusions, including potassium feldspar, microcline feldspar, plagioclase feldspar, muscovite, epidote, quartzite, rhyolite, sericite, rutile, and hornblende. Although epidote and perhaps quartzite suggest a potential Kankakee or Marshall County origin, other minerals (e.g., muscovite, quartzite, rhyolite, rutile, and hornblende) point towards a clay type characteristic of either the immediate vicinity of the Simpson site or outside the study region.

Contributing to the atypical nature of these two samples is the fact that both reflect the use of different recipes, one more Prison Farm-like and the other more Jancarich/Spoonville-like. Despite this, both contain dentate stamping that is 0.8 mm thick, which is more similar to the means of Kankakee valley or Marshall County sites. Additionally, both samples possess a thicker lip than rim, which is another common Kankakee trait. Both have vertical rim profiles and flat lips, which is rare at Prison Farm (n = 1). Meanwhile, rim and lip thickness for both samples generally are more similar to Kankakee or Kankakee-affiliated sites. Therefore, although the body values for one are most like Jancarich/Spoonville communities and the other is more like Prison Farm community values, all of the other pertinent variables strongly suggest a Kankakee origin rather than a west Michigan one. This is a problematic conclusion that requires additional testing in the future but one that certainly leaves open the possibility of people from outside the study region traveling through this site's region.

Group 2, consisting of sample #'s 5 and 6, contain the same paste and body values. While the body matches that of the Jancarich or Spoonville communities, the paste is somewhat similar to more silty samples in the lower St. Joseph valley region, such as those seen at Sumnerville, Rock Heart, Behner, and Moccasin Bluff. The combination of chert, hornblende, and quartzite in the paste seems to support this designation. Thus, it is likely that these were manufactured by either Jancarich or Spoonville community members in the lower St. Joseph valley before their deposit at the Simpson site. This is also a potentially problematic conclusion due to these sample's thin bodies (7.1 mm and 7.6 mm, respectively), which are most similar to the means for the primarily non-Jancarich or Spoonville community sites, such as the Eccles (7.15 mm), 12MR162 (7.22 mm), Big Grape Island (12JS3) and Sand Creek (7.45 mm), and Lower Lake 1 (7.66 mm) sites.

The group 3 paste group, including sample #'s 7 and 8, provides perhaps the most reliable conclusions. Sample #7 appears to have been made by Goodall community individuals with a clay from the lower St. Joseph valley. Multiple lines of evidence support this. The paste, especially the percent silt, aligns most closely with those Havana clays observed in the lower St. Joseph basin, such as Rock Hearth, Behner, or Moccasin Bluff. Especially pertinent here is the inclusion of natural minerals such as chert, hornblende, rhyolite, and perthite, the latter of which is characteristic of the Moccasin Bluff/Rock Hearth region. Meanwhile, the percent temper (24.3%) is most like Goodall or Prison Farm values, but other variables strongly support a Goodall designation. Specifically, it is tempered with quartz arenite sandstone, which is only seen at the Moccasin Bluff, Hart, Goodall, and Brems sites, all of which are affiliated with the Goodall community. Additionally, the body thickness of 7.9 mm is well within the statistical ranges of both the Goodall and Good's Ford sites but not Prison Farm or Davis Swamp. Considering the available data, this sample was likely made by Goodall community people with lower St. Joseph valley clay and transported to the Simpson site. Along with sample #'s 5 and 6 above, this points toward a Kankakee-derived origin that potentially began in the lower St. Joseph valley before a corresponding movement into the Portage-Thornapple Corridor.

Sample #8 contained chert, hornblende, and quartzite in its paste, a combination which supports a Kalamazoo or St. Joseph valley origin. The paste composition illustrated in the ternary diagram above, on the other hand, supports a Grand or Kalamazoo valley origin. The percent temper included in this sample (12.2%) falls just under the range of the Prison Farm community and falls within the range of both the Spoonville and Jancarich communities. A 9.53 mm body thickness for this sample is most similar to the mean Spoonville value of 9.8 mm but is within the statistical range of both the Prison Farm and Jancarich ranges as well. Excluding the possibility of an Ohio-derived population at this time, it is safe to assume that this vessel was made by 1) either a Grand valley community (i.e., Spoonville or Prison Farm) or Muskegon valley (i.e., Jancarich) community with 2) either a Kalamazoo or St. Joseph clay. Regardless of the specific situation, this sample likely provides evidence of a west Michigan community traveling into the Portage Corridor, an occurrence that was not observed at either the Eccles or Strobel sites.

Lastly, sample #4's paste contains a high percent of sand that is only characteristic of the Marshall County region. However, the presence of pyroxene points towards a Grand valley origin while hornblende suggests a Kalamazoo or St. Joseph origin. Further, this sample contains a metamorphic quartzite natural inclusion as well, which was the only occurrence of this type observed in this research. The recipe is most similar to the 12MR5 site but the body thickness (10.1 mm) is similar to 12MR4's mean of 10.56 mm. Thus, we can speculate that this sample was made by the 12MR4 community somewhere south of the Grand valley.

Although the results from this site are a bit confounding, there are several broad conclusions we can draw from the Simpson site results. First, it is likely that the Goodall community utilized this site, as evidenced by sample # 7, but also perhaps sample #'s 1 and 2. Second, a Muskegon or Grand valley community signature is present at the site, as evidenced by sample #8. Third, 12MR4 community members likely also used this site, as evidenced by sample #4, providing a connection to peoples in west Michigan for this community. Fourth, sample #'s 5 and 6 suggest that people from either the Jancarich or Spoonville community traveled through this region. Fifth, three samples point towards a potential mobility pattern used exclusively by Kankakee peoples, one specifically beginning in the lower St. Joseph valley before a secondary movement into the Portage-Thornapple Corridor. Last of all, the striking lack of agreement between the petrographic, morphological, and stylistic variables in this rare case leaves open the very real possibility of an influence from outside the study region. Taken together, evidence for an increased intensity in travel and interaction at this site is in full agreement with the Eccles and Strobel site results, which point towards the likelihood of the later temporal use of the Portage-Thornapple Corridor region for the continued spread of Havana-Hopewell information, technology, and style into west Michigan. Although a couple samples from Simpson could have been manufactured by west Michigan peoples, there appears to have been more northward movement by Kankakee (and other?) peoples or pots than southward movement by west Michigan peoples or pots in this region.

Schilling site
(habitation, Middle and Transitional Communities periods) (n = 1 Hopewell sample)

One Hopewell Plain Rocker Stamped vessel (Figure A-8 in Appendix A) from the Schilling site closely resembles Ohio Hopewell Wares and was included for study in this research. This vessel is relatively thin (6.05 mm rim thickness and 3.8 mm lip thickness) and contains plain vertical rows of rocker stamping, which produces what has been referred to as a "herringbone pattern" on the exterior surface (Garland and DesJardins 2006). The results from this sample suggest that it could have been a Goodall community import (i.e., manufactured by Goodall community members with a Kankakee clay type). The recipe and morphological traits fit comfortably within the diagnostic Goodall community Hopewell samples. If this is a Goodall import, then it may represent a copy that was made by these peoples receiving stylistic influences from Ohio Hopewell peoples. Similar to the Simpson site above, however, I cannot rule out the manufacture of this vessel by an outside community. With extant evidence of Ohio Hopewell traits present in this region (Garland and DesJardins 2006), Ohio Hopewell influence and/or movement seems very possible.

Dieffenderfer site
(habitation, Middle and Transitional Communities periods) (n = 5 Hopewell samples)

Similar to the Simpson site results, there is a lack of correspondence between petrographic, morphological, and stylistic variables at the Dieffenderfer site. For example, sample #1, a Hopewell Incised and Punctated rim sherd with a decorative design resembling the "flying bird" motif common in Ohio contained a rare combination of recipe, rim shape, and vessel morphology that did not match any identified residential community. In fact, there is such an alarming lack of correspondence between the variables for all five samples that I do not feel comfortable assigning any of these five Hopewell samples to any of the residential communities in this research. I believe the probability is high that each of these five samples was likely constructed by peoples from outside of the study region, perhaps Ohio populations. Unfortunately, this cannot be substantiated at the time due to a lack of Ohio samples in this research. Nevertheless, it presents an intriguing possibility that requires future investigation.

TRANSITIONAL COMMUNITIES PERIOD: RESIDENTIAL COMMUNITIES

The decline and eventual dissolution of the Havana-Hopewell Middle Woodland phenomenon is not well known in the study region. This research does not attempt to resolve this issue since it focuses primarily upon its inception and change through time. Thus, this section describes the trends that become evident during the waning part of the Transitional communities period (Table 5-4). Specifically, the introduction of one final residential community in the study region (Figure 5-26), the continued use of the lower Kankakee valley by the Goodall and Stillwell residential communities, and the use of the Mushroom and Fennville sites by the Spoonville residential community is discussed.

Residential Community Name	Sites in each Residential Community
1) Jancarich	Jancarich, Toft Lake, Sand Creek
2) Prison Farm	Prison Farm, Davis Swamp, Lower Lake 1
3) Stillwell	Stillwell, Mud Lake, 12MR217, 12MR162, Harper, Wunderink, Watson, Newton County; *Schoon*
4) Goodall	Goodall, Good's Ford, Brems, 12ST8, Lefty's Coho Landing, 12JS3, Strobel, Eccles, Simpson, Yahl, Schissler, Watson, Newton County; *Schoon*
5) 12MR4	12MR4, 12MR5
6) Spoonville	Spoonville, Battle Point, Boom Road, Armintrout-Blackman, *Mushroom, Fennville*
7) Amey	***Amey***

Table 5-4: Residential Community Definition during Transitional Communities Period (***bold-italics*** denote a new community, while new sites providing evidence of previous community persistence are *italicized*) (sites already discussed are not italicized for sake of brevity)

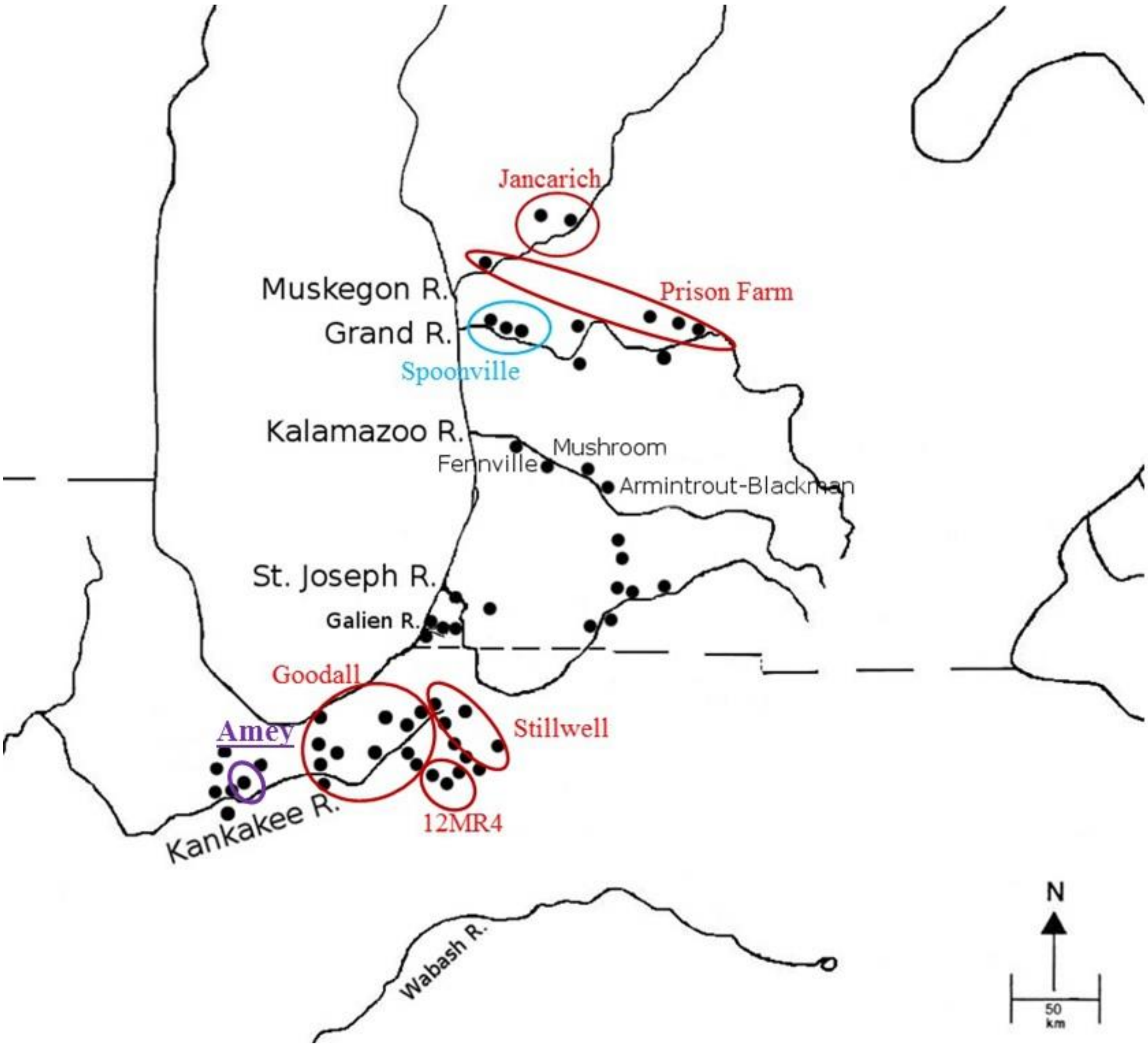


Figure 5-26: Residential Communities and Ancillary Sites Observed during Transitional Communities Period

Residential Community #7: Amey Residential Community Development

Amey site
(habitation, Transitional Communities period) (n = 5)

One Hopewell and five Havana-related samples were examined from the Amey site (Figure 5-26). A unique paste and body at the site (Figures 5-27 and 5-28) was identified, providing justification for defining Amey as a new and distinct residential community. Paste values for the most commonly used clay at the Amey site consisted of 3.1% - 3.5% silt and 4.5%

- 4.9% sand. The natural inclusions common in this clay consists of a combination of potassium feldspar, microcline feldspar, plagioclase feldspar, chert, and hornblende. Four of five (80%) Havana samples from the site contained ARF's as well. A sand size index of 1.5 for the Havana samples and 2.5 for the one Hopewell sample generally falls within the relatively larger mean SSI's of other lower Kankakee sites, such as Newton County (1.53 for Havana and 2.0 for Hopewell samples), Schoon (1.54 for Havana and 1.6 for Hopewell samples), or Watson (1.64).

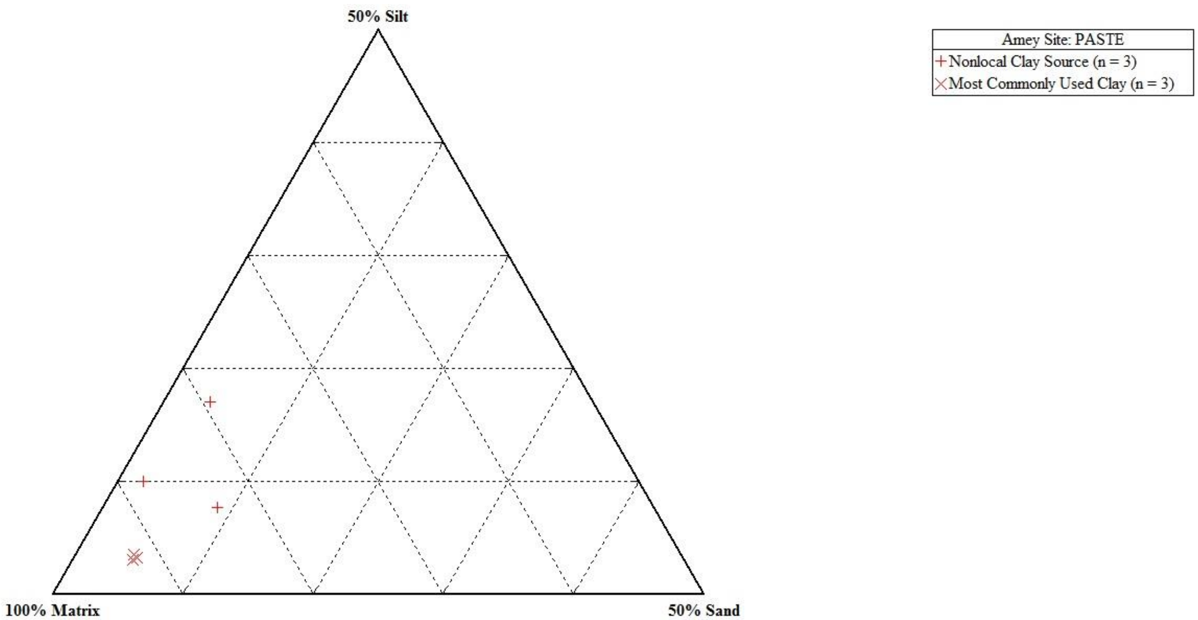


Figure 5-27: Amey Site Paste

Figure 5-27 illustrates that the three exotic clay types (i.e., not matching the most commonly used clay) at Amey contain a comparatively excessive amount of silt (7.7 %, 10%, and 17%, respectively) and contain natural inclusion types (e.g., epidote, muscovite, quartzite) that contrast significantly with the most commonly used clay. The presence of epidote strongly suggests the use of a clay from an unknown locality within the Kankakee basin. Interestingly, the three samples (two Havana and one Hopewell) that contain the exotic clay type were determined to have been created by Amey site residents (i.e., local recipe), which likely suggests the use of multiple types of clays in multiple regions by these peoples.

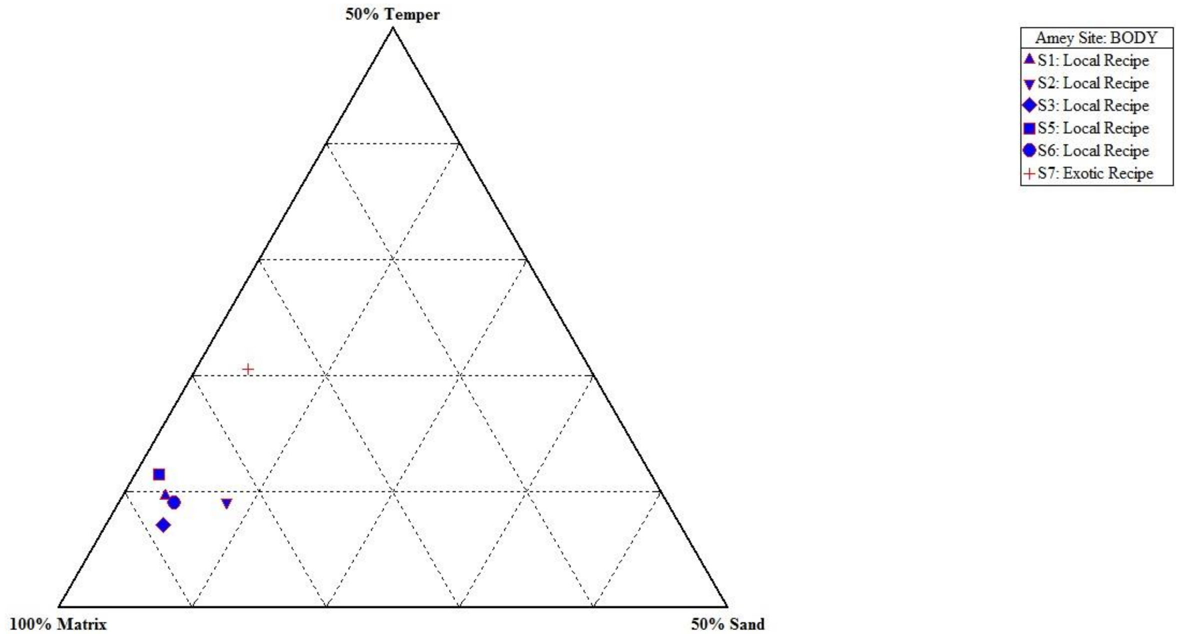


Figure 5-28: Amey Site Body/Recipe
("S1" in Key = Sample #1, etc.)

The ternary diagram portraying the local body or recipe of the Amey residential community (Figure 5-28) illustrates that the percent temper of these vessels range from 7.1% to 11.5% while the percent sand spans from 1.8% to 8%. As can be seen, five of the six total samples contained the recipe of the Amey community and were thus made by the Amey community. Sample #'s 3 and 6 were made at the Amey site by Amey community peoples. As discussed in the previous paragraph, the other three Amey-manufactured samples (S1, S2, S5) were made with an unknown and silty clay likely originating from the Kankakee valley.

The five samples containing a local Amey recipe (S1, 2, 3, 5, 6) were tempered with gabbro and granite (n =2), diorite (n = 1), and granodiorite (n=1), while the Hopewell sample was tempered with grog. The only sample that contained an exotic recipe (S7) was also the only sample that was completely tempered with only granite. Sample #7, a Naples Dentate Stamped sherd, matched the body values of the Goodall community and was made with the Amey site's most commonly used clay type. This suggests the probable movement of Goodall community individuals to the Amey site locale likely for various interaction purposes with the Amey community (discussed further in Chapter 6). This type of interaction could have occurred when the Goodall and Stillwell communities at this time were utilizing the lower Kankakee valley at nearby sites such as the Yahl, Schissler, Harper, Watson, Wunderink, Newton County sites, as well as Schoon (described below).

As a whole, the local body values for this site are within the range of both the Jancarich and Spoonville communities, suggesting the possibility of a migration or fission from one of these two communities into the lower Kankakee. Although I cannot completely rule out this possibility, the stylistic and morphological variables are certainly more akin to other Kankakee communities rather than the Jancarich and Spoonville communities. For example, the thin dentate stamping that occurs during the middle to late Middle Woodland expansion of the Goodall and Stillwell communities is certainly present at Amey (mean of 1.03 mm).

Further, the mean Havana lip thickness (8.78 mm) at the site is larger than the mean rim thickness (8.58 mm), which is a common Kankakee trait. This is partially due to the presence of another common Kankakee trait at Amey: beveled interior lips. At Amey, all three Havana rim samples contained an interior beveled lip with a vertical rim. Another stylistic similarity between Amey and Kankakee sites, specifically the Goodall community, is the use of interior-exterior dentate stamping on rims. Amey site sample # 1 (Figure 5-29) is one of only four total samples in this research that contained this distinctive stylistic trait and all of these were determined to have been manufactured by the Goodall community. Thus, a strong Goodall community stylistic and morphological influence is present at the Amey site, rather than a Jancarich or Spoonville community influence.

Figure 5-29: Amey Site Sample #1 (left): interior of sherd shown

Despite the strong Goodall community style influence at Amey, other Amey site traits support its designation as a separate residential community entirely. First, the petrographic *body* values (Figure 5-28) are entirely distinct from Goodall and Stillwell body parameters. Second, mean Havana body thickness at Amey (8.9 mm) is significantly larger in relation to other lower Kankakee Goodall and Stillwell community-affiliated sites. Third, the pyrotechnology practiced at the Amey site is another clue to this site's distinctiveness. All five of the Amey site Havana samples contained active clay micromasses, which is rare for lower Kankakee sites (e.g., Newton County, Schoon, Schissler, and Watson) which generally saw an increasing frequency of slightly active micromasses during this time. The one Hopewell sample at Amey was the only sample from the site that contained a slightly active clay micromass.

Amey Residential Community Conclusions

Based upon the available data, it is suggested that the occupation of the Amey site represents the introduction of a new residential community into the lower Kankakee region. Although we cannot completely rule out the migration of the Jancarich or Spoonville community to the lower Kankakee, it is more likely that another immigrant population from outside the study region arrived here for sustainable community interactions and/or for seasonal occupations. This is supported by the stylistic and morphological influence from the Goodall community but also the Amey site's distinctiveness from other Goodall styles, morphological traits, and body values. In this case, small-scale migration or seasonal use of this region appears to be the most logical mechanism for the presence of this community in the lower Kankakee. Mangold effectively explains the situation that most likely explains the origin of the Amey site residents: "While it is entirely possible that migrations did occur, I conclude that it was only in small units such as individuals or families" (Mangold 2009: 221). It is likely that the composition of Amey site residents were composed of these types of small family units who likely used this locale for seasonal purposes. Lastly, the temporal placement of the Amey residential community within the Transitional Communities period is based upon ceramic traits that appear to be relatively late in time. However, the potential inception of this community during the mid to late Middle Communities period cannot be completely ruled out.

Continued use of the Lower Kankakee valley by Stillwell and Goodall Communities

Schoon site
(habitation, Transitional Communities periods) (n = 18: 12 Havana + 6 Hopewell samples)

As discussed earlier in the chapter, the Schoon site radiocarbon date of Cal A.D. 140-260/Cal A.D. 270 to 330 represents the beginning date of the Transitional Communities period.

Importantly, Schoon provides evidence of the continued temporal use of the lower Kankakee valley region by the Goodall and Stillwell communities, at a time when the Amey residential community was also inhabiting a portion of this region. Of the twelve Havana samples examined from this site, seven were probably manufactured by members of the Goodall community, while five were likely made by Stillwell community peoples. Interestingly, all three of the samples with interior beveled lips at Schoon were made by Stillwell community members. One of the seven Goodall community manufactured samples included the AMS dated sample. This curvilinear zoned, dentate stamped and punctated rim section (Figure 5-30) was imported directly from the Goodall community in the upper Kankakee.

Unlike the samples from Newton County, six Havana samples (three apiece from the Goodall and Stillwell communities) probably represent actual imports from the upper Kankakee, which supports the notion that pots and people were moving into the lower Kankakee. The clay type matches the paste values of clays from that region and all possess ARF’s as well. This clay contrasts with the sandier clays near the Schoon site, which lack ARF’s. Regarding the latter clay, six samples used this Schoon site clay type in the construction of several vessels. Four of these were Goodall-made while two were Stillwell community-made.

Of the six Hopewell samples from Schoon, five were likely manufactured by Goodall community members. Two of these were probably imports from the upper-middle Kankakee (i.e., containing an upper-middle Kankakee clay type), while the other three were made with a lower Kankakee clay likely from the immediate vicinity of the Schoon site. Lastly, one other Hopewell sample was likely an import from the Stillwell community (containing an upper-middle Kankakee valley clay). These results mirror the results from the Havana samples described above (i.e., the simultaneous use of this site by both Stillwell and Goodall communities).

Figure 5-30: Sample #1, Schoon site (Cal A.D. 140 to 260/Cal A.D. 270 to 330)

Spoonville Residential Community's Late Temporal Use of the Kalamazoo Valley

Mushroom site
(habitation, Transitional Communities periods) (n = 15: 6 Havana + 9 Hopewell samples)

Similar to the Armintrout-Blackman site in the Kalamazoo valley, the Mushroom site also has no distinct recipe that is diagnostic of a separate community. Considering the close proximity of the Armintrout-Blackman site, it is not surprising that the Mushroom site provides further evidence for the continued short-term seasonal use of the Kalamazoo valley by the Spoonville residential community. The other community signatures present at the site parallel those also encountered at the Armintrout-Blackman site (i.e., Prison Farm, Goodall) and point towards the continued shared use of this river valley as a buffer zone by both northern (i.e., Prison Farm and Spoonville) and southern Kankakee peoples. The late temporal placement of the Mushroom site is based upon two radiocarbon dates from the site (Cal. A.D. 265 and Cal. A.D. 410 [Uga-2347]), and the fact that the ceramic assemblage from the site has an overwhelmingly Hopewell, as opposed to Havana, Ware character.

Six Havana-related samples and nine Hopewell samples were investigated from the Mushroom site. More samples at this site (n = 6) were probably made by Spoonville members than there were vessels made by other communities. Two Havana and four Hopewell samples from Mushroom were determined to have likely been manufactured by Spoonville community members. The results of these six Spoonville community-made samples support previous research that suggested a probable relationship between the Mushroom and Spoonville sites. For example, Mangold (1981) found nearly identical stylistic traits between two Hopewell series vessels from the Mushroom and Spoonville sites which led him and others (e.g., Garland and DesJardins 2006) to suggest they were made by the same potter.

Both of the Havana samples from Mushroom match the clay type of the Spoonville site environs, or at least the Grand River valley, and match the recipe of the Spoonville community. Therefore, they both probably represent imports from the Spoonville community in the Grand River valley. All four Hopewell samples that were made by the Spoonville community, on the other hand, were likely made with a Kalamazoo valley clay. As discussed in Chapter 6, five other samples were found to have been made by the Goodall community while four were made by the Prison Farm community.

Fennville site
(habitation, Transitional Communities period) (n = 3 Hopewell samples)

Of the three Hopewell-related samples examined from the Fennville site, one Hopewell Zoned Plain Rocker Stamped body sherd was found to have likely been manufactured by the Spoonville residential community. Interestingly, two samples were found to have probably been made by the Goodall community (explained in the next chapter), which corroborates the relationship between these two communities as observed at other sites such as at the Mushroom site.

Frequency of Local vs. Nonlocal Samples

Before sustainable and symbolic communities are introduced in the next chapter, the frequency of local and nonlocal vessels requires discussion. For purposes of this section, "local" simply refers to samples made by an identified residential community, while "nonlocal" refers to those statistical outlier samples that were manufactured by members of separate residential communities. This discussion is broken down into Havana sample results and Hopewell sample results. For these tables, it was deemed necessary to exclude results from all sites that were likely short-term seasonal or travel sites and those representing communal expansion because these are all "nonlocal." They were either imported from another river valley, or made by a community originating from elsewhere. These site results would have severely skewed the data and interpretations of the data.

Table 5-5 illustrates the percentages of local vs. nonlocal (i.e., statistical outliers) Havana-related samples in this research. Interestingly, roughly two-thirds of all Havana samples can be considered local. These local samples are broken down into two separate categories for ease of interpretation. The first local sample type are locally manufactured vessels, which comprise the largest majority (50.5% of all Havana samples) of any category in this research. These vessels were made by a particular residential community with the most commonly used clay type characteristic of that community (i.e., possessing the local recipe and most commonly used clay diagnostic of that community: see Chapter 1 for a review).

The second local sample category is comprised of vessels that were manufactured within the social boundaries of the residential community it was created by but was created with an exotic clay originating from outside those social boundaries. Subsequently, all of these types of vessels would have been broken and then deposited at a site located within its residential community's social boundaries. A simple example of this scenario would be a vessel excavated from a Jancarich community site that was found to have been manufactured by the Jancarich community but with a clay likely from the Kalamazoo valley. This class of vessels provides excellent evidence of *people* (not simply pots) from specific residential communities traveling throughout the region, making vessels with nonlocal clays but returning back to their "homeland" where final discard could have occurred. In this research, it was found that 15.1% of all Havana-related samples in this research conformed to this type of scenario.

Total Samples (n = 186)	**Local Samples (n = 122)**		**Nonlocal Samples (n = 64)**	
Sample Designation	Locally Manufactured (n = 94) (50.5%)	Made by residential community with nonlocal clay (n = 28) (15.1%)	Imports (n = 23) (12.4%)	"Visitor"-made (n = 41) (22%)
Total Percent	**65.6%**		**34.4%**	

Table 5-5: Frequency of Local vs. Nonlocal Havana Samples

Nonlocal samples, on the other hand, comprised roughly one-third of all Havana samples, suggesting a relatively high degree of mobility and interaction associated with these more utilitarian vessel types. Imports were the least common of all sample categories in this research, comprising only 12.4%. Although imports likely reflect the movement of both pots and people throughout the study region, they also could represent simple down-the-line exchange of pottery vessels.

The fourth and final category, "visitor"-made samples, represented the second most frequent category at 22%. These types of vessels were found to have been made by people who likely were "visiting" a site and utilized that site's most commonly used clay type to construct that vessel. An example would be a vessel that was found to have been manufactured by the Goodall residential community at the 12MR site with the most commonly used 12MR4 clay. These types of vessels also provide great evidence for the movement of *people* throughout the study region.

Total Samples (n = 94)	**Local Samples (n = 47)**		**Nonlocal Samples (n = 47)**	
Sample Designation	Locally Manufactured (n = 37) (39.4%)	Made by residential community with nonlocal clay (n = 10) (10.6%)	Imports (n = 16) (17%)	"Visitor"-made (n = 31) (33%)
Total Percent	**50%**		**50%**	

Table 5-6: Frequency of Local vs. Nonlocal Hopewell Samples

Table 5-6 illustrates the local vs. nonlocal nature of Hopewell samples in this research. It was assumed that there would be a higher frequency of nonlocal Hopewell Series vessels (indicating more frequent interactions) than nonlocal Havana-related samples. This assumption was proven to be a sound one since 50% of all Hopewell samples were determined to be nonlocal, an increase in 15.6% (compared to Havana samples). This reflects an increasing level of interaction, regional mobility, and the sharing of Havana-Hopewellian information through time. Despite this, the Hopewell results mirror those from the Havana samples in some ways.

Specifically, locally manufactured Hopewell vessels comprised the largest percentage of pots (39.4%), while “visitor”-made vessels comprised the second most common vessel designation category (33%).

Overall, Tables 5-5 and 5-6 provide strong evidence for a vast interaction network that included the movement of both pots and people throughout the study region. They also exemplify an increasing rate of interactions between residential communities through time. A larger discussion of the two nonlocal categories (i.e., imports and visitor-made vessels) is discussed in the following chapter, along with the specific interaction networks (e.g., sustainable and symbolic community involvement) characteristic of each residential community.

Conclusion

This chapter introduced a three-tier tentative temporal framework that was utilized to discuss and identify the various residential communities present within the study region through time. The mechanisms responsible for the rise of these communities and how they expanded through time were also reviewed. Two important avenues of travel and shared buffer zones were identified that allowed for a southern-derived Havana-Hopewell influence into west Michigan, the earliest using the lower St Joseph (Moccasin Bluff and Rock Hearth sites) and Kalamazoo (Hart and Swan Creek sites) valleys, while the later occurred within the Portage-Thornapple Corridor. Lastly, the frequency of locally manufactured samples vs. nonlocal samples was discussed.

Overall, the results of each residential community provide strong evidence for the presence of vast and complex interaction networks and mobility patterns that functioned to unite residential communities to each other, to varying degrees. It appears that drainage systems were used by these communities to organize their movements and interactions amongst each other, which is in agreement with other recent studies on northern foragers (e.g., Jarvenpa and Brumbach 2016; Lovis and Donahue 2011; Lovis and Whallon 2016). Especially striking was the high frequency of movement of people and pots observed throughout the study region and the sharing of resource zones or buffer zones by *multiple* residential communities. These findings correlate nicely, however, to expectations pertaining to small-scale/hunter-gatherer interactions. For example, it has been demonstrated that hunter-gatherer social units can be extremely fluid in composition throughout the year because individuals or small segments of a community move about the landscape on different schedules and for different reasons (Kelly 1995). There are a wide array of economic, social, political, and religious motivations that spur groups and individuals to move: to procure raw materials or firewood, to gather information about the availability and abundance of resources in other regions ("informational mobility": see Whallon 2006; Whallon, Lovis, and Hitchcock 2011), to relieve social tension, to visit nearby and distant relatives or friends ("network mobility": see Whallon 2006), to seek spouses, allies, or shamans for ritual services or cures (e.g., Ford 1972), to distance themselves from sorcery or death (Kelly 1995), or to participate in rituals and ceremonies (e.g., burial mound ritual or pilgrimages) (Carr 2006d).

Regardless of the specific reason(s) for such high degrees of mobility observed in this research, this mobility likely assisted in the short and long-term survival of each residential community in this research. To this end, the use of buffer zones, the seasonal scheduling of resource zones, intermarriage, visitation, information exchange, ritual participation, or the reciprocal exchange of food or other material goods as a form of "social storage" are common integrative mechanisms among these types of societies (Halstead and O'Shea 1989; Ingold 1987; Kelly 1995; Lovis and Whallon 2016; Spielman 1986; Whallon 2006; Whallon, Lovis, and

Hitchcock 2011) and were likely important to Middle Woodland peoples in the study region. The next chapter elaborates on the findings of this chapter through the discussion of the nonlocal samples identified in this research, which community manufactured them, and how these were involved in the extra-local interaction patterns of the residential communities in the study region. The results pertaining to these regional scale interactions and mobility patterns reveal an even more impressive and more complex suite of interactions occurring between these communities, as well as an even higher degree of movement between regions.

CHAPTER 6 SUSTAINABLE AND SYMBOLIC COMMUNITY IDENTIFICATION

Introduction

This chapter uses the results discussed in Chapters 4 and 5 to draw conclusions regarding the identification of regional scale sustainable and symbolic communities throughout the study region. As mentioned in the previous chapter, the statistical "outliers" from the initial process of identifying local samples and residential communities were utilized to explore a site's involvement in these extralocal communities. This was accomplished by determining the origin of their clays and temper types and by searching for recipe matches throughout the study region. It appears that all residential communities had somewhat unique sustainable and symbolic community involvement with all other communities in this research. An interesting consequence of this process was the revelation of the distance (measured by the number of river valleys crossed) that vessels traveled or were exchanged within the study region. In the previous chapter, it was mentioned that 34.4% of Havana samples and 50% of Hopewell samples were determined to be nonlocal, a high percentage suggesting the relatively frequent movement of both pots and peoples throughout the study region. These vessels were used to determine the number of river valleys people and pots were being transported within the study region.

Table 6-1 illustrates a general inverse relationship for all nonlocal Havana samples in this research, in which the number of nonlocal vessels decreases as the number of river valleys increases. For example, the majority of imports (78.7%) and vessels that were made by members of different residential communities (i.e., "visitor"-made) (55.9%) were recovered at sites one river valley away from the residential community that constructed it, or were within the same river valley in which the creators of these pots resided. On the other end of the spectrum, Havana peoples or pots traveling across four river valleys was significantly rarer. No imported Havana vessels were found to travel beyond three river valleys, while only 6.5% of all visitor-made vessels traveled across four river valleys. This suggests that most interactions and exchanges occurred between communities that were most closely located to one another on the landscape.

Distance	**Imports (n = 61)**	**"Visitor"-made (n = 93)**
1 RV or less	78.7% (n = 48)	55.9% (n = 52)
2 RV	8.2% (n = 5)	21.5% (n = 20)
3 RV	13.1% (n = 8)	14% (n = 13)
4 RV	0%	6.5% (n = 6)

Table 6-1: Distance Traveled from their Residential Community Core Area for Nonlocal Havana Vessels ("RV" = river valley)

The results for Hopewell vessels displayed in Table 6-2 differ from those observed for Havana vessels. The most striking difference is that, for Hopewell vessels, there is a surprisingly high percentage (42.9%) of imported vessels that traveled three river valleys from the homeland of the residential community that constructed them. Interestingly, all of these derive from the Converse and Spoonville sites in the Grand River valley in which vessels were found to have originated from the home-range of the Goodall (n = 10) and 12MR4 (n = 3) residential communities, and from an unknown/unidentified community likely originating from outside the study region (n = 2). This supports the notion that a strong intensification in the sharing and adoption of Hopewellian information, as well as pottery style and technology, occurred within the Grand valley during the Middle Communities period.

Besides the major exception described above, a similar inverse relationship described from Havana samples between the distances traveled and the number of vessels is exemplified for nonlocal Hopewell vessels as well. Specifically, most interactions, travel between communities, and social and material exchanges appear to have occurred between those communities that were most closely located to one another. The frequency of nonlocal vessels appearing at sites far removed from the residential community it is associated with decreases as distance increases.

Distance	**Imports (n = 35)**	**"Visitor"-made (n = 56)**
1 RV or less	37.1% (n = 13)	73.2% (n = 41)
2 RV	17.1% (n = 6)	14.3% (n = 8)
3 RV	42.9% (n = 15)	10.7% (n = 6)
4 RV	2.9% (n = 1)	1.8% (n = 1)

Table 6-2: Distance Traveled from their Residential Community Core Area for Nonlocal Hopewell Vessels ("RV" = river valley)

A short discussion on symbolic communities and mortuary vessels is warranted here before moving on to the results for each residential community. Regarding symbolic communities in this research, Table 6-3 will act as an important aid for this chapter by briefly summarizing which residential community's vessels were included in mortuary ritual at various burial mound sites throughout the study region. For example, the table reveals that four Prison Farm residential community vessels were recovered from the Norton Mounds and one Prison Farm-made sample was found from the Paggeot Mound. This chapter frequently refers back to Table 6-3. Overall, Goodall residential community-manufactured vessels were the most numerous (n = 26) in the study region, occurring at the Brooks (n = 1), Norton (n = 4), Spoonville (n = 2), Moccasin Bluff (n = 1), Mud Lake (n = 13), and Weise Mound (n = 5) sites. In descending order, the Spoonville (n = 9), Jancarich (n =6), Prison Farm (n = 5), 12MR4 (n = 5), and Stillwell (n = 4) residential communities also participated in mortuary ritual at various burial mound sites in west Michigan and northwest Indiana (see Table 6-3).

	Burial Mound Sites											
Residential Community	Brooks	Norton	Converse	Spoonville	Paggeot	MB[*1]	Sumnerville	Scott	Mud Lake[*2]	Goodall	Weise	**Total**
Goodall	1	4		2		1			13		5	**26**
Spoonville	1			3			2				3	**9**
Jancarich	2		1				2			1		**6**
Prison Farm		4			1							**5**
12MR4				1				1	2		1	**5**
Stillwell		2							1		1	**4**
Total	4	10	1	6	1	1	4	1	16	1	10	**55**

Table 6-3: Symbolic Community Participation by Individual Residential Communities in Study Region

([*1] MB = Moccasin Bluff site)

([*2] Mud Lake samples were surface collected but were likely from mound contexts)

Now that these very general results have been discussed, the specific types of sustainable and symbolic community interactions that each residential community was involved in and how these changed through time is discussed. Rather than organizing this discussion by each temporal period and discussing the results for each time period, the discussion focuses on each individual residential community, their extralocal interactions, and how these changed through time.

EXTRALOCAL INTERACTION PATTERNS

This section's discussion is broken down into individual subsections that summarize the extralocal interactions of each residential community in a table and thoroughly addresses the individual sample results from each site important to this discussion. Thus, this section ultimately defines each residential community's involvement in sustainable and symbolic communities. Recall that *sustainable communities* are regional social networks that play a role in the long-term viability of a group by meeting the size requirements necessary to avoid incest, maintain a viable mating network, and to offset and buffer against local subsistence shortages and local demographic variations (e.g., birth and death rates, sex ratios, etc.) (Carr 2006a; Mahoney 2000; Ruby et al. 2006). This can be accomplished through the exchange of mates, information, labor, food, and other material resources (e.g., pottery vessels), as alluded to in the previous chapter.

Symbolic communities, on the other hand, emphasize symbols to actively define, communicate, and negotiate membership in a social group that transcends or crosscuts local residential groups for common political, economic, social, and/or religious purposes (Carr 2006a; Charles 1995; Ruby et al. 2006). Although a symbolic community can include age grades, cult societies, sodalities, or gender-based groups (Ruby et al. 2006), this research focuses on the social and religious aspects (specifically mortuary ritual at burial mound sites) to define symbolic communities because there are not enough data available at this time to identify the other more specific segments of a symbolic community.

Jancarich Residential Community

There is strong evidence that the Jancarich residential community participated in a sustainable community (Table 6-4) that included individuals from the Prison Farm and Stillwell residential communities during the Early Communities stage, while sustainable community involvement during the later Middle and/or Transitional Communities periods included the Prison Farm, Spoonville, and 12MR4 residential communities. The Prison Farm community appears to have been the most frequent contact in which seven total Prison Farm-made samples were found at Jancarich community sites. Additional Jancarich-made samples are found at Prison Farm residential community sites: five at the Lower Lake 1 site, one other at Prison Farm, and four at Davis Swamp (discussed in Prison Farm section). One Jancarich-made sample was also found at the Spoonville site as well.

	Sustainable Community (Early period)	**Sustainable Community (Middle and/or Transitional period)**	**Symbolic Community* (Early, Middle and/or Transitional period)**
Residential Communities	Prison Farm (n=11)	Prison Farm (n=6)	Goodall
	Stillwell (n=1)	Spoonville (n=3)	Spoonville
		12MR4 (n=1)	

Table 6-4: Jancarich Residential Community's Sustainable and Symbolic Community Participation (* symbolic community determined by presence of vessels made by other communities who used same burial mounds as the Jancarich community)

Jancarich community participation in symbolic communities (Table 6-4 and Table 6-3) occurred at the Brooks, Converse, Sumnerville, and Goodall Mounds sites. The Jancarich symbolic community likely involved interactions with the Goodall and Spoonville residential communities since these communities also deposited vessels at these mound sites. This symbolic community would have likely been in operation during the Middle and/or Transitional Communities periods, but at least some of the Brooks mounds are probably contemporary with the Jancarich site and date to the Early Communities period (Kingsley 1999). Below, a more detailed discussion of these results is provided.

Jancarich Residential Community Sustainable Community Involvement

Jancarich site
(n = 4 Havana and 4 Hopewell samples excavated from
the Jancarich site that were made by other residential communities)

Four total Havana samples were determined to be nonlocal from the Jancarich site and manufactured by members from other communities. These nonlocal samples originated from two separate residential communities: Prison Farm and Stillwell. We will begin with the Prison Farm community connection. Three total Havana samples were likely manufactured by this community. A Havana Plain vessel's (sample #26) paste and body values fit comfortably within the parameters of the Prison Farm community and likely represent an import from that community. The morphological variables are also within the range of those of Prison Farm. Sample #2 (Figure 6-1), on the other hand, was likely made by a Prison Farm community member while at the Jancarich site. In other words, this sample matches the most commonly used clay at the Jancarich site but its recipe/body matches that of the Prison Farm community. Contrasting with the relatively bland granitic tempers (i.e., lacking amphiboles) used by Jancarich site inhabitants, sample #2 not only contains nonlocal percentages of temper, it also has a significant amount of amphibole present in its granite temper grains, which further supports its nonlocal designation. Granite temper containing various amounts of amphibole is not uncommon at Prison Farm or other Grand River valley sites. Sample #2 contains an odd mixture of both Havana and Hopewell Ware stylistic traits, which is another characteristic of the Jancarich site. Thus, this sample could represent a local interpretation or "copy" of Havana and Hopewell Ware designs. Specifically, the sloppy crosshatching, noding, and "snowshoe" punctates combined with thick rim and lip values is highly unusual in both west Michigan and the Kankakee valley.

Although somewhat speculative, this sample could have been made by members of the Prison Farm community who were copying and experimenting with these relatively new designs. This is further supported by the findings of the Lower Lake 1 site in the Grand River valley, which probably functioned as a shared seasonal locale between the Jancarich and Prison Farm communities. Additional support comes from one Hopewell sample from Jancarich that was determined to have been made by the Prison Farm community with the most commonly used clay at the Jancarich site. These findings ultimately support a connection between the Jancarich and Prison Farm residential communities.

Figure 6-1: Jancarich site samples: Sample #2 (bottom left)

Sample #19, a burnished Havana Plain sherd, possesses a clay type that matches Kankakee River valley clays but it is within the range of percent temper for both the Goodall and Prison Farm residential communities. This sample is the only major outlier in body thickness at the Jancarich site (11.43 mm), however, and is a lot closer to Prison Farm's mean of 11.23 compared to the means of the two main Goodall residential community sites (Good's Ford: 8.67 mm and Goodall: 8.3 mm). Thus, this vessel is tentatively designated as being manufactured by Prison Farm people with a Kankakee valley clay type and was later deposited at the Jancarich site.

There is one Havana sample that was found to have been made by the Stillwell community. Sample #25 yielded an AMS date of B.C. 200-50 (Beta 327507) and the data suggest that it was probably made by Stillwell residential community members with the most commonly used Jancarich clay type. This sample is granite tempered but differs from granite tempers at Jancarich because several grains contain portions in which chlorite is being replaced by biotite, which was observed in higher frequencies in the Kankakee valley.

Evidence for interaction between the Jancarich and Stillwell communities is exemplified in samples 7 and 13 as well. These two samples match the most commonly used clay type parameters of the Kankakee River valley but the percent of temper matches that of the Jancarich site. In other words, the data suggest that they were likely made by Jancarich residential community people with a clay from the Kankakee valley. Sample #7's clay contains ARF's, a key Kankakee valley diagnostic, and also contains a significantly higher percent of voids in relation to other samples at the Jancarich site.

Sample #13, on the other hand, is the only smoothed-over-cordmarked Havana Ware sample from Jancarich examined in this research and is tempered with granodiorite. Recall that the presence of granodiorite is strongest in the Kankakee River valley (n = 26 or 22.4%) and that it is rarest in the Muskegon River valley (n = 2 or 5%). Therefore, it is possible that a member of the Jancarich community made this vessel in the Kankakee not only with Kankakee clay but also with locally available granodiorite temper types as well. Furthermore, a Jancarich community origin is further supported by these two samples' body thicknesses (8.53 and 8.97 mm, respectively), which are also more similar to the Jancarich mean body thickness of 8.51 mm, in contrast to the mean values from the Stillwell and Mud Lake sites in the Kankakee (10.04 and 9.05 mm, respectively).

Lastly, three Hopewell samples are likely imports originating from other communities. A noded Hopewell Plain Rocker Stamped vessel and a Hopewell Plain sherd were both determined to have been imported from the Grand River valley (i.e., matching Grand River valley clay types) by the Spoonville residential community (i.e., matching Spoonville recipe and morphological traits). One last sample, a noded Naples Cordwrapped Stick Impressed sample matched the paste and recipe values of the 12MR4 community. Thus, it was likely imported from the 12MR4 community. Whether this vessel was obtained via down-the-line exchange from Marshall County or 12MR4 peoples transported this to the Jancarich site is unclear.

Toft Lake site
(n = 3 Havana samples excavated from the
Toft Lake site that were made by other residential communities)

There are three samples from the Toft Lake site that contain a Prison Farm community recipe and corroborate the sustainable community interaction findings at the Jancarich site. Two samples were likely manufactured with Kalamazoo valley clay by Prison Farm peoples and later deposited at the Toft Lake site. One last sample presents an especially interesting case. Sample #4, a burnished Havana Plain sherd, was likely made by Prison Farm community members with the most commonly used clay identified at the Jancarich site and subsequently deposited at the Toft Lake site. Interestingly, this sample is burnished like many Jancarich site samples, perhaps pointing towards the influence of Jancarich style patterns on Prison Farm community members. In any case, the cumulative evidence obtained from these three samples provide strong evidence for participation in a shared sustainable community by the Jancarich and Prison Farm communities. Thus, the intermarriage and exchange of food and material goods between these two relatively closely located communities likely assisted in the creation and maintenance of this sustainable community.

Jancarich Residential Community Symbolic Community Involvement

Brooks Mound (n = 2)

Two Hopewell-related samples (see Figure 5-19) from the Brooks Mound site were determined to have been constructed by Jancarich community members. Both were likely manufactured at the Jancarich site by Jancarich peoples (matching the Jancarich site's most commonly used clay and recipe) before being interred in Mound A (sample #1) and Mound D (sample #2) at Brooks. As Table 6-3 illustrates, the data suggest that Goodall and Spoonville residential community peoples used the Brooks Mound site for mortuary purposes as well.

Converse Mounds (n = 1)

The data from one slipped Hopewell Zoned Dentate Stamped mortuary vessel (sample #27) with punctation and incising on the rim (Figure 6-2) suggest that it was manufactured by the Jancarich community with an unidentified sandy clay. It matched the recipe composition, temper type, temper size index, and pyrotechnology (presence of slightly active paste) of the

Jancarich community. This was the only sample obtained for this research from the Converse site that contained a likely burial mound provenience.

Figure 6-2: Converse Mound Site, Hopewell Sample #27

Sumnerville Mounds (n = 2)

One interesting finding in this research was related to the likely participation of the Jancarich residential community in mortuary ritual at the geographically-distant Sumnerville Mounds in the St. Joseph River valley. Both Havana samples available for petrographic analysis from Sumnerville were found to be made by a Jancarich residential community member who used a St. Joseph River valley clay type (i.e., Jancarich recipe + St. Joseph clay). Other evidence supporting this claim involves the presence in this sample of diagnostic Jancarich community cord widths and the use of amphibolite temper. Recall that amphibolite temper is much more common in the Grand and Muskegon River valleys and is nearly absent in the Kankakee.

Therefore, the evidence suggests that Jancarich residential community members likely participated in symbolic communities operating at the Sumnerville Mounds.

Goodall site Mound 22 (n = 1)

The “Picasso Pot” (Brown 1964; Mangold 2009: 82) (Figure 6-3), was excavated from Mound 22 at the Goodall site. It presents an unusual case because this quadrilobate vessel was decorated with ovoid stamping, curvilinear zoning, dentate stamping, and is unusually thin compared to other early vessels. The clay is siltier than the most commonly used clay at Goodall and is similar to St. Joseph valley commonly used clays. The lack of ARF’s supports a clay origin outside the upper Kankakee, as do the natural inclusions in the paste. The paste includes plagioclase feldspar, muscovite, and hornblende, all of which are relatively more common in the St. Joseph River valley than in the Kankakee, which suggests a clay origin from that region. Other types of evidence to support the inference that this vessel was made south of the Kalamazoo valley includes the presence of both granodiorite and quartz arenite sandstone tempers. Granodiorite is most common in the Kankakee while quartz arenite is most common in the Kankakee and St. Joseph River valleys.

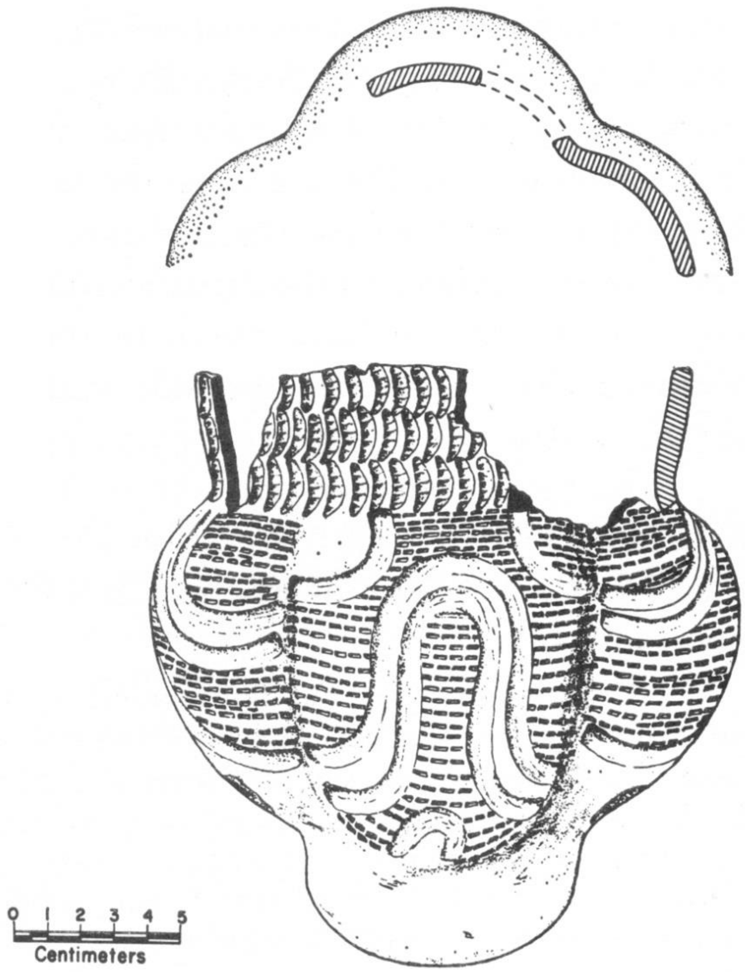


Figure 6-3: Picasso Pot, Goodall Site Mound 22 (from Brown 1964)

The percent temper present in this sample (15.4%) is within the upper range of Havana samples for the Jancarich residential community and is within the lower edge of the Prison Farm community. Compared to Hopewell samples, it more closely resembles the mean percent temper in the Muskegon (14.5%) and Grand (15.3%) valleys rather than the Kankakee (19.3%). The stylistic (containing an unusual combination of both Havana and Hopewell Ware decorative motifs) and morphological traits of this vessel, meanwhile, likely preclude the possibility of a Prison Farm community origin for this vessel. For example, the pottery collection at the Prison Farm site is characterized by a cruder decorative repertoire. Conversely, Havana-related copies containing both Havana and Hopewell Ware decorative motifs are observed at the Jancarich site.

Additionally, the rim thickness (6.65 mm) and lip thickness (5.65 mm) are well outside the statistical ranges of the Prison Farm site and are actually more similar to Hopewell Ware samples. Although lip thickness is not within the statistical range of the Jancarich site, rim thickness and orifice diameter (26.0 mm) are within the range of Jancarich mean values. Based upon the available evidence, the best determination is that this sample was probably manufactured by Jancarich community individuals who made this "copy" with a St. Joseph valley clay. This complex situation suggests the actual sharing of pottery technology and style by members of two separate communities. However, an origin for this vessel from outside the study region cannot be completely ruled out.

Prison Farm Residential Community

There is very strong evidence that members of the Prison Farm residential community participated in an extensive sustainable community with individuals from the Jancarich, Goodall, and Stillwell residential communities during the Early Communities period, while later sustainable community participation involved interactions with members from the Jancarich and Spoonville residential communities. Pottery samples made by the Prison Farm community that are discussed in different sections in this chapter include six Havana samples and one Hopewell sample recovered from Jancarich community sites (Jancarich and Toft Lake), and twelve Havana and four Hopewell samples recovered at Spoonville community sites (Spoonville, Battle Point, Armintrout-Blackman, and Mushroom).

	Sustainable Community (Early period)	Sustainable Community (Middle and/or Transitional period)	Symbolic Community* (Early, Middle and/or Transitional period)
Residential Communities	Jancarich (n=11)	Jancarich (n=6)	Goodall
	Goodall (n=7)	Spoonville (n=17)	Stillwell
	Stillwell (n=1)		

Table 6-5: Prison Farm Residential Community's Sustainable and Symbolic Community Participation (* symbolic community determined by presence of vessels made by other communities who used same burial mounds as the Prison Farm community)

Evidence of symbolic community participation is evident at the Norton Mounds site during the Early Communities period and at the Paggeot Mound site during the Middle Communities period (Table 6-3). Table 6-5 reveals that the Prison Farm symbolic community included members from the Goodall and Stillwell residential communities. As will be shown below, there is no evidence of Prison Farm community vessels traveling into the upper or middle Kankakee during the Early Communities time period. Prison Farm community presence is noticeably absent at sites in both the Stillwell and Goodall communities. This is in stark contrast with evidence supporting the presence of Jancarich residential community-made vessels at various sites within the Goodall residential community (discussed above). This ultimately suggests that the southward boundary of Prison Farm residential community travel was likely at the Moccasin Bluff site, while Jancarich community travel of pots and/or peoples extended further south into the upper and middle Kankakee.

Prison Farm Residential Community Sustainable Community Involvement

Prison Farm site
(n = 8 Havana samples and 1 Hopewell sample excavated from
the Prison Farm site that were made by other residential communities)

Interestingly, a fairly substantial connection to the Goodall residential community (n = 7 Havana samples) became apparent at the Prison Farm site during analysis. One sample was made with the most commonly used clay identified at the Prison Farm site but matched the recipe of the Goodall residential community, while six other Havana samples appear to be imported from the Goodall community to the Prison Farm site (i.e., contained the Goodall residential community's commonly used clay and recipe). This connection to the Goodall community is supported by the results from the Moccasin Bluff site (see Chapter 5) in which Prison Farm (and Goodall) community signatures are numerous.

Additional evidence for interaction with another community from the Kankakee basin comes from one sample from the Prison Farm site that was determined to be an import from the Stillwell residential community. The most commonly used clay matched those of the upper Kankakee valley and it matched the very distinctive Stillwell residential community recipe. This sample is one of the two diorite tempered Havana samples present at Prison Farm, the other having been found to be imported from the Goodall community.

Lastly, one Hopewell Crosshatched rim with hemiconical punctates from the Prison Farm site (Figure 6-4) was found to have been made by the Jancarich residential community with a Grand River valley commonly used clay. The recipe, temper size index, rim thickness, lip thickness, and moderately everted rim and beveled interior lip shape all more closely resemble traits from the Jancarich community than any other community. A Grand valley clay type origin is based upon the presence of potassium feldspar, plagioclase feldspar, chert, quartzite, and sericite in the paste, which is a combination most common to the most commonly used clays in the Grand valley. Furthermore, the sand size index approximates most Grand River valley site's samples.

Figure 6-4: Hopewell Rim from the Prison Farm site

Lower Lake 1 site
(n = 5 Havana samples and 1 Hopewell sample excavated from the
Lower Lake 1 site that were made by other residential communities)

As mentioned in the previous chapter, the Lower Lake 1 site likely served as a shared extraction site or meeting place between members of the Prison Farm and Jancarich residential communities. Chapter 5 mentions that there were five Havana samples recovered from Lower Lake 1 that were determined to have been manufactured by the Jancarich residential community. One sample is an import directly from the Jancarich community in the Muskegon valley, matching the most commonly used clay type and the recipe of the Jancarich community. The other four were made by the Jancarich residential community, three with the most commonly used clay type of the Lower Lake 1 site and one with an unidentified clay.

Lastly, results suggest that a Hopewell Zoned body sherd with circular punctation was likely an import created by Spoonville residential community members with Grand River valley clay. Although a paste composition match for a most commonly used clay type could not be confirmed, a likely Grand valley site origin for the clay is based upon natural inclusion types and its sand size index. The recipe matches that of both the Spoonville and Jancarich residential communities but the morphological (body thickness), stylistic, and pyrotechnological (active micromass) traits of this sample, as well as the temper type and temper size, conform more to the Spoonville community.

Prison Farm Residential Community Symbolic Community Involvement

Norton Mounds (n = 4)

The Norton Mounds site is the earliest known Middle Woodland mortuary site in west Michigan and falls comfortably within the Early Communities temporal period, although later mound construction and use during the Middle Communities period seems likely (see Chapter 5 discussion on temporal framework and radiocarbon dates). As such, an important characteristic of this site is its overwhelmingly Havana Ware-like ("Norton Ware") presence, a fact which allowed samples from this site to be compared to other Havana-like samples throughout the study region. Results from this site strongly support the interregional relationships highlighted in the Prison Farm sustainable community involvement section above. Specifically, the presence of samples made by members from the Prison Farm, Stillwell, and Goodall residential communities corroborates the overlapping relationships between these communities.

The strongest and most frequent participation observed at Norton comes from the Prison Farm residential community (Table 6-3). Four samples have a Prison Farm community origin. Three are imports from the Prison Farm site, possessing diagnostic Prison Farm traits in recipe, paste, and body thickness (12.7, 11.4, 11.2 mm respectively). Another sample appears to have been made with a commonly used clay type characteristic of Kalamazoo valley sites. There are also two samples that provide evidence of Stillwell residential community involvement and two samples that provide evidence of Goodall residential community symbolic community interaction at Norton as well. These cases are discussed in more detail in the Stillwell and Goodall community sections below.

Although it is acknowledged that only a small sample size was available for petrographic analysis from Norton Mounds (n = 10), it should be noted that there is no evidence of Jancarich community members participating in mortuary ritual at the site, despite the sharing of a sustainable community between these two residential communities at this time. This tentatively suggests that Jancarich community members buried their dead primarily in mounds directly adjacent to the Jancarich site in the Muskegon River valley during the Early Communities period, but began to expand their participation in mortuary ritual at the Converse, Sumnerville, Goodall sites during the Middle and/or Transitional periods (see Table 6-3).

Paggeot Mounds (n = 1)

The Paggeot Mounds site is located in the lower Grand valley, some distance from the Prison Farm residential community's home range in the upper Grand valley. One Hopewell Zoned Plain Rocker Stamped body sherd was examined in this research from Paggeot. The paste is unusually sandy (33.8%) and includes potassium feldspar, plagioclase feldspar, hornblende, and quartzite, which suggests a likely origin from the Grand or St. Joseph valleys. The sand size index (1.44), however, is most similar to means from Grand River valley sites, such as Converse (1.41) and Spoonville (1.38). Thus, the Grand valley, especially the middle to lower portion, is the likely place of origin for this clay type.

The recipe composition is most similar to the Prison Farm and Goodall communities. The pyrotechnology (active micromass), temper type, body thickness, use of plain rocker stamping (which is common at the Prison Farm community-affiliated Davis Swamp site), and Paggeot's proximity to the Prison Farm community sites (Davis Swamp and Prison Farm) all support a Prison Farm (rather than a Goodall) community designation. Therefore, this sample is tentatively suggested to have been manufactured by the Prison Farm residential community with Grand valley clay. If this is the case, it is likely that the Paggeot locale was inhabited by Prison Farm members during the Middle Communities period, at the same time they began utilizing the lower Muskegon valley at the Davis Swamp site. At Davis Swamp, plain rocker stamping is very common and one sample at the Prison Farm site contains plain rocker stamping, providing evidence that this community was beginning to incorporate the use of this decorative motif during this time period.

Spoonville Residential Community

As explained in Chapter 5, the Spoonville community likely fissioned off from the Jancarich community and it appears that they continued to draw upon the far reaching contacts of its parent community. Sustainable community involvement from the Spoonville community included interactions with the Prison Farm, Goodall, Stillwell, 12MR4, and Jancarich residential communities (Table 6-6). Since the Spoonville residential community appears to have arisen during the Middle Communities period, these interactions would have occurred during the Middle and Transitional Communities periods. Results suggest that symbolic community integration appears to have included members deriving from the Jancarich, Goodall, Stillwell, and 12MR4 residential communities (Table 6-6). Vessels determined in this research to have been manufactured by the Spoonville residential community have been recovered from mortuary contexts at the Brooks, Spoonville, Sumnerville, and Weise Mound sites (Table 6-3). The absence of the Prison Farm community within this symbolic community is noteworthy, however, despite the large presence of Prison Farm in Spoonville's sustainable community.

	Sustainable Community (Middle and/or Transitional period)	**Symbolic Community* (Middle and/or Transitional period)**
Residential Communities	Prison Farm (n=17)	
	Goodall (n=11)	Goodall
	Stillwell (n=4)	Stillwell
	12MR4 (n=3)	12MR4
	Jancarich (n=3)	Jancarich

Table 6-6: Spoonville Residential Community's Sustainable and Symbolic Community Participation (* symbolic community determined by presence of vessels made by other communities who used same burial mounds as the Spoonville community) (Note: Early Community sustainable community interactions are not applicable because this community arose during the Middle period)

Spoonville Residential Community Sustainable Community Involvement

Spoonville site
(n = 7 Havana samples and 9 Hopewell sample excavated from
the Spoonville site that were made by other residential communities)

At the Spoonville site, there is evidence for a rather significant Prison Farm residential community connection. Seven total samples (five Havana and two Hopewell) were determined to have likely been made by the Prison Farm community. Of the Havana-related samples, one appears to have been an import from the Prison Farm site (containing Prison Farm recipe, morphology, and most commonly used clay values). Three Havana samples, all tempered with diorite, were found to have probably been made at the Spoonville site (i.e., with the most commonly used Spoonville clay) and by the Prison Farm community.

One other Havana sample was likely made by Prison Farm community members with Kalamazoo valley clay (based upon composition and natural inclusions) and could have later been discarded at the Spoonville site. This scenario is also supported by two Hopewell Plain

Rocker Stamped samples recovered from the Spoonville site that were also found to have been made by the Prison Farm community with a clay type common at sites in the Kalamazoo basin.

Evidence for interactions with Kankakee communities is present at the Spoonville site. The likelihood of Stillwell community member interaction is supported by two Havana samples that were constructed by Stillwell members (matched the body values for the Stillwell residential community) with the most commonly used clay from the Spoonville site. Both of these are gabbro tempered as well, which is most common in the Kankakee and gradually decreases as one travels north. The large body thickness values for both of these samples (11.2 mm and 11.0 mm, respectively) are more similar to Prison Farm values but are well within the 95% confidence interval of the Mud Lake site and just outside the Stillwell site. Thus, based upon the available data, it is likely that both of these samples were made by Stillwell community members with the most commonly used clays at the Spoonville site.

Goodall residential community interaction is also evidenced by the presence of three Hopewell samples that were determined to be imports from the Goodall community in the upper Kankakee. One of these was recovered from the village component of the Spoonville site and therefore represents sustainable community interaction, while the other two (described later in the chapter) were recovered from mortuary contexts and reflect symbolic community participation.

The 12MR4 residential community appears to have participated in a sustainable community at the Spoonville site as well. Three Hopewell-related samples were found to have been imported from the 12MR4 community in Marshall County, Indiana. Two of these were found in village contexts and reflect sustainable community involvement, while one was recovered from a mound context (discussed later in chapter) and represents symbolic community participation. The 12MR4 connection is interesting because there is no evidence of this residential community participating in sustainable communities in west Michigan during the Early Communities period. Thus, an expansion in both their sustainable and symbolic community networks appears to have occurred during the Middle Communities period. Whether or not these vessels were obtained via down-the-line exchange or through the actual movement of 12MR4 community peoples to the Spoonville site is unclear, however. Finally, one Hopewell sample from Spoonville was found to be an import from the Muskegon valley by the Jancarich community, providing evidence of the continued sustainable community relationship shared between these two communities.

Battle Point site
(n = 2 Havana samples excavated from the
Battle Point site that were made by other residential communities)

The Battle Point site shares the same sustainable community partners as the Spoonville site. Interaction with the Prison Farm residential community is supported by one Havana Zoned sherd with circular punctation. Stylistically, it is similar to a Prison Farm community-manufactured sample from the Norton Mounds site. This sample was likely made by Prison Farm community peoples at the Battle Point site, using the most commonly used clay at that site.

A Stillwell residential community connection is exemplified by a Havana sample that contains the diagnostic percent temper of the Stillwell community. This sample was likely made by the Stillwell community with a most commonly used clay characteristic of Kalamazoo valley sites and later discarded at the Battle Point site. The body thickness (9.4 mm) splits the mean values for the Stillwell (9.1 mm) and Mud Lake (10.04 mm) sites, two Stillwell residential community sites.

Armintrout-Blackman site
(n = 6 Havana and 2 Hopewell samples excavated from the
Armintrout-Blackman site that were made by other residential communities)

In general, sustainable community interaction at Armintrout-Blackman with the Prison Farm and Stillwell residential communities mirrors that seen at the Spoonville and Battle Point sites. Four Havana samples were determined to have been manufactured by Prison Farm community members. Two almost certainly were manufactured with Kalamazoo valley clays and were therefore probably made by Prison Farm peoples while in the Kalamazoo valley. The other two samples also likely were made in the Kalamazoo valley based upon the presence of natural inclusions common to sites in this valley and matched the Prison Farm community recipe.

One Havana sample was found to have been imported from the Stillwell community. The presence of epidote in the paste suggests a Kankakee origin for the clay, while the percent temper and other morphological variables support the inference of the Stillwell community manufacture of this vessel. Additionally, one other Havana sample from the Armintrout-Blackman site was likely made by Goodall community members with a Kalamazoo or St. Joseph valley, based upon the types of natural inclusions present in the paste. The percent temper and morphological variables are within the range of Goodall community values. This sample is the only granodiorite tempered sample at the site and since granodiorite is a lot more common in the Kankakee valley, it supports the determination of a Kankakee origin for this sample. Also recall that at the Good's Ford site, one sample was probably manufactured by the Spoonville community, which lends further support to sustainable community interaction with the Goodall community.

Two Hopewell samples from Armintrout-Blackman provide evidence of a continued sustainable community connection with the Goodall residential community during the Middle Communities period. One Hopewell Crosshatched rim was found to be an import from the Goodall residential community. The large sand size index (1.7), the presence of epidote in the paste (a Kankakee trait), and the clay composition all support a Kankakee valley origin for the clay. The recipe, percent temper (18.9%), temper size index (3.4), and rim and lip thickness values all fall within the limits of the Goodall residential community as well. Another sample, a Hopewell Zoned Plain Rocker Stamped body sherd tempered with limestone and grog was also found to have been made by the Goodall residential community with Kalamazoo valley clay.

Mushroom site
(n = 6 Havana and 5 Hopewell samples excavated from
the Mushroom site that were made by other residential communities)

The Mushroom site likely is a Transitional Communities period site based upon late radiocarbon dates (see Chapter 2) that place the site within the middle to late Converse phase (Garland and DesJardins 2006) and on ceramic styles and morphology that appear to be relatively late Middle Woodland in character. A temporally late sustainable community relationship with the Prison Farm, Spoonville, and Goodall residential communities is evident at Mushroom, again providing support of the use of this region as a buffer zone between these communities (see Chapter 5). Four total samples (two Havana and two Hopewell samples) were determined to have been manufactured by the Prison Farm community. One Havana sample was an import from the site (matching both Prison Farm community paste and body values), while the other Havana sample was made with Kalamazoo valley clay probably from the Mushroom site vicinity. This latter sample is a Havana Cordmarked and noded rim and is a major outlier for body thickness at the Mushroom site. With a thickness of 13.4 mm, it is well within the robust

Prison Farm Havana body thickness figures. Similarly, two Hopewell samples were also manufactured with a Kalamazoo valley clay type likely near the Mushroom site and were likely created by Prison Farm peoples.

Five additional (two Havana and three Hopewell) samples were found to have been manufactured by the Goodall residential community, but all of these were made with a clay matching the most commonly used clays common to Kalamazoo valley sites. Thus, these samples provide good evidence of Goodall community peoples using the Kalamazoo valley region, likely as a shared buffer zone (as discussed in the previous chapter). Interestingly, the three sole Havana vessel imports from the Mushroom site were determined to have derived from both Grand River valley communities (i.e., 2 from Spoonville and 1 from Prison Farm), while all four Goodall community derived samples were manufactured within the Kalamazoo valley, likely within the immediate vicinity of the Mushroom site.

Fennville site
(n = 2 Hopewell samples excavated from the
Fennville site that were made by other residential communities)

Similar to the Mushroom site, the Fennville site also was likely inhabited during the Transitional Communities period. Two Hopewell samples (a Hopewell Incised sample and a Hopewell Plain Rocker Stamped sample) appear to have been manufactured by the Goodall residential community, both with a clay type approximating the most commonly used clays observed at Kalamazoo valley sites.

Spoonville Residential Community Symbolic Community Involvement

Brooks Mound (n = 1)

As Flanders (1965) stated decades ago, many vessels from the Brooks Mound compare favorably to those at the Spoonville site in the Grand River valley. This is supported in this research by one sample (see Figure A-3 in Appendix A) from the Brooks Mound site. This sample was determined to have been manufactured by Spoonville community members with a Muskegon valley clay (perhaps at the Jancarich site, based upon the presence of opaque minerals in the paste) and later deposited at the site during mortuary ceremonialism. The moderately everted rim, round lip, and lip thickness (4.38 mm) all resemble Spoonville community values (mean lip thickness of 4.4 mm). Other samples at Brooks Mound indicate mortuary ceremonialism participation by the Jancarich and Goodall residential communities as well (see Table 6-3).

Spoonville Mounds (n = 3)

It is not surprising that the evidence suggests that the Spoonville residential community participated in mortuary ritual at the Spoonville site. There were more samples observed from these burial mounds that were manufactured by Spoonville community members than people from other residential communities (Table 6-3). Three Hopewell vessels recovered from burial mound contexts at the site were examined in this research. All appear to have been made with Kalamazoo valley clay based upon the percentages of silt and sand, sand size indices, and natural inclusion types. All also fell within the statistical parameters of the Spoonville community for the recipe, temper size index, and morphology (rim, lip, and thickness).

Sumnerville Mounds (n = 2)

A Hopewell Zoned Incised cambered and channeled rim with hemiconical punctates and a slight interior lip bevel, and a Hopewell Zoned Plain and Dentate Rocker Stamped body sherd recovered within the vicinity of the Sumnerville Mounds were examined in this research. The data support the inference that both were manufactured by the Spoonville residential community but with different clay types. The former sample appears to have been made with Kankakee valley clay based upon the cumulative presence of biotite, muscovite, quartzite, and rhyolite in the paste, while the latter vessel was likely made with a St. Joseph valley clay. Both of these samples provide evidence of members from the Spoonville residential community utilizing clays from the Kankakee and St. Joseph valleys to manufacture vessels probably in preparation for mortuary ritual at the Sumnerville Mounds.

Weise Mounds (n = 3)

Three Havana-related samples from the Weise Mound in the Kankakee valley detail the rather sprawling symbolic community involvement of the Spoonville residential community. All three were manufactured with a clay type in the St. Joseph River valley. Paste values match St. Joseph site clays, as do the presence of muscovite, chert, hornblende, and quartzite in their pastes. Although the body values of these three samples can be identified as arising from either the Jancarich or Spoonville communities, the morphological variables generally suggest the stronger likelihood of Spoonville manufacture. As shown in Table 6-3 and detailed below, the Weise Mound also provides evidence of pottery vessel manufacture from the Goodall, Stillwell, and 12MR4 residential communities. Symbolic community participation with both Kankakee residential communities mirrors the original symbolic community relationships of the Jancarich community and likely represents a continuation of these relationships by the Spoonville community. An expansion of the original Jancarich interaction sphere is evident, however, with the inclusion of the 12MR4 community.

Stillwell Residential Community

Stillwell residential community members likely participated in a sustainable community with individuals from the Goodall, 12MR4, Prison Farm, and Jancarich residential communities during the Early Communities period, and the Goodall, 12MR4, and Spoonville communities during the Middle and Transitional Communities periods (Table 6-7). Based upon the large presence of Goodall community-made vessels at every Stillwell community site, it is safe to assume that the Stillwell community was closely related to and/or frequently came into contact with the Goodall residential community. This is also supported by evidence suggesting the shared use of the lower Kankakee valley by both of these communities (see Chapter 5)

Furthermore, despite the absence of Prison Farm, Jancarich, and Spoonville residential community signatures at Stillwell community sites, there are Stillwell community signatures present at Prison Farm, Spoonville, Jancarich, and Goodall community sites in variable frequencies (see Prison Farm, Jancarich, and Spoonville sections). This perhaps suggests that there was more frequent northward movement by Kankakee residents than southward movement by Prison Farm and Jancarich peoples. The Stillwell community also appears to have used several sites in Marshall County as well (see Figure 5-21). Evidence for symbolic community participation is present at the Norton, Mud Lake, and Weise Mound sites (Table 6-3), as well as the Sumnerville Mound complex. Residential communities involved in the Stillwell symbolic community included the Goodall, 12MR4, Prison Farm, and Spoonville communities (Table 6-7).

	Sustainable Community (Early period)	Sustainable Community (Middle and/or Transitional period)	Symbolic Community* (Early, Middle and/or Transitional period)
Residential Communities	Goodall (n=19)	Goodall (n=8)	Goodall
	12MR4 (n=2)	12MR4 (n=2)	12MR4
	Prison Farm (n=1)	Spoonville (n=3)	Prison Farm
	Jancarich (n=1)		Spoonville

Table 6-7: Stillwell Residential Community's Sustainable and Symbolic Community Participation (* symbolic community determined by presence of vessels made by other communities who used same burial mounds as the Stillwell community)

Stillwell Residential Community Sustainable Community Involvement

Stillwell site
(n = 5 Havana samples and 1 Hopewell sample excavated from
the Stillwell site that were made by other residential communities)

Four total samples were found to have been made by the Goodall residential community at the Stillwell site. Two Havana samples were manufactured by Goodall community members with the most commonly used clay at the Stillwell site. One additional Havana sample was found to have been made by Goodall community members (matching Goodall community recipe) but with a loessic clay (with a SSI of 1.0) from the Kankakee, based partially upon the presence of epidote in the paste. The body thickness, cord width, and the number of twists per centimeter present in the cordage are most similar to Goodall community means as well. One Hopewell-related sample from the Stillwell site was also found to have been manufactured with a Kankakee valley clay by the Goodall residential community.

There is also evidence of two Havana vessels from Stillwell that were likely imported from the 12MR4 community. The extremely sandy clays (33.5% and 52.3%, respectively) are similar only to Marshall County clays. The percent temper and sand is well within the statistical range of both of the sites in the 12MR4 residential community during the Early Communities period (i.e., 12MR4 and 12MR5). Body thickness values for both of these samples (9.63 mm and 10.2 mm) are within the mean range of 12MR4 (9.5 mm) and 12MR5 (9.2 mm). Sample #10's TSI of 3.9 is almost identical to 12MR4 (4.0), which has the highest average TSI of any site in this research. This sample also has a cord width of 0.45, which is very similar to the Marshall County mean of 0.6 mm.

Mud Lake site
(n = 9 Havana samples and 6 Hopewell samples excavated from
the Mud Lake site that were made by other residential communities)

The Mud Lake site provides evidence of the presence of vessels manufactured by the Goodall (n = 13) and 12MR4 (n = 2) residential communities. Of the thirteen Goodall-made samples, three Havana vessels are likely imports from the Goodall community. All three of these are Naples Ovoid stamped samples (S3, 9, 17) which were constructed with an unidentified clay source that is unusually silty and sandy. Based upon the presence of epidote in all three samples, it is likely that the clay originated somewhere in the Kankakee.

Ten other samples were probably made by the Goodall community with various clay types. There were only two Mud Lake site Havana samples in this research that were dentate stamped and noded. One sample probably was manufactured with a St. Joseph River valley clay and, thus, was likely made by Goodall residential community peoples in the St. Joseph valley and was later deposited at Mud Lake. The second sample matches the composition of Marshall County clays and was likely made in that region by Goodall community peoples.

Two of the three Sister Creek samples (samples 1 and 16) and two of the five Hummel Dentate Stamped samples (samples 5 and 20) at the site were likely made by Goodall community people. These samples were made with the most commonly used clay present at the Mud Lake site by Goodall community people. The results from the compositional data are corroborated by stylistic and morphological data in these cases. Additionally, four Hopewell-related samples were determined to have likely been made by the Goodall community with a Kankakee clay type, probably near the Mud Lake site. The large sand size index values for these samples (1.7, 1.7, 1.6, 1.6), which are characteristic of Kankakee valley clays (see Chapter 4), and the presence of epidote in the pastes firmly places the origin of these clays in the Kankakee.

Lastly, two Hopewell-related samples appear to have been manufactured by the 12MR4 residential community. Both of these samples contain unusually silty clays (20% and 22.3%, respectively) and do not match any defined clay type in this research. Based upon clay composition, natural inclusion types and sand size indices, the most likely origin for these clays is probably Marshall County. Additionally, the combination of recipe, pyrotechnology (i.e., slightly active pastes), and body thickness (5.78 mm and 5.6 mm) suggests a likely 12MR4 community creator.

Stillwell Residential Community Symbolic Community Involvement

Norton Mounds (n = 2)

Two Havana samples from the Norton Mounds provide evidence of mortuary ceremonialism participation by the Stillwell community likely during the Early Communities period. One is an import from the Stillwell residential community, containing the Stillwell recipe and matching upper Kankakee valley clay parameters. It also has a body thickness of 10.3 mm, which is similar to the Mud Lake mean (10.04 mm) and is within the range of the Stillwell site's average (9.1 mm). The second sample utilized an unusually silty and unidentified clay source that likely originated from the Grand River valley (based upon natural inclusions). Thus, this vessel was likely made in the Grand valley by Stillwell peoples, perhaps before their participation in mortuary ritual at Norton. The presence of pyroxene in the paste, which is significantly more common in the Grand River valley, supports this conclusion.

Mud Lake Mounds (n = 1)

One Hopewell Incised rim with hemiconical punctates and an interior beveled lip shape provided evidence of the Stillwell community participating in mortuary ritual at Mud Lake. It is likely that the clay for this sample originated from the Kankakee based upon the low percentage of silt (1.3%) and sand (3.7%), as well as the presence of ARF's and the relatively large sand size index of 1.7 (which is diagnostic of Kankakee clays). Meanwhile, the recipe (including 29.8% temper and 2.6% sand), temper size index (2.8), temper types (granite + grog), and morphology (5.0 rim thickness and 4.13 lip thickness) all fall comfortably within the values of the Stillwell community.

Weise Mounds (n = 1)

One Naples Zoned Dentate Stamped sample likely represents an import from the Stillwell residential community. The paste parameters (2.2% silt and 8.2% sand) conform to Kankakee values, while the combined presence of epidote, muscovite and biotite also point toward a Kankakee origin. A 1.55 sand size index approaches the mean Kankakee valley value of 1.58 (see Chapter 4 and Table 4-3), as well. The recipe (percent temper at 33.9% and percent sand at 5.4%) matches only the Stillwell community's recipe. Furthermore, the dentate width (1.4 mm) and body thickness (7.95 mm) are within the statistical ranges of the Stillwell community.

Sumnerville Mounds (n = 7)

Due to the paucity of thin section data available from the Sumnerville Mounds, conclusions in this section are drawn primarily from the stylistic and morphological analyses of seven total Havana-like and seven total Hopewell-related samples. Despite this drawback, it became obvious that the style and morphology of these vessels was more similar to samples in the Kankakee than in west Michigan. The evidence supports a strong level of participation by Kankakee valley peoples (i.e., Stillwell and Goodall communities) in mortuary ritual at this site. Rim, lip, and body thickness, as well as dentate stamping width, for Havana samples are all large and suggest a relatively early temporal placement (i.e., Early Communities period) of these samples. One diagnostic Kankakee valley trait common at Sumnerville Mounds is the relatively thick lips in relation to rim thickness. Two samples actually contained lips that were thicker than their rims, a strong Kankakee (and Stillwell site) trait. Mean body thickness (9.9 mm) is eerily similar to Mud Lake (10.04 mm), 12MR217 (9.5 mm), and is within the statistical range of Stillwell values (9.1 mm). The mean Havana lip thickness (9.6 mm) from Sumnerville samples is also most similar to Kankakee sites. Lastly, mean Havana dentate width (2.05 mm) is similar to the means from Stillwell and Mud Lake (1.8 mm) and falls within their statistical ranges.

Although it was impossible to identify exactly where these samples originated from (due to the lack of thin section data), the results strongly support a general Kankakee valley origin for many Havana and Hopewell vessels. Since only two of the earliest Havana-related residential communities are present in the Kankakee, it is safe to assume at least some degree of participation by Stillwell community members at Sumnerville. Thus, participation from Stillwell community individuals at Sumnerville is likely, which would have functioned to maintain symbolic community ties with at least the Jancarich and Spoonville communities who also manufactured vessels recovered from Sumnerville (refer to Jancarich and Spoonville sections above).

Goodall Residential Community

The sustainable community developed by the Goodall community included contacts with members from the Stillwell, 12MR4, Jancarich, and Prison Farm residential communities during the Early Communities period and the Spoonville, Stillwell, 12MR4, and Amey residential communities during the Middle and/or Transitional Communities period (Table 6-8). Goodall-manufactured samples found at sites associated with other residential communities are discussed in separate sections in this chapter (in the Prison Farm, Spoonville, Stillwell, and 12MR4 sections). Symbolic community participation consisted of interactions with all residential communities in this research (excluding the Amey community), which points toward a rather significant Goodall residential community contribution to the spread of Havana-Hopewell throughout the study region. Mortuary sites with Goodall community signatures include the Brooks, Norton, Spoonville, Moccasin Bluff, Mud Lake, and Weise Mound sites (Table 6-3), and probably the Sumnerville Mounds as well.

	Sustainable Community (Early period)	**Sustainable Community (Middle and/or Transitional period)**	**Symbolic Community* (Early, Middle and/or Transitional period)**
Residential Communities	Stillwell (n=16)	Spoonville (n=10)	Jancarich
	Prison Farm (n=7)	Stillwell (n=8)	Spoonville
	Jancarich (n=5)	12MR4 (n=3)	Prison Farm
	12MR4 (n=2)	Amey (n=1)	Stillwell
		Unknown (n=1)	12MR4

Table 6-8: Goodall Residential Community's Sustainable and Symbolic Community Participation (* symbolic community determined by presence of vessels made by other communities who used same burial mounds as the Goodall community)

Goodall Residential Community Sustainable Community Involvement

Goodall site
(n = 5 Havana samples and 2 Hopewell samples excavated from
the Goodall site that were made by other residential communities)

Not surprisingly, there is good evidence of vessels manufactured by Stillwell residential community individuals at the Goodall site. Two Havana samples were probably made by Stillwell peoples likely with clay from the Goodall site. The strong presence of ARF's in the pastes and rim and lip thickness values are more similar to the Mud Lake and Stillwell sites than Goodall or Good's Ford sites. A third Havana sample was also probably made by Stillwell community people but with a clay that is more similar to those observed in nearby Stark and Jasper Counties. Finally, a Hopewell Zoned Dentate Stamped sample was probably made by the Stillwell community (based upon 41% temper and 4.1% sand in the body, 3.6 temper size index, and a thick body of 8.2 mm) with a Kankakee River valley clay (based upon the presence of ARF's and diagnostic Kankakee percentages of silt and sand).

There is also evidence of the presence of vessels constructed by the Jancarich residential community at the Goodall site. One Havana sample from the Goodall site contains a recipe that straddles the boundaries between the Jancarich and Prison Farm residential community recipes. However, the vertical rim and round lip combination is relatively more common at Jancarich than at Prison Farm. The clay contains a lot of ARF's, and the natural inclusions present in the paste (including biotite mica, hornblende, and quartzite) strongly suggest an upper or middle Kankakee origin. Another particularly diagnostic trait of this sample's paste is the presence of the same orange-brown colored chert that is common in the Goodall and Good's Ford site region, while the use of granodiorite temper is another common Kankakee occurrence. Based upon the available data, it is suggested that this vessel was likely made by the Jancarich community with an upper-middle Kankakee valley clay type. This finding corroborates the findings of one sample from Mound 22 at Goodall that was likely made by the Jancarich community (refer to the Jancarich section above).

Lastly, a slipped Brangenburg Plain rim sample from Goodall was made with a silty (19.6%) clay likely from the Kankakee valley, based upon the presence of epidote, biotite, and rhyolite in the paste (all common Kankakee clay traits). The creator of this vessel, however, is unclear. It contains no temper, which severely restricts valid interpretations related to its assignment to a residential community. It contains a slightly active paste, a 10.3 mm rim thickness, and a 15.1 mm lip thickness, which also did not assist in finding a creator of this vessel. Therefore, this sample could not be assigned to any residential community.

Good's Ford habitation site
(n = 7 Havana samples and 1 Hopewell sample excavated from the Good's Ford site that were made by other residential communities)

There is a strong Stillwell residential community presence at the Good's Ford site. Three Havana samples at the site were determined to have been imported from the Stillwell residential community, matching the recipe and most commonly used clay employed by potters of the Stillwell community. One additional Havana sample, part of a Hummel Dentate Stamped vessel, was likely made by Stillwell community potters at the Good's Ford site. Lastly, one Hopewell Dentate Rocker Stamped body sherd was likely made by the Stillwell community with a nearby Kankakee clay. The clay composition (4.7% silt and 3.7% sand) matches the most commonly used Kankakee Havana and Hopewell clays, while the presence of muscovite also supports a Kankakee origin. The percent temper (43.1%) approximates only the Stillwell community, while an 8.33 mm body thickness conforms to the relatively thick Kankakee site averages (7.1-8.5 mm)

Lastly, a Jancarich residential community presence is evident at the Good's Ford site. Three Havana samples were determined to have a Jancarich community origin. Two of these (samples 5 and 11) were compositional outliers, containing more silt than the most commonly used clay at Good's Ford (see Figure 6-5 below). In these instances, it was vital to pay close attention to the natural inclusions present in the paste. The paste for sample #5, for example, included grey chert, hornblende, and quartzite, a combination which suggests a likely origin from either the Kalamazoo or St. Joseph River valleys. The lack of ARF's in the paste support the inference that the clay originates from outside the Kankakee.

Besides matching the low percent temper characteristic of the Jancarich residential community, other evidence supports a Jancarich community origin. Body thickness is within the lower edge of the statistical range for Jancarich site body thickness values and the cord width (0.3 mm) of this sample is almost identical to Jancarich's mean value of 0.4 mm. Based upon these data, it is concluded that this sample was likely made by Jancarich community individuals who used a clay from the Kalamazoo or St. Joseph valleys.

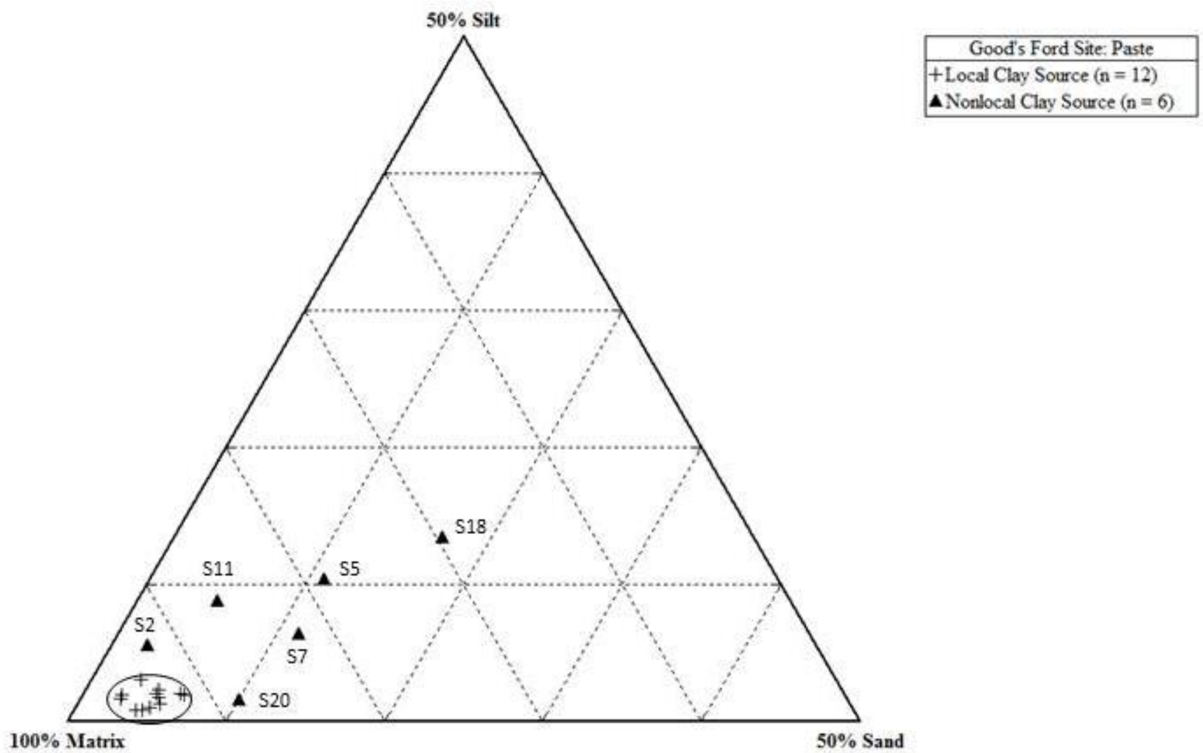


Figure 6-5: Paste for Good's Ford Site ("S2" refers to Sample #2 and so on)

Sample # 11, a Naples Dentate Stamped vessel, matched the Jancarich recipe and some morphological traits, but the silty clay was likely extracted from the Kankakee. The presence of ARF's, biotite, chert, epidote, and quartzite in the paste all strongly support this conclusion. Lastly, a Steuben Punctate sample matches the most commonly used clay at the Good's Ford site and contains a significant amount of ARF's and was therefore likely made at the site or at least in the Kankakee. This sample's morphological variables were smaller than other Havana-related samples, likely suggesting that it is slightly later temporally (middle to late Goodall phase). If this is the case, this sample could also have been manufactured by the Spoonville residential community, a community that arose during the Middle Communities period.

The rim thickness (7.2 mm) and lip thickness (5.0 mm) is closer to Spoonville site means than Jancarich means. This sample has a vertical rim with a beveled interior lip, which is not uncommon at either Jancarich or Spoonville. In any case, the low percent of temper matches only the Jancarich or Spoonville residential communities. Therefore, depending on the temporal placement of this particular sample, it was likely manufactured by either the Jancarich or Spoonville residential community. If it was made by Spoonville members, this provides additional evidence of the Spoonville community continuing its parent community's (i.e., Jancarich) interactions with groups in the Kankakee through time.

Goodall Residential Community Symbolic Community Involvement

Brooks Mound (n = 1)

A Hopewell vessel from the Brooks Mound site is tentatively suggested to have been manufactured by the Goodall residential community during the late Early Communities or early Middle Communities period. It was made with an unusually silty clay probably from the Muskegon valley. The presence of opaque minerals in the paste supports a Muskegon valley origin, while the recipe (especially the 27.9% temper) matches the Goodall community. If this is the case, this points towards the actual movement of a member (not just a pot) of the Goodall community to the Muskegon valley for mortuary participation, a rare instance involving very long distance mobility.

Norton Mounds (n = 4)

There are four Havana samples from the Norton Mounds site that provide evidence of Goodall symbolic community participation in the Grand River valley during the Early Communities period. One was probably made with Kalamazoo valley clay, while two were likely imports from the Kankakee valley (matching the paste and body of the Goodall community). Lastly, one Havana Incised sample was made by the Goodall community with an unknown clay type, perhaps originating from the St. Joseph or Grand valleys or Marshall County (based upon the paste data). Interestingly, two samples from the Stillwell residential community were deposited in mounds at the Norton Mounds site as well (see above), suggesting a somewhat important Kankakee influence in mound ritual at Norton.

Spoonville Mounds (n = 2)

A Hopewell vessel with a zoned crosshatched and punctated rim and a quadrilobate zoned and plain rocker stamped body section (Figure 6-6, vessel on right) was investigated, along with a Hopewell vessel with a zoned rocker stamped and punctated rim and a zoned dentate stamped body (Figure 6-6, vessel on left). Both vessels were tempered with limestone (leached limestone in one sample), grog, and granite. The paste compositions, relative lack of sand, and natural inclusions present in the paste were most similar to clays observed at Kankakee valley sites, while the recipe matches the Goodall residential community. Therefore, these samples were likely made by the Goodall community in the Kankakee and represent imports from this region to the Spoonville site. Whether or not this reflects down-the-line exchange or the actual transport of this vessel north by Goodall peoples is unclear.

Figure 6-6: Hopewell Vessels from Spoonville Mounds

Moccasin Bluff Mound (n = 1)

A Hopewell Plain bowl (Figure 6-7) with a burnished exterior surface treatment is mentioned to have possibly originated from a burial mound in the southern portion of the Moccasin Bluff site (Bettarel and Smith 1973). This sample's paste is more silty (12.4%) than any most commonly used clay type defined in this research. However, the small sand size index (1.17) is most similar to means from the Bobinski and Stillwell (1.0) and Good's Ford (1.05) sites, which are all Kankakee-affiliated sites. Furthermore, it contains microcline, biotite, muscovite, hornblende, quartzite, and perthite in its paste. Biotite and perthite are most common in Hopewell samples from the Kankakee, while muscovite is most common in the St. Joseph and

Kankakee valleys. Thus, the cumulative evidence most likely suggests a Kankakee origin for the clay.

The percent temper for this sample (12.5%) matches that of several residential communities, including the 12MR4, Jancarich, Spoonville, and perhaps the Goodall or even Amey communities. It is tempered with grog (that contains limestone within it). Grog temper is most common in the Kankakee and in Marshall County. The small temper size (2.67) is similar to the Behner and Stillwell sites, two Kankakee-affiliated sites. The rim thickness (3.78 mm), lip thickness (2.62 mm), inverted rim shape, and round lip shape are most similar to other Goodall community sites, such as Bobinski, Brems, 12JS3, Newton County, and Schoon. The best interpretation, based upon the available data, is that this bowl could have been manufactured by the Goodall residential community, despite the low amount of temper included in its construction. Therefore, this sample could represent an import from the Goodall residential community which probably employed it in mortuary ritual at the Moccasin Bluff site. An origin from outside the study region is also a possibility that cannot be disregarded at this time.

Figure 6-7: Hopewell Plain Bowl from Moccasin Bluff Site

Mud Lake (n = 13)

At least some of the thirteen samples (described above in the Mud Lake section) were likely from or intended for mortuary ceremonialism surrounding the burial mounds at the Mud Lake site. Unfortunately, these samples were primarily surface collected and we cannot confidently confirm their mortuary context due to the lack of provenience data. Regardless, it is likely that at least some of these samples were constructed by Goodall residential community members (thirteen samples contain a Goodall community recipe) with the intention of utilizing them in mortuary mound ritual at Mud Lake.

Weise Mound (n = 5)

Three Havana-related samples were determined to have likely been manufactured by the Goodall residential community at Weise. Two represent actual imports from the upper or central

Kankakee, as evidenced by the presence of ARF's, biotite, and epidote in their pastes. The other Havana sample was probably made by the Goodall community but with an unknown silty clay that lacked ARF's. The presence of epidote, however, tentatively suggests its origin lies somewhere in the Kankakee basin. All three of these samples' morphological variables were well within the statistical range of the Goodall community and, therefore, supported their designation as Goodall residential community-made samples. There were also two Hopewell-related samples that were manufactured by the Goodall community (both tempered with granodiorite and possessing similar body thickness values of 7.1 mm and 7.08 mm) with a clay matching the most commonly used clays recovered from sites in the upper-middle Kankakee (containing epidote, muscovite, and hornblende).

Sumnerville Mounds (n = 7)

As explained above in the Stillwell community section, stylistic and morphologic data on samples from Sumnerville Mounds suggests a stronger Kankakee stylistic influence in comparison to west Michigan populations. Goodall community individuals were likely participants in burial mound ritual at Sumnerville but this interpretation cannot be tested at this time due to the lack of petrographic data.

12MR4 Residential Community

The 12MR4 residential community appears to have a relatively smaller sustainable community network compared to other communities. It also appears that it was rare for other communities' vessels to be constructed with clays originating from their homeland in Marshall County. Their sustainable community included participants from the Goodall residential community (as evidenced by samples at the 12MR4 and 12MR115 sites) and Stillwell residential community (as evidenced by two 12MR4 imports recovered from the Stillwell site: see Stillwell section above) during the Early Communities period (Table 6-9). During the Middle and Transitional Communities periods, sustainable community involvement expanded to include participation from the Goodall, Stillwell, Spoonville, and Jancarich residential communities. Pottery vessels that were made by the 12MR4 residential community at Stillwell, Spoonville, and Jancarich residential community sites during this later temporal span were already discussed in the Stillwell, Spoonville, and Jancarich sections above.

	Sustainable Community (Early period)	**Sustainable Community (Middle and/or Transitional period)**	**Symbolic Community* (Middle and/or Transitional period)**
Residential Communities	Goodall (n=2)	Goodall (n=1)	Goodall
	Stillwell (n=2)	Stillwell (n=2)	Stillwell
		Spoonville (n=3)	Spoonville
		Jancarich (n=1)	

Table 6-9: 12MR4 Residential Community's Sustainable and Symbolic Community Participation (* symbolic community determined by presence of vessels made by other communities who used same burial mounds as the 12MR4 community)

Interestingly, there is no evidence of 12MR4 residential community members traveling into west Michigan during the Early Communities period. The Stillwell site appears to have been the northernmost location that provided evidence of the northward extent of 12MR4 community ceramic signatures during this time. During the Middle Communities period, however, there is evidence of vessels manufactured by the 12MR4 community at the Jancarich site in the Muskegon valley and at Converse and Spoonville in the Grand valley. The symbolic community of 12MR4 included the participation of the Goodall, Stillwell, and Spoonville residential communities. Vessels manufactured by members of the 12MR4 residential community have been recovered from the Spoonville, Moccasin Bluff, Scott, Mud Lake, and Weise Mound sites (Table 6-3).

12MR4 Residential Community Sustainable Community Involvement

12MR4 site
(n = 2 Havana samples excavated from the
12MR4 site that were made by other residential communities)

Two Havana-related samples (one with an AMS date of B.C. 110 – A.D. 50) from the 12MR4 site contained a recipe diagnostic of the Goodall residential community and a clay characteristic of most commonly used clays in the Kankakee. Thus, these both represent probable imports from the Goodall community in the upper Kankakee valley. These samples point towards a very early Havana influence from the Goodall region during the early portion of the Early Communities period. As such, these can probably be seen as having contributed to the initial transition from an Early Woodland community to a Middle Woodland Havana-related one at 12MR4.

12MR115 site
(n = 1 Hopewell sample excavated from the
12MR115 site that were made by other residential communities)

One Hopewell-related sample from 12MR115 was determined to have likely been made by Goodall residential community members with a most commonly used clay characteristic of the Marshall County region. Natural inclusions such as muscovite, epidote, hornblende, and quartzite, as well as a 1.36 sand size index support a Marshall County origin for the clay. The recipe, temper size index, and body thickness (8.5 mm) matches or are most similar to the Goodall community. Interestingly, this sample was tempered with quartz arenite sandstone, which was only observed in one other sample in this research at the Brems site, a site determined to be part of the Goodall residential community.

12MR4 Residential Community Symbolic Community Involvement

Spoonville Mounds (n = 1)

One Hopewell quadrilobate Zoned Plain Rocker Stamped vessel with an incised rim appears to have been imported from the 12MR4 residential community. A sand size index of 1.3 for the paste and the presence of biotite in the paste (most common in Marshall County and the Kankakee) support a Marshall County origin for the clay. The 17.7% temper is most similar to the Hopewell means for Marshall County (17.7%) and the Kankakee (19.3%). The two variables that support a 12MR4 rather than a Goodall or Stillwell community origin are temper type and lip thickness. This sample is limestone tempered which is much more common in Marshall County Hopewell samples (25%) than Kankakee samples (3.2%). The sample's lip is 4.13 mm thick, which splits the averages for the 12MR78 (3.8) and 12MR115 (4.2 mm) sites, two sites included in the 12MR4 residential community. Therefore, the cumulative evidence suggests that this sample was likely imported from the 12MR4 community to the Spoonville site, either from down-the-line exchange or by 12MR4 community members themselves.

Scott Mound (n = 1)

The style and morphology of one Hopewell Punctate sample from the Scott Mound was examined before it was repatriated to a federally recognized tribe in Michigan. Unfortunately, it was unavailable for petrographic analysis. Therefore, the interpretations here are based solely upon the stylistic and morphological analyses and should be regarded as tentative. The rim thickness (4.4 mm) is most similar to the means from Stillwell (4.9 mm) and 12MR78 (5.05 mm), while the lip thickness (3.7 mm) is most similar to site averages from 12JS3 (3.7 mm), 12MR78 and Schilling (3.8 mm), and 12MR115 (4.2 mm). Lastly, the body thickness (6.2 mm) is comparable to site averages from Moccasin Bluff (6.2 mm), Mud Lake (5.96 mm), and

12MR115 (5.9 mm). Based upon the few data present for this sample, the best guess is that it could have been manufactured by the 12MR4 residential community. However, a Goodall, Stillwell, or another community origin is certainly plausible.

Mud Lake (n = 2)

A Hopewell Plain Rocker Stamped sample and a Hopewell Zoned Dentate Rocker Stamped sample also containing dentate stamping from Mud Lake suggest the participation of the 12MR4 residential community in a symbolic community operating at this site. Both were probably made with a clay from Marshall County based upon the presence of epidote, muscovite, and biotite in the paste, as well as sand size indices more similar to Marshall County samples than Kankakee samples. The recipe approximates many Marshall County Hopewell samples, while its pyrotechnology (slightly active pastes) is diagnostic of the 12MR4 residential community. Additionally the body thickness for these two samples (5.78 mm and 5.6 mm) is similar to 12MR115 values, while the light buff-colored exteriors are similar to some Marshall County Hopewell samples. Therefore, the best interpretation of the data is that these two samples were probably imported from the 12MR4 residential community for the purposes of mortuary ceremonialism. This scenario is supported by the relatively strong relationship between the nearby Stillwell and 12MR4 communities that has been documented in this dissertation.

Weise Mound (n = 1)

One Hopewell sample was likely made by the 12MR4 residential community. The percent temper (13.3%) matches the range of several communities, including 12MR4, Prison Farm, Jancarich, and Spoonville communities. The large body thickness (11.83 mm) would seem to eliminate the Jancarich and Spoonville communities as the most likely creators. Although it is most similar to Prison Farm mean body thickness values, there are locally manufactured 12MR4 samples that are as thick as this sample. Additionally, the extremely sandy (43.9%) paste is only characteristic of the Marshall County region and the presence of epidote and microcline support a Marshall County or Kankakee valley origin. If we also consider the observed increase in 12MR4 community participation within the Kankakee at this time, it is most likely that this sample was created by a 12MR4 community individual and is probably an import from the Marshall County region.

Amey Residential Community

The Amey residential community was a relatively late newcomer to the study region, arising during the Transitional Communities period (or perhaps the late Middle Communities period). There is no evidence for their participation in a symbolic community in the study region, which supports the relatively late temporal placement of this community in the study region. Sample #7, a Naples Dentate Stamped sample, was the only sample from the Amey site that was found to be nonlocal. It matched the body values of the Goodall community but was constructed from the Amey site's most commonly used clay. This provides evidence for a shared sustainable community relationship between the Amey and the Goodall residential communities occurring near the Amey site locale. This is not surprising given the strong Goodall and Stillwell community presence at this time in the lower Kankakee documented in this research at the nearby Yahl, Schoon, Harper, Watson, and Wunderink sites, and in Newton County. Therefore, the Amey community's sustainable community involved the Goodall residential community (Table 6-10), and perhaps the Stillwell community as well.

	Sustainable Community (Transitional period)
Residential Community	Goodall (n=1)

Table 6-10: Amey Residential Community's Sustainable Community Participation

Conclusion

This chapter began with a general discussion of the frequency of nonlocal samples in this research and the number of river valleys these nonlocal samples traveled across before final discard. A more specific identification of each residential community's sustainable and symbolic communities ensued, highlighting the dynamic and complex relationships between these peoples. These relationships suggest the presence of open social boundaries that remained fluid between these communities over time. Although the presence of open social boundaries between closely located communities was expected (as was documented in Chapter 5), the presence of similarly open boundaries documented in this chapter among more far reaching communities was striking. This conforms well, however, to the ethnographic and ethnohistoric data on small-scale societies and their far reaching mobility and interaction patters. Specifically, these types of societies typically show limited interest in the maintenance or defense of true territorial boundaries, despite the fact that they live within a loosely defined procurement territory that they associate with on the basis of primary kinship ties (Holman and Kingsley 1996).

In these cases, Cashdan's (1983) "social boundary defense" model conforms better to what is expected from communities in this research. Generally, due to the large size of territories (as documented in this research for all residential communities), defense of local group boundaries would not only be unrewarding but impossible in face of the need to collect food. A more efficient strategy that likely was employed by Middle Woodland peoples in the study region is to make acceptance into the local land-using group a preliminary requirement for using the resources in its territory. Thus, the boundaries of the *social group*, rather than the perimeter of the territory itself, are the object of "defense."

The rites of access to these social groups (residential communities in this research) generally involve exchange and gift giving, which are vital forms of the permission-granting behaviors whereby these small-scale societies regulate access to resources so that resources can be conserved or managed (Kelly 1995; Whallon, Lovis, and Hitchcock 2011). Rites of access can also take the form of elaborate greeting ceremonies (frequently involving the active symbolism of identity), so that greeting ceremonies can be functionally analogous to boundary defense (Peterson 1975). Admittance of outsiders involves the expectation that access, favors, obligations, and the exchange of information (about the environment for example) will be reciprocated (a form of "social storage" or risk reduction). Granting of permission generally involves the allocation of particular foraging areas to be used by visitors, which ensures that both residents and visitors make optimum use of an area's resources.

This type of land tenure and the open social boundaries that result from such a system is characteristic of small-scale societies and is an integral part of hunter-gatherer lifeways that contribute to their long-term survival (Halstead and O'Shea 1989; Ingold 1987; Kelly 1995; Smith 1991; Spielman 1986; Whallon, Lovis, and Hitchcock 2011). Ultimately, this system acts as a means of effecting *cooperation* among communities over an extensive range in a situation which precludes regular face-to-face contact between these cooperating communities in the course of extractive activities. These types of scenarios have been documented in this research in various regions of west Michigan and northern Indiana, such as the buffer zone region of the Kalamazoo and St. Joseph river valleys, the lower Kankakee valley occupation by the Stillwell and Goodall communities, or the shared use of the Marshall County region by the 12MR4 and Stillwell communities (discussed in Chapter 5). It is vital to point out, however, that these sustainable community relationships are usually supplemented, strengthened, or expanded upon by additional social, political, or religious means (e.g., network mobility or symbolic community interaction through burial mound ritual and the mobility types required for these ceremonies, etc.).

When we consider the type of social boundary maintenance mechanisms likely being employed by peoples in the study region, it is not surprising that sustainable community interactions were vast, spanning the entire study region and included participation from all residential communities, to varying degrees. It appears that, in general, northward movement by Stillwell and Goodall communities and pots into west Michigan was more common than west Michigan groups or pots traveling south into the upper and middle Kankakee. This does not imply that the migration of Kankakee peoples was the mechanism for the introduction of Havana-Hopewell in west Michigan, however, because all west Michigan residential communities maintained unique recipes through time, which remained distinct from Kankakee community recipes.

Symbolic community integration was generally not as vast or broad as sustainable community interactions, but the nature of these communities did not conform to a "local symbolic community" (Carr and Case 2006a) since participants do not appear to originate from a limited (or localized) geographic region. As illustrated in this chapter, members of symbolic communities derived from all areas of the study region, to varying degrees. Subsequently, symbolic communities provided evidence of shared mortuary ritual that involved multiple distinct communities. In fact, evidence suggests that all burial mound sites in this research (at least those containing more than one sample available for study) were utilized by *multiple* residential communities. It appears that burial mounds were used to actively define Havana-Hopewellian membership and to construct a shared sense of Havana-Hopewellian identity which resulted in the definition of a large symbolic community, one that played a dual role in binding together or maintaining sustainable community memberships. In conclusion, it is clear that regional-scale sustainable and symbolic community social boundaries within the study area were dynamic, overlapping, and continually renegotiated through time, conforming to cross-cultural expectations derived from ethnographic and ethnohistoric data on other small-scale societies.

CHAPTER 7 CONCLUSION

This dissertation has employed a bottom-up approach to identify various types of communities on multiple spatial scales in order to address the ways in which various types of information (specifically socioreligious and technological ideas related to identity, interaction networks, and the adoption of a foreign belief system) are introduced, adopted, or incorporated into an extant cultural system. The study of over 500 Havana-Hopewellian pottery samples from roughly 56 habitation and mortuary sites in west Michigan and northwest Indiana served as a case study for such an approach. An important aspect of this research was to examine Havana-Hopewell community formation on the intraregional spatial scale as a first step. This dissertation adopted the view that a community should be "thought of as a *process* of group identity formation wherein individuals actively construct and negotiate group identities and affiliations" (Ruby et al. 2006: 122).

In this research, I found that the social boundaries of various communities in the study region were open, fluid, and probably unbounded. By using an approach that combined a technical style (i.e., ceramic petrography) with a visual style analysis, I was able to accomplish the goals that were introduced in Chapter 1, one of which was the comprehensive identification of various communities on multiple spatial scales and the types of interactions that occurred between these communities. This type of approach allowed this research to go beyond the commonly relied upon tradition-phase model by examining the dynamic cultural processes operating within and between these small-scale communities before regional scale interactions were investigated.

Residential communities were the first type of community to be defined. Interestingly, these small-scale intraregional communities conformed to a "neighborhood" (Ruby et al. 2006) or a cluster of archaeological sites within a small area, generally within a river valley (with a few exceptions in which a residential community expanded across two river valleys). Following O'Shea and Milner (2002), social boundaries between residential communities appear to have been created and shared through both a combination of built structures and the ideological incorporation of major nature features. Specifically, burial mounds acted as the most important type of built structure in this research, while rivers acted as the major natural feature of importance on the landscape since the social boundaries of residential communities were generally confined to a specific portion of a major river basin.

It was revealed that the inception and definition of both sustainable and symbolic communities was a complex process that appears to have varied through time. In general, regional scale sustainable community participation was greater than those observed for symbolic community integration. As Fie (2006, 2008) observed for the lower Illinois valley, sustainable community mechanisms such as interregional visitation by small family groups appears to have been a common occurrence within west Michigan and northwest Indiana as well. The use of buffer zones, the granting of permission to resource zones through sharing or gift-giving, the creation of social storage, intermarriage, information exchange, or the reciprocal exchange of food or other material goods also appears to have been vital mechanisms (see Chapters 5 and 6).

Meanwhile, symbolic communities in this project did not meet Carr and Case's (2006a) definition of a "local symbolic community" because mortuary ritual participants did not derive from a limited geographic region. To the contrary, members of symbolic communities derived from all areas of the study region, to varying degrees. It was revealed that all burial mound sites in this research were utilized by multiple residential communities, a situation which appears to have defined membership in a symbolic community and simultaneously supported existing sustainable community relationships. The use of mortuary sites by multiple residential communities is in agreement with results deriving from other recent Middle Woodland studies in Ohio and Illinois (e.g., Carr 2008a; Carr and Case 2006a; Case and Carr 2008; Charles 1995).

Applying Clay's (1991) model to this research, the geographical location of burial mound sites in relation to the social boundaries of the residential communities defined in this research can be examined. According to Clay, burial mounds (and earthworks) can function as either "hinges" between separate communities by being placed at the edges of the boundaries of separate communities, or they can define the corporate identity of a small residential community by being located at the center of these communities' social boundaries ("bull's-eye" model). In this research, it was found that both types of models apply. Specifically, mound sites such as Norton, Converse, Moccasin Bluff, Scott, or Sumnerville Mounds appear to be located in "buffer zones" or between the social boundaries of residential communities and conform to the hinge model. These mortuary sites likely served as hinges between separate communities and as contexts for intergroup interaction, negotiation, and integration.

Conversely, other sites such as the Brooks, Spoonville, Paggeot, Weise, Mud Lake, or Goodall Mounds fall within the centers (i.e., bull's-eye model) of the social boundaries of the Jancarich, Spoonville, and Goodall residential communities, respectively. Despite this, since all burial mounds included participation from members of multiple communities, the presence of open social boundaries between all residential communities in the study region is likely. Therefore, it appears that while some burial mound sites likely acted as hinges between different residential communities, other mortuary sites located within the core areas of residential communities acted in a similar capacity as social contexts for multi-community integration and interaction. These mound sites ultimately defined membership in a larger symbolic and/or sustainable community.

Summary of Observed Temporal Trends

It is evident from the results of this project that the Havana-Hopewell phenomenon was more dynamic than earlier studies suggest. Multiple mechanisms and scenarios operating on different spatial scales were likely involved in the sharing of Havana-Hopewellian information and objects. This type of dynamic situation is exemplified in this research and illustrated below in which some of the most pertinent trends observed for each temporal period are outlined (see Chapters 5 and 6 for more detailed discussions on these topics).

Early Communities (150 B.C. – A.D. 30) Developments

1. The establishment of the five earliest residential communities (Jancarich, Prison Farm, Stillwell, Goodall, 12MR4) through interaction and selective adaptation involving diffusion of Havana information and technology.

2. The widespread interaction between all communities in this research (to varying degrees), resulting in the inception and maintenance of complex sustainable and symbolic communities.

3. The use of the Kalamazoo and St. Joseph River valleys as a buffer zone or shared seasonal locale between a) Grand and Muskegon valley peoples and b) Kankakee peoples, which could have encouraged the spread of Havana information and objects throughout the study region.

4. The use of the Moccasin Bluff site as the earliest known locale for the sharing of Havana information between west Michigan and Kankakee communities and a location of potential pilgrimage for west Michigan populations.

5. The simultaneous interment of the dead and/or participation in mortuary ritual from members of different residential communities at burial mound sites (Norton Mounds, Brooks, and possibly Sumnerville Mounds).

Middle Communities (A.D. 30 – A.D. 250) Developments

1) The temporal persistence of the original five residential communities (i.e., continuation of their diagnostic recipes and traits through time).

2) The emergence of the Spoonville residential community (likely via fission from the Jancarich residential community) and their seasonal occupation of the Kalamazoo valley.

3) An intensification of Havana-Hopewellian participation in the Grand River valley, especially at the Converse site.

4) The expansion of communities and the use of larger geographical regions by most extant residential communities (e.g., expansion into the lower Kankakee and Marshall County by the Stillwell and Goodall communities, the Prison Farm community occupation of the Davis Swamp site, or 12MR4 community travel into Michigan, etc.).

5) The use of the Portage-Thornapple Corridor as a relatively new interaction region facilitating the heightened spread of Havana-Hopewell into Michigan (as opposed to the earlier use of the west side of west Michigan during the Early Communities period).

6) The presence of unidentified ceramic compositional and stylistic signatures, suggesting the introduction and influence of new communities originating from outside the study region (that some of these likely originated from Ohio-related or Saginaw basin communities is an important hypothesis that requires future testing).

7) The relative decline in frequency of Prison Farm and Stillwell residential community ceramic signatures in the study region, compared to the Early Communities period, suggesting their potential merger into other communities, movement to areas outside the study region, or the eventual implementation of unrecognizable ceramic technologies.

Transitional Communities (A.D. 250 – A.D. 400) Developments

1) The rise of the Amey residential community in the lower Kankakee valley and their interaction with the Goodall community.

2) The continued use of the Kalamazoo valley by the Spoonville residential community at the Mushroom and Fennville sites.

3) The continued use of the lower Kankakee valley by the Goodall and Stillwell communities at the Schoon site.

4) The gradual deterioration of archaeological signatures of diagnostic Havana-Hopewell objects and, presumably, a transition to a Late Woodland lifestyle (not addressed in this research, but it remains an important future research project).

Mechanisms

With such a wide array of relationships and mobility patterns occurring between communities documented in this research, it is logical to assume an equally impressive number of mechanisms responsible for the spread of Havana-Hopewell across the study region over time. This was certainly apparent in this research. Table 7-1 lists the types of mechanisms potentially responsible for the introduction and spread of Havana-Hopewell information, technology, and ceramic style into west Michigan and northwest Indiana in rough chronological order. While certain primary mechanisms appear to operate in each case, there is clearly a multicausal trajectory of change with shifting criterion of importance. In general, the Early Communities period can be defined by the importance of diffusion, interregional visitation, intermarriage, seasonal scheduling or use of buffer zones, mortuary ceremonialism, pilgrimage, and down-the-line exchange. Of importance, interaction and selective adaptation involving diffusion of Havana information and technology is suggested to be perhaps the most important mechanism that allowed for the *initial* establishment of Havana in the study region.

The Middle Communities period witnesses the intensification and expansion of Havana-Hopewell throughout the study region through the incorporation of more and new types of mechanisms such as fission or residential units or families, territorial expansion, community merger, and an increase in mortuary mound ceremonialism, along with other mechanisms already observed (diffusion, interregional visitation, intermarriage, seasonal scheduling/buffer zones, pilgrimage, and down-the-line exchange). Lastly, the Transitional Communities period experiences a decline in Havana-Hopewell identity and provides evidence of almost all of the mechanisms listed in Table 7-1, along with evidence for the only possible occurrence of migration in the study region.

Below is a short discussion connecting these specific mechanisms to the individual sites or regions in which they were observed and detailing which mechanisms appear to be more prominent over time. Note that although these mechanisms are separated here for the sake of discussion, it is possible (even likely) that several of these were operating at the same time and within the same cultural contexts.

		TIME PERIODS		
MECHANISMS		**Early Communities**	**Middle Communities**	**Transitional Communities**
	Diffusion/ Selective Adoption	X	x	x
	Interregional Visitation/Network Mobility	X	X	x
	Migration, including Informational Mobility			X
	Fission		X	
	Intermarriage	X	X	x
	Seasonal Scheduling/ Buffer Zones	X	X	x
	Territorial Expansion		X	x
	Community Merger		X	
	Mortuary Ceremonialism	X	X	x
	Pilgrimage	X	X	
	Down-the-line Exchange	X	X	x

Table 7-1: Mechanisms for the Introduction and Spread of Havana-Hopewell, arranged by Time Period

(X = time period in which mechanism was likely more important to the introduction and spread of Havana-Hopewell; x = mechanism still likely functioning but probably not as important as other time periods; blank boxes = not observed during time period)

The first and probably the most important mechanism observed was interaction and selective adaptation resulting in diffusion, as evidenced by the identification of five statistically and qualitatively distinct Early Communities period residential communities in the study region. This mechanism appears to be the most apt explanation for the initial spread of Havana into west Michigan and accounts for the rise of the Jancarich and Prison Farm residential communities in west Michigan, and the 12MR4 community in Marshall County. It was also the accepted explanation for the inception of Kankakee Havana populations or communities (Mangold and

Schurr 2006; Schurr 1997), a proposition which is fully supported by the results of this research (with the definition of the Stillwell and Goodall communities).

Despite abundant evidence for the movement of vessels and people within and between regions, with roughly one-third (34.4%) of all Havana samples and half of all Hopewell samples being “nonlocal” (i.e., imports or samples made by members of other communities), none of the unique residential community recipes were displaced by recipes of other residential communities over time. This scenario precludes the likelihood of the long-held belief that migration accounted for the initial spread of Havana in west Michigan. The data in this dissertation simply do not support the migration hypothesis in this case. Thus, it is evident that the relatively frequent interaction, exchange, and/or movement of Havana-related people, pots, and ideas resulted in the active incorporation of selected aspects of Havana information into extant cultural systems and spurred the introduction of Havana information into west Michigan and northwest Indiana.

A second mechanism, family visitation (e.g., Fie 2006, 2008) or “network mobility” (Whallon 2006), appears to have been operating quite frequently within the study region during the Early and Middle Communities period and likely during the Transitional Communities period as well. As described in Chapter 5, it is argued that these family visits could be organized for multiple additional reasons as well: to relieve social tension, to catch up on news, to seek spouses, allies, or shamans for ritual services or cures, to distance themselves from sorcery or death, or to participate in various rituals and ceremonies. We should not view these sustainable community interactions, however, as involving all members from specific residential communities. Entire residential communities were likely not moving *en masse* or as a whole unit. Instead, network mobility and other types of mobility likely comprised individual subsectors of each residential community, who maintained varying connections to individuals from other residential communities. A simple contemporary example involves current Potawatomi interactions in Michigan and elsewhere in which some individuals from the Nottawaseppi Huron Band of the Potawatomi, for example, interact with Pokagon Potawatomi kin. Other individuals, on the other hand, have stronger historical kinship connections to the Gun Lake Band of Potawatomi or the Walpole Island First Nation and they interact predominately with these individuals (United States Department of Interior, Bureau of Indian Affairs 1995). This type of fluid composition of a community is also characteristic of small-scale hunter-gatherer societies, based upon ethnographic and ethnohistoric data (Kelly 1995), as explained in Chapter 5.

This illuminates the extremely complex networks of interaction that can operate amongst and between distinct communities. Similarly complex interaction networks were expected and were documented for Havana-Hopewell peoples in the study region who likely possessed unique historical trajectories and kin ties that determined their participation in and maintenance of these interactions. In such instances, vessels accompanying mobile individuals could represent "travel gear" that were likely used for food preparation on sometimes lengthy travels to and from their destination sites (e.g., Stoltman 2015) or were transported for upcoming mortuary or ceremonial rituals taking place at various sites throughout the study region.

A third, but rare, mechanism was the probable small-scale migration and subsequent (short-term?) occupation of the lower Kankakee valley by the Amey residential community during the Transitional Communities period. "Informational" mobility, trips undertaken in which the major motive revolves around gathering important information about the socioreligious environment (Whallon 2006), was likely applied in this instance and could have represented an incipient stage that eventually spurred a subsequent migration. As Burmeister (2000) states, the idea of pre-Columbian mass migration is extremely rare and should be replaced with the recognition that pre-Columbian migrations consisted of a process of infiltration that took place over centuries. Furthermore, the majority of pre-Columbian migratory moves were short-distance movements within a local area, especially for societies who practiced a diffuse subsistence strategy (Anthony 1990), as is the case for west Michigan and northwest Indiana populations (Brashler, Garland, and Lovis 1994; Brashler et al. 2006; Garland and DesJardins 2006; Mangold and Schurr 2006). This type of short-distance migration, an outcome of a process occurring over a long temporal span, can explain the introduction of the Amey residential community in the lower Kankakee valley. Of note is that the introduction of the distinct Amey recipe at the Amey site occurred with the simultaneous occupation of the lower Kankakee valley by the Stillwell and Goodall communities. A future research project could test the hypothesis that this scenario allowed for the Amey residential community migration and motivated and spurred interactions between the Amey, Goodall, and Stillwell communities.

A fourth mechanism explaining the spread of Havana-Hopewellian communities in Michigan is fission (Holman 1990), which likely was most important during the Middle Communities period. This mechanism likely accounts for the rise of the Spoonville residential community, which appears to have budded off from the Jancarich community. Although sufficient evidence was available to define Spoonville as a separate residential community (e.g., differences in rim shape, orifice diameter, temper size index, pyrotechnology), it is very likely that this community maintained connections to its parent community. This is based upon evidence for continued interaction between the two communities and other aspects of pottery manufacture and style that continued to be shared between them, such as similar recipes and technical styles (e.g., percent temper, rim and lip thickness, body thickness, lip shape ratios, dentate width). Thus, as a separate community, the Spoonville community primarily inhabited the Spoonville, Boom Road, and Battle Point site region, likely incorporated the Armintrout-Blackman and Mushroom sites in the Kalamazoo valley into their seasonal round, but also probably maintained ties to the Jancarich community.

The fifth mechanism likely encountered between all residential communities, to varying degrees, was intermarriage. Sustainable communities, by definition, include intermarriage and the creation of viable mating networks as a mechanism of group integration. Evidence for open social boundaries and the widespread sustainable community interactions documented in this research, including the use of buffer zones, the seasonal scheduling of resource zones, the sharing of ceramic styles and Havana-Hopewell information, and the presence of rare pottery samples manufactured by individuals of separate residential communities recovered from sites throughout the study region, point towards a considerably high degree of mobility and interaction occurring throughout the study region. It is therefore safe to assume intermarriage was operating within the study region and that it contributed to the spread and persistence of a Havana-Hopewell lifestyle, especially during the Early and Middle Communities periods.

A sixth mechanism that could spur the spread and continuing practice of a Havana-Hopewell way of life is the sharing and scheduling of resource areas or the use of "buffer zones." This is most obvious during the Early and Middle Communities periods in the Kalamazoo and St. Joseph valleys, the lower Kankakee valley (which was inhabited by both the Stillwell and Goodall communities), Marshall County, or the Lower Lake 1 site (which was likely a shared occupation between the Prison Farm and Jancarich communities). As explained in Chapters 5 and 6, this type of activity likely also involved the implementation of informational mobility as well, the granting of rights to resources, or the reciprocal exchange of food or other material goods as a form of "social storage" (Halstead and O'Shea 1989; O'Shea and Milner 2002).

The seventh mechanism for the spread of Havana-Hopewell is territorial expansion or the use of larger geographical regions by communities through time. This could have functioned to cast a wider net for the inclusion of more peoples into previous interaction networks, to maintain social ties, or to maintain knowledge of large areas in order to have backup options in case unexpected resource shortages occur (Kelly 1995). This is especially evident during the Middle Communities period through the use of the Davis Swamp site by Prison Farm community peoples, the use of Marshall County by the Stillwell community, or the "movement out of the central Kankakee area" (Mangold and Schurr 2006: 217) by the Stillwell and Goodall communities into the lower Kankakee valley and into parts of Marshall County. The Stillwell and Goodall communities' movement into the lower Kankakee hints at the possibility of an eighth mechanism in operation: the potential merger of these two communities likely during the Middle Communities period. Although additional research on the topic is needed, this scenario is partially supported by the simultaneous occupation of sites in the lower Kankakee valley, the declining frequency of Stillwell community signatures through time, and the inclusion of the dead from both communities in mound complexes through time.

Mortuary mound ceremonialism represents the ninth mechanism facilitating the inception and maintenance of Havana-Hopewell through time. The evidence suggests that all symbolic communities in this research participated in ceremonies involving the simultaneous interment of the dead with members of different residential communities. This practice is evident during the Early and Middle Communities periods in all of the mound complexes in this research and likely functioned to create new Havana-Hopewell related ties and to cement previous ones. The simple act of burying one's ancestors with those of another community not only creates a shared identity, but it also unites those ancestors together in "an essentially permanent afterlife existence, thereby giving the living strong reasons for upholding the principles of alliance" (Carr 2006c: 266). While some mound complexes in this research conform to Clay's (1991) hinge model and others follow the bull's-eye model, they all probably functioned in this capacity.

Pilgrimage to a Havana ceremonial or cultural center (Carr 2006d; Gill 1982) may also have been operating within the study region and represents the tenth mechanism for the spread of Havana-Hopewell. This may have occurred at the Moccasin Bluff site during the Early Communities period (and perhaps Converse during the Middle Communities period), as discussed in Chapter 5. Theoretically, individuals from west Michigan could have traveled to these locations in order to immerse themselves in Havana socioreligious practices. The subsequent experimentation and adoption of Havana-related behaviors and the accompanying stylistic and technological pottery traits could have occurred. This specialized knowledge could have been brought back to their communities, and certain ideas and traits that were deemed culturally acceptable would have been chosen and incorporated into extant cultural systems.

Finally, down-the-line exchange of both utilitarian and mortuary vessels is evidenced by the imported vessels documented in this research that were recovered from both habitation and burial mound sites that date predominately to the Early and Middle Communities periods. Although many of these imported vessels could represent the actual transportation of these vessels by their makers across the landscape, it is safe to assume (due to the vast distances traveled for numerous vessels) that a number of these pots (and possibly their contents) were obtained via down-the-line exchange. These imports are the least common type of nonlocal vessel category in this research, however. Evidence for the actual movement of people across the landscape who manufactured vessels from various clays throughout the study region was roughly twice as frequent as the evidence for imported vessels (see Chapter 5).

As exemplified by the presence of a complex array of mechanisms that spurred the introduction and spread of Havana-Hopewell over time, the Middle Woodland period in west Michigan and northwest Indiana was a dynamic and evolving time that involved the selection and incorporation of specific Havana-Hopewell ceramic styles and technologies, ideas, or behaviors that fit within existing cultural systems. Furthermore, the presence of open and fluid social boundaries between all communities in this research was striking. This strongly suggests that intercommunity relationships within the study region were very peaceful, conforming to the "Pax Hopewelliana" model of social cooperation (Carr and Case 2006a; Hall 1977) that has previously been applied to peoples in the Midwestern United States during the Middle Woodland period. The likely unimpeded movement over long distances observed in this research for Havana-Hopewellian peoples and pots and the gathering of peoples from distinct communities for economic means (risk reduction, exchange of resources, seasonal scheduling of resource zones, etc.) or for various ceremonies is in agreement with studies from elsewhere in the Havana-Hopewellian world (e.g., Carr 2006c, 2006d; Case and Carr 2008; Fie 2006, 2008; Hughes 2006; Ruby 2006; Ruby and Shriner 2006; Spence and Fryer 2006; Stoltman and Mainfort 2002; Walthall, Stow, and Karson 1980). Thus, Havana-Hopewellian interactions within the study region overwhelmingly focused on the *cooperation* of these peoples for common social, religious, economic, and political purposes.

Future Research

There is a significant amount of future research that must be completed in order to more comprehensively understand and document the inception, maintenance, and demise of Havana-Hopewell. First of all, I would like to conduct additional studies that utilize a similar methodology that was employed in this dissertation to examine Havana-Hopewellian pottery from the Saginaw basin and Ohio regions, or Laurel populations located further north in west Michigan. These studies would go a long ways towards documenting their likely contribution to the introduction and continuation of Havana-Hopewell in west Michigan and northwest Indiana. Although this dissertation tackled a large geographical area and contributed significantly to these topics, a relatively more comprehensive picture would emerge from such studies.

Additionally, studies focusing on other types of Middle Woodland material culture within the study region (e.g., lithic, faunal, subsistence data, etc.) would also provide a more comprehensive image of past social dynamics. The study of pottery samples in this research certainly provided us with a complex image of Havana-Hopewellian cultural dynamics but pottery provides us with only one opportunity to glimpse into the past. Studies incorporating other types of material culture would most likely reveal overlapping and perhaps entirely different cultural trajectories, interaction networks, and settlement-subsistence patterns than those recorded in this dissertation.

For example, one problem within the study region is the presence of aceramic Middle Woodland sites (Brashler, Garland, and Lovis 1994), which clouds our interpretations of these cultural systems. Due to the multicomponent nature of most Middle Woodland sites in the study region, our inferences regarding settlement-subsistence patterns and chronologies are hindered because some notched and expanding stemmed projectile point styles exhibit continuity from the

Early Woodland into the Middle Woodland period (Clark 1990). A better understanding of these aceramic sites represents just one example of the additional types of future research projects that could be employed that incorporate other types of material culture types.

Another important future consideration revolves around the determination of the contents of pottery vessels that were being exchanged between populations in the study region and how those contributed to past subsistence and settlement patterns, as well as the interaction networks and mobility patterns identified in this research. For example, there is recent mounting evidence that maize was being incorporated into diets earlier than expected, as early as the early Middle Woodland period in the Saginaw basin of east Michigan (probably in the form of a dried version: kernels or flour) (Raviele 2010), in Quebec (St.-Pierre and Thompson 2015), in New York state (Hart and Brumbach 2005; Hart et al. 2007; Hart and Lovis 2013), and during the Middle Woodland in Ontario (Boyd and Surette 2010). Despite the low level incorporation of maize (and other cultigens) into the diet, subsistence patterns in west Michigan do not appear to have been drastically altered (Brashler, Garland, and Lovis 1994) and a transition to a settled agricultural village lifestyle was not achieved (Hart and Lovis 2013; Hart and Means 2002). It would, nevertheless, be interesting to examine whether or not potential expansions in interaction networks (i.e., sustainable and symbolic communities) or increasing degrees of mobility commenced with the exchange of pottery vessels containing maize, or other cultigens. A more complex subsistence pattern incorporating wider variety of resources is becoming ever present.

Furthermore, future research focusing on the breakdown and eventual demise of Havana-Hopewell within west Michigan and northwest Indiana is essential and would contribute to a better understanding of the Transitional Communities period outlined in this dissertation. Although extant general models (e.g., Bender 1978; Braun 1977, 1986; Carr 2008b; Charles

2012; Griffin 1960; Tainter 1977) may be applicable to this area, this research has shown that understanding what is going on within local contexts and developing models from these specific regions is a more appropriate approach to understanding the unique economic, social, religious, and political dynamics operating in that specific region. Relying on models from elsewhere can limit or mask the complex cultural dynamics unique to each region. Additionally, collection of more radiocarbon dates would further solidify certain sites within the Transitional Communities period and add to a better understanding of the cultural dynamics within this region through time.

Contributions to the Field of Anthropology

An important theoretical contribution of this project involved the investigation of information exchange in a more quantifiable and inclusive manner than previous studies within the study region. It ultimately expanded our dialogue on information exchange to include active and passive expressions of social identity via the study of both ceramic styles and technologies. It also considered the development of identity, communities, interaction networks, and mobility on multiple spatial scales and how these changed over time, providing a long-term perspective to information exchange processes among small-scale societies. Common mechanisms that contribute to the long-term survival of small-scale societies were documented in this dissertation, such as the use of buffer zones, the seasonal scheduling of resource zones, intermarriage, visitation, ritual participation, or the reciprocal exchange of food or other material goods as a form of "social storage." These mechanisms were traced temporally throughout the study region, revealing the presence of an extremely complex array of interaction networks and degrees of mobility.

On a more general theoretical level, this research provided important insights into the functioning of segmentary tribal societies. Although Havana-Hopewell peoples in west

Michigan (and in other areas of the Midwest) lacked well-developed agriculture, craft specialization, centralized distribution, and a hierarchical social structure (Hall 1997), this project displayed the different types of interactions and mechanisms (such as diffusion, migration, mobility, intermarriage, family visitation, etc.) that were responsible for integrating these seasonally mobile and decentralized societies for various social, ceremonial, political, and economic motives. It was found that residential communities in the study region likely organized their movements and interactions around particular drainage systems, similar to findings of other studies documenting northern hunter-gatherer/small-scale groups (e.g., Jarvenpa and Brumbach 2016; Lovis and Donahue 2011; Lovis and Whallon 2016; O'Shea and Milner 2002).

A significant methodological contribution of this research involved the integration of style with compositional analyses (i.e., petrography). Paired with an appropriate theoretical framework, this methodology allowed for the identification of separate communities for the first time in the study region, each reflecting distinct behavioral patterns. This research design was also intended to address certain deficiencies common in previous work, notably the over-fixation on stylistic or macroscopic ceramic analyses to explain interaction networks. Previous studies, for example, grappled with the problem of identifying imported vessels containing grit temper.

In reference to the Havana-Hopewell ceramic assemblages in the study region, it was mentioned that it is "much less clear that any grit tempered Havana-like vessels are actual imports" (Brashler, Garland, and Lovis 1994: 5). This project's methodology has allowed us to no longer assume that grit tempered vessels are locally made copies of "authentic" Havana Ware vessels from Illinois (e.g., Kingsley's [1990] "Norton Ware" category) or that all limestone tempered Hopewell pots are imports from Illinois (e.g., Kingsley's [1990] "Hopewell Ware" category). For example, in this research, the clear identification of grit tempered imports was completed for the first time in the study region and it was found that the vast majority of imported vessels in this research were not limestone or grog tempered; they were grit tempered.

This research also makes substantial contributions to an understanding of the spread of the Middle Woodland Havana-Hopewell phenomenon outside of the relatively more popular Illinois and Ohio "core areas." It was important to examine and understand the complex cultural dynamics operating within the study region as a first step, before examining their interactions on larger spatial scales. Not only were small-scale residential communities identified in west Michigan and northwest Indiana, but their larger extralocal interaction patterns (i.e., sustainable and symbolic communities) were also revealed. Additionally, outside of Faulkner's (1961) general description of Marshall County Havana-Hopewellian ceramics, this research represents the first substantive study of Marshall County ceramics through the application of this study's rigorous stylistic and compositional methodology. This has yielded new information related to the communal identity of these Marshall County peoples and their complex relationships to west Michigan and Kankakee valley peoples.

Furthermore, the mechanisms responsible for the introduction and spread of Havana-Hopewell information and ceramic technology and style were identified. These results highlight a very complex array of mechanisms, information sharing, interaction networks, mortuary ritual, and mobility and settlement patterns at play within the study region. These dynamic factors were likely in operation throughout the Midwestern United States as well. With this in mind, this project's approach is applicable to understanding the spread of Havana-Hopewell into other areas of the Eastern Woodlands and, generally, to understanding the spread of information in other regions and temporal periods as well.

APPENDICES

APPENDIX A

Middle Woodland Sites in West Michigan and Northwest Indiana

This appendix introduces and briefly describes the sites from which pottery samples were chosen for study in this research. Ceramic samples from 53 total sites in the Muskegon, Grand, Kalamazoo, St. Joseph, and Kankakee valleys were examined in this research (see Figure 1-1). The reason for choosing such a large number of sites was to identify the recipes and clays used at as many sites as possible in order to define the geographic extent of individual communities within the study region. Choosing a representative sample from each river valley was important. As a result, I was able to identify larger geographic social boundaries of communities in the study region that more likely approximated the true geographic extent than would be possible if pottery from only the largest or most well-known sites were studied.

The following discussion is organized from north to south and by river valley, beginning with the Muskegon River valley and concluding with Kankakee valley and Marshall County sites. Although most of the sites in this research are multicomponent, this discussion focuses only on the Middle Woodland Havana-Hopewell occupation(s) of these sites. It is not meant to be comprehensive, but it introduces information related to site types (e.g., habitation vs. mound site) as well as key information for understanding site relationships within river valleys and the nature of cultural relationships between regions. The types of material culture (with a focus on Middle Woodland pottery) present at these sites are also included in this discussion.

Muskegon River Valley Sites, Michigan (n = 4 sites)

Jancarich (20NE113) (and surrounding mound complexes)

The Jancarich site (Prahl 1970, 1991) is the largest known habitation site in the Muskegon River valley, encompassing slightly less than 1 acre in extent. The site lies roughly 10 feet above the Muskegon River on a low flat terrace between Croton and Newaygo, Michigan. It is located in the SW ¼ of the SE ¼ of Section 22, Brooks Township, Newaygo County, Michigan (T 12N, R 12W) (Prahl 1970: 259) and is surrounded by a high ridge 25 feet in height. The Palmiteer Mounds lie roughly 600 feet on this ridge to the north of Jancarich, while the Brooks, Parsons, and Schumaker Mounds are located a bit further to the north-northeast (Figure A-1). It is likely that Jancarich site residents built and utilized the surrounding mounds (Prahl 1991).

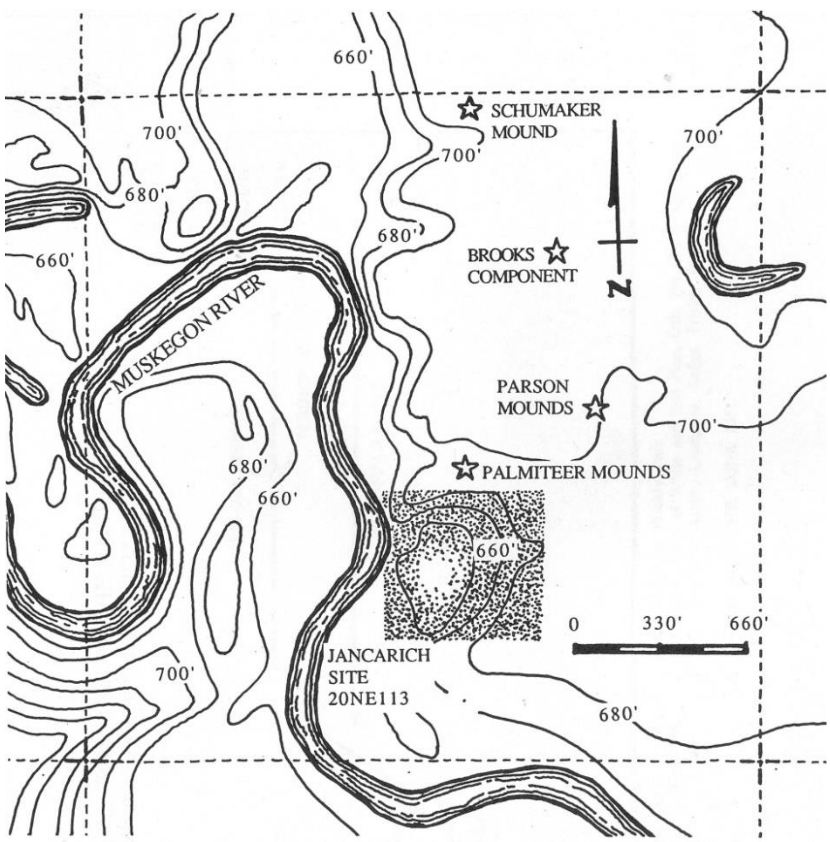


Figure A-1: Jancarich Village Site and Surrounding Mound Groups, Muskegon River Valley (from Prahl 1991: 80).

The site location was discovered in 1965 and first tested in 1966 (Prahl 1966, 1970, 1991). Among the types of material culture recovered included faunal remains (primarily white-tailed deer bones with minute amounts of fish), nineteen small corner-notched projectile points, scrapers, blades, utilized flakes, bipolar cores, large chopper-like tools, and 3,741 pottery sherds. Of the 3,741 sherds, 35 (0.9%) were rim sherds, 0.8% were decorated body sherds, and 79% were sherdlets (smaller than 1 cm). The dominant decorative techniques employed at Jancarich are those common in the Havana Ware series with some Hopewell Ware motifs present (Figure A-2). Dentate stamping, incising, cordwrapped stick and cord impressing with punctates, noding on smoothed surfaces, and some crosshatching are most common (Prahl 1970, 1991). An interesting aspect of decorative ceramic traits utilized at Jancarich is the simultaneous use of both Havana and Hopewell Ware traits on the same sherds and the intermixing of Havana and Hopewell-like sherds within the same stratigraphic contexts (Prahl 1970). An unusually early radiocarbon date of 310 B.C. ± 140 with a 2-sigma calibration of B.C. 790 to A.D. 20 (M-1982) was extracted from charcoal taken from a hearth below the plow zone (Prahl 1970). Although originally suspect, believed to be inaccurate, spanning too large temporally, or being too early, recent AMS dating from Jancarich in this dissertation support and legitimize this date if the true date is closer to the first century B.C. and A.D. range. This would cement the Jancarich site as perhaps the earliest Middle Woodland Havana site in Michigan (see AMS dating discussion in Chapter 5).

Figure A-2: Jancarich Site Middle Woodland Rim Sherds

There are several mound complexes located adjacent to the Jancarich site. Unfortunately, ceramic collections originally recovered from the Palmiteer, Parsons, and Schumaker Mound sites (Figure A-1) could not be found by the author and were therefore not available for study. A short discussion of these mound complexes is nonetheless warranted here. The Palmiteer Mounds site (20NE101) (Gillis and Davis 1956; Prahl 1970, 1980, 1991) originally consisted of four small burial mounds and is located in the NW ¼ of the SE ¼ of Section 22, Brooks Township (T 12N, R 12W) (Prahl 1970). It is the closest mound complex to the Jancarich site, is 2300 feet to the south of the Brooks Component and 1600 feet southwest of the Parsons Mounds (Prahl 1970). A radiocarbon date of 10 B.C. ± 140 (M-1965) recovered from a charcoal sample found in Mound 2 compares favorably with the very early occupation of the nearby Jancarich village site. The four Palmiteer mounds range in diameter from 12 to 36 feet while height ranges from 12 to 30 inches. The subfloor burial pits were either oblong or circular in shape (Prahl 1990) and all burials reported by Gillis and Davis (1956) were bundled. Burial goods contained within the Palmiteer Mounds included one copper celt, approximately 200 rolled copper beads, one *Busycon* shell, one antler drift, one flint blade, and two Havana Ware-related (one cordwrapped stick impressed with circular incised line, the other plain/undecorated) ceramic vessels. The cordwrapped stick vessel contained evidence of fire or use, suggesting that it had a utilitarian purpose prior to its interment (Prahl 1970: 215).

The Parsons Mound group (20NE100) (Gillis and Davis 1954; Kinietz 1929; Prahl 1970, 1991) is located in the SE ¼ of the NE ¼ of Section 22, Brooks Township, Newaygo County (T 12N, R 12W) It consists of five burial mounds, spanning from 23 feet to 17 feet in diameter and 3 feet to 18 inches in height. The burial pits at Parsons were oblong or rectangular in shape and consisted of secondary or bundle burials. The Parsons Mound group is highly unusual because two mounds contained grave goods with no burials, while the remaining three mounds contained no artifacts despite evidence of burials (Prahl 1991). Recovered grave goods included a platform pipe, two single-holed rectangular gorgets, one copper pin, two corner-notched projectile points, one deer ulna, two chert flakes, one Havana-like cordwrapped vessel, and one Hopewell Ware vessel.

The Schumaker Mound (20NE107) (Prahl 1966, 1970, 1991) site consists of one singular mound located 2000 feet to the northwest of the Brooks Mound site. The legal location is the NW ¼ of the NE ¼ of Section 22, Brooks Township, Newaygo County (T 12N, R 12W). The mound is 30 feet across its east-west axis, 7 feet across its north-south axis, and is 1.5 feet in height. The burial pit contained fragments of badly weathered human long bones, several decortation flakes resulting from primary flaking, and a crude lithic preform (Prahl 1991). No pottery was found from Schumaker. A radiocarbon date of 80 B.C. ± 140 (M-1938) was drawn from a charcoal sample recovered from the central burial pit.

Brooks Mound (20NE1)

The Brooks Component consists of 18 burial mounds located in the SW ¼ of the NE ¼ of Section 22, Brooks Township, Newaygo County (Gillis and Davis 1955; Hinsdale 1930; Kinietz 1929; Miles n.d.; Prahl 1966, 1970, 1991; Spooner n.d.) (Figure A-1). The mounds range from 10 feet to 40 feet in diameter and 1.5 feet to 5 feet in height (Prahl 1991). Grave pits were rectangular or oblong. Single articulated and extended single burials and multiple bundled burials were most commonly practiced at the site but one "ossuary" type burial similar to that found at the Mallon Mound group further east was observed in Brooks Mound N. Unfortunately, this site has been looted extensively like most mounds sites in the Midwest (Hinsdale 1928, 1930; Prahl 1970, 1991), which has destroyed contextual data and severely limited the potential of accurately reconstructing cultural and mortuary patterns. Despite the presence of an intrusive Late Woodland burial in Mound A, Brooks Mounds overwhelmingly yielded an abundance of Havana-Hopewellian artifacts, such as slate pendants/gorgets, copper celts and pins, platform pipes, conch shells, corner-notched projectile points, small lamellar blades, beaver incisors, effigy bear canines made from bone, bone awls, and hematite ore.

Unlike the Havana and Hopewell Ware ceramic collection present at the Jancarich site, ceramics from the Brooks Mound appear to be primarily Hopewell Ware in character. Small globular-shaped pots, quadrilobate in form with constricted necks (e.g., Figure A-3) are most common at Brooks. Hopewellian designs, such as crosshatching, hemiconical punctates, curvilinear zones, incising, fine-toothed dentate stamping, and plain rocker stamping are most common. One plain undecorated vessel and several small pottery bowls are also present (Prahl

1970, 1991). Many vessels from the Brooks Mound compare favorably to those at the Spoonville site in the Grand River valley (Flanders 1965). On the other hand, Brooks Mound ceramic designs contrast with those found at the Norton Mounds site in the Grand valley, which are almost exclusively Havana Ware-related (Griffin et al. 1970).

Figure A-3: Hopewell Ware Vessel from Brooks Component, probably Mound G

Toft Lake (20NE110)

The Toft Lake site (Losey 1967; Prahl 1970) exemplifies the seasonal and short-term use of small upland or hinterland locations on small lakes or tributaries away from the main Muskegon River valley. It is located in the SW ¼ of the NW ¼ of Section 27, Everett Township, Newaygo County and is roughly four miles north of the Brooks Component (Losey 1967; Prahl

1970). Toft Lake represents the use of a different environmental microzone than that present at the Jancarich site and its surrounding mound complexes. The site itself is located on the southward and westward edges of Toft Lake, a small pit lake drained by an unnamed creek. Diagnostic Middle Woodland artifacts recovered at the site include four corner-notched points, two side-notched scrapers, a quartzite knife, a bifacially flaked blade, and a single-holed gorget similar to those found at Parsons and Brooks Mound (Losey 1967). Ceramics from the site exhibit Havana-like traits, such as dentate stamping, cordwrapped stick impressing, and zoning, while some rims are beveled inward (Losey 1967; Prahl 1970). Accordingly, the Middle Woodland Toft Lake ceramic collection is acknowledged as being more closely affiliated with Norton phase Havana-like ceramics than Hopewellian ceramics (Brashler 2003).

Davis Swamp (20MU132)

The Davis Swamp habitation site is located in the lower Muskegon River valley in the S ½ of the NE ¼ of Section 9, Muskegon Township, Muskegon County (T 10N, R 16W). The site was originally discovered by amateur archaeologist George Davis and was recently excavated in 2005 by the Coffinberry Chapter of the Michigan Archaeological Society under the supervision of Dr. Janet G. Brashler of Grand Valley State University (Brashler 2005). Although some Havana Ware pottery resembling Havana Plain and Cordmarked types was recovered, most of the Middle Woodland collection is represented by Hopewell Ware, especially the presence of plain rocker stamping and some dentate rocker stamping and punctating. The Davis Swamp site represents an important Middle Woodland site located a fair distance away from the Jancarich and Brooks Mound site vicinity, and informs on the western extend of Havana-Hopewell in the Muskegon valley.

Grand River Valley Sites, Michigan (n = 9 sites)

Prison Farm (20IA58)

The Prison Farm site (Brashler et al. 2006; Brashler 1995, 1998; Brashler, Laidler, and Martin 1998; Morrissey, Brashler, and Detz 1998) is one of the most significant Middle Woodland habitation sites in the study region. It is located in the central Grand River valley in the NE ¼ of the NW ¼ of Section 25, Easton Township, Ionia County (T 07N, R 07W). Prison Farm represents, along with Jancarich, the earliest and most substantial Havana Middle Woodland occupation in west Michigan. The Middle Woodland component at the site dates between 100 B.C. and A.D. 150, based upon radiocarbon dates from two features, several ceramic sherds, and a midden deposit (Brashler et al. 2006; Hart and Lovis 2007).

In general, the site evidences a settlement and subsistence pattern focused on seasonally abundant large game (primarily white-tailed deer) and anadromous fish (especially lake sturgeon) (Brashler et al. 2006), perhaps supplemented with a low level of nut harvesting (Parker 2000). There is a lack of botanical evidence and a clear paucity of cultigens and other plant food remains present at the site (Meekhof and Martin 1998; Parker 2000). Thus, Prison Farm is representative of west Michigan Middle Woodland populations as a whole in which "a pattern of nonintensive use of available plant foods (perhaps related to low population density and mobile settlement strategies), in which cultigens were known but marginally significant, may have persisted from Late Archaic times well into the Late Woodland period in western Michigan" (Brashler et al. 2006: 275).

The Middle Woodland artifact collection is characterized by heavily curated projectile points, scrapers, and bifaces. Projectile point forms tend to conform to the *affinis* Snyders and Norton points (Brashler, Laidler, and Martin 1998; Chivis 2002; Garland and DesJardins 2006:

250-254; Griffin et al. 1970; Justice 1987; Montet-White 1968). Several characteristic Illinois or Ohio Hopewell lithic artifacts are absent from Prison Farm, such as bladelets, hoes and hoe chips, Snyders Points, and cache blades. Exotic cherts dominate the lithic assemblage, many originating from the Saginaw Bay region and northern Lower Peninsula regions of Michigan, as well as from various locales in Illinois, Ohio, Indiana, and Ontario (Brashler et al. 2006).

Ceramics from Prison Farm are almost exclusively thick, crudely fashioned, clunky Havana Ware-related types and may be the earliest Middle Woodland utilitarian ceramics in Michigan. They are characterized by round and flat-lipped, noded vessels with cordmarked and smoothed-over cordmarked exteriors. One rather unique trait of the Prison Farm assemblage is the presence of interior cordmarking on Middle Woodland vessels, suggesting the continuation of this hallmark Early Woodland technique through time. Beveled interior rims and dentate stamping are relatively rare in the Prison Farm assemblage (Brashler 1995; Morrissey, Brashler, and Detz 1998), as are design elements thought to be early in the Havana sequence in Illinois (punctuates/Sister Creeks punctated, Neteler crescents, and Morton and Fettie Incised) (Brashler et al. 2006). Prison Farm also lacks incised sherds common in the late Early Woodland and early Middle Woodland in other regions of the Midwest, such as Black Sand, Dane, Fettie, and Morton Incised types. Lastly, with the exception of a mere handful of samples, Prison Farm lacks Hopewellian Ware-related vessels.

Lower Lake 1 (no site #)

The Lower Lake 1 site is located in Oakfield Township, northeastern Kent County within the Wabasis Creek watershed, a tributary of the Flat River in west central Michigan (Guernsey and DiPersio 2000; Stretton, Chapman, and Brashler 2000). The Flat River is one of the larger southern flowing tributaries of the Grand River. Buerl Guernsey, an avocational archaeologist, began collecting artifacts in the Wabasis Creek region in the 1940's (Guernsey and DiPersio 2000). Fortunately, he carefully documented the location of over 100 sites in this area and appropriately catalogued the material.

The Middle Woodland occupation at the Lower Lake 1 site produced five Norton points, thirty-eight probable *affinis* Snyders points, five other Middle Woodland projectile point types, and fifteen Havana and Hopewell Ware-related vessels. The common pottery design elements include flat and round lips, smoothed or smoothed-over cordmarked surfaces, dentate stamping with exterior nodes, plain rocker stamping, incising, and crosshatching (Stretton, Chapman, and Brashler 2000). Based upon decorative techniques employed at the site and comparison of Middle Woodland pottery analogs elsewhere in the Grand River valley, the Middle Woodland Lower Lake 1 site occupation likely spanned from the first century B.C. to the third century A.D. The importance of the Lower Lake 1 site is due to its location away from the main Grand River itself, thus representing another instance (e.g., Toft Lake site) in which upland sites were being utilized by these peoples for various seasonal purposes.

Norton Mounds (20KT1)

The Norton Mounds site (Gibson 1959; Griffin et al. 1970; Hambacher, Robertson et al. 2003; Kingsley 1984) is one of the most important and well preserved Middle Woodland mound groups in the Midwest. The site has been listed on the National Register of Historic Places and is designated as a National Historic Landmark (Hambacher, Robertson et al. 2003). It is located along the south bank of the Grand River in the W ½ of Section 3 and the SE ¼ of Section 4, Wyoming Township, Kent County, Michigan (T 06N, R12W). Three radiocarbon dates from the site (10 B.C., A.D. 100, A.D. 160) (Crane and Griffin 1966: 261), especially the 10 B.C. date, place it very early in the Middle Woodland sequence and suggests the possibility of Norton

Mounds representing the earliest Middle Woodland mound complex in west Michigan. The radiocarbon dates have historically been utilized by professional archaeologists to define the temporal boundaries of the Norton phase in west Michigan (Griffin et al. 1970).

At the time of its first excavation in 1874 by Wright L. Coffinberry, Norton Mounds consisted of 17 mounds ranging in size from 30 feet in diameter and 1.5 feet in height to 100 feet in diameter and 15 feet in height (Griffin et al. 1970; Hambacher, Robertson et al. 2003). H.E. Sargent excavated two mounds in 1915. The most extensive excavations at Norton occurred in 1963-1964 by the University of Michigan (Flanders 1964; Frankforter 1963, 1964; Griffin et al. 1970). Today, only 11 mounds still persist and are under the protection of the Grand Rapids Public Museum.

Norton Mounds artifact types nearly represent the full range of Havana-Hopewellian mortuary items and are typical of Hopewellian Interaction Sphere goods, including copper axes; smoking pipes; Norton and other diagnostic projectile points; hammerstones; bone awls, various tools and ornaments; antler flaking; conch shells; mica sheets; cut animal jaws; beaver incisors; bear canines; bone, shell, pearl, and copper beads; turtle carapace shells; and elaborately decorated pottery, among others (Griffin et al. 1970).

The ceramic collection at Norton is characterized primarily by Havana Ware-related (referred to as "Norton Ware" in Michigan; see Kingsley 1990) types and decorative motifs (such as thick dentate stamping, cordwrapped stick impressions, annular punctates, etc.) with occasional use of Hopewell Ware-related decorations such as crosshatching, hemiconical punctates, curvilinear zoning, and cambered rim shapes (Griffin et al. 1970) (see Figure A-4 below). Thus, while the ceramic collection is represented by very early Havana types, such as

Sister Creeks Punctated or Norton Dentate Stamped, later Hopewell Ware types are also present which evidences a somewhat lengthy temporal use of the site spanning perhaps over 200 years.

Figure A-4: Hopewell Zoned Incised, Punctate Vessel from Norton Mounds

Converse Mounds/Village (20KT2)

The Converse site (Brashler et al. 2006; Hambacher, Brashler, Egan-Bruhy et al. 2003; Quimby 1941a) consists of an extensive mound complex and associated village site(s)/areas, located along the Grand River in the city of Grand Rapids in the W ½ of Section 25, Grand Rapids Township, Kent County, Michigan (T 07N, R 12W). Unfortunately, none of the approximately twenty-nine original Converse burial mounds are present today due to the building of the modern city of Grand Rapids during the late 1850's to the mid-1880's, but habitation areas surviving the decades of destruction did survive and were recently investigated by Commonwealth Cultural Resources Group, Inc. (CCRG) in 1999 and 2000 (Demeter and Robinson 1999; Hambacher, Brashler, Egan-Bruhy et al. 2003). These excavations presented a unique opportunity to understand one of the most important, yet least understood, mound and habitation complexes in Michigan and to investigate the validity of the Converse phase, as it was understood at that time.

The Converse mound complex and associated habitation areas appear to have extended for over 1.0 km (0.6 miles) along the west bank of the Grand River (Hambacher, Brashler, Egan-Bruhy et al. 2003). Professional scientific excavations of the site were not conducted prior to CCRG's recent investigations, although the site was "superficially explored in 1879 and 1885" (Quimby 1941a: 98) by Coffinberry. Instead, local antiquarians and looters undertook limited "excavations" in many of the mounds. Unfortunately, no full reports were produced by these amateurs, leaving only partial and sometimes contradictory accounts available for future archaeological inquiries (e.g., Coffinberry 1962a, 1962b, 1964a, 1964b; Coffinberry and Strong 1876).

The artifact assemblage at Converse mounds included the presence of red ocher, large nuggets of copper and silver, copper panpipe jackets, copper awls, copper celts, drilled effigy and true bear canines, beaver teeth, platform pipes, *Busycon* shell dippers, Havana and Hopewell Wares, polished slate gorgets, and diagnostic Middle Woodland projectile points fashioned from exotic chert sources, among many others (Halsey 2000; Quimby 1941a). There is intriguing evidence at the Converse site that point toward an increasing degree of interaction and influence with Ohio Hopewell peoples (presumably occurring shortly after the initial appearance of Havana culture in west Michigan), such as the presence of an effigy beetle made of antler

(Halsey 1990), various stone artifacts fashioned from east central Ohio-derived chert sources (Hambacher, Brashler, Egan-Bruhy 2003), the use of certain ceramic decorative styles (e.g., "flying bird imagery," or the dominant use of crosshatching and rocker stamping) and the presence of ceramic vessel forms characteristic of Ohio assemblages (e.g., a foot from a tetrapodal vessel) (Brashler 2003; Brashler et al. 2006). Accordingly, the Converse site seems to be more heavily aligned with Ohio Hopewell compared to the earlier Norton phase in west Michigan, which appears to be more heavily influenced by Illinois Havana (Brashler, personal communication, 2011).

Ohio-derived cultural influences related to mound construction techniques do not appear to have diffused to west Michigan populations, however, as there is no evidence of the use of charnel houses which is the status quo in Ohio mortuary mound practices (Brown 1979; Kingsley 1999). Instead, at Converse, and to our knowledge all other Michigan mounds, the mortuary program closely mirrors Illinois practices and includes the use of submound central pits surrounded by a "ramp" frequently composed of a different soil type (Flanders 1969; Griffin et al. 1970; Hambacher, Brashler, Egan-Bruhy 2003; Kingsley 1984, 1999).

The Middle Woodland ceramic collection at the Converse village areas are comprised primarily of "sandy" Hopewell Ware-like sherds, which account for 72.9% of all Middle Woodland ceramics at the site (Brashler 2003). Typical Hopewellian designs include plain rocker stamping, incising, combing/brushing, crosshatching, hemiconical punctates, and zoned lines. Less than 10% of all Middle Woodland ceramics, on the other hand, were Havana Ware-related. The small number of Havana-related sherds at Converse was characterized by silty pastes, smoothed-over cordmarked or cordmarked exterior surfaces, noding, dentate stamping, incising, and zoning (Brashler 2003; Brashler et al. 2006).

Spoonville (20OT1)

The Spoonville site (Baldwin 1984; Brashler 1991; Flanders 1965, 1969, 1979; Peske 1962; Quimby 1941a) originally consisted of three burial mounds located on the northern side of the lower Grand River and associated village areas within the vicinity of the nearby Crockery Creek. The legal location is the NE ¼ of the NW ¼ of Section 34, Crockery Township, Ottawa County, Michigan (T 08N, R 15W). Spoonville was first investigated in 1897 by Abel Anderson (Quimby 1941a) and then in 1962 by the University of Michigan (Flanders 1965, 1969, 1979).

Hopewellian artifacts at Spoonville included copper awls and celts (some woven with fabric), *Busycon* shells, an engraved turtle carapace, mica sheets, smoking pipes, Hopewell pottery, prismatic cores and blades, and an extraordinarily rare copper spoon/ladle (Figure A-5) that may be the only example of its kind anywhere (Baldwin 1984; Brashler 1991; Flanders 1969; Quimby 1941a). Two radiocarbon dates from Spoonville come from village deposits on a terrace below the mounds (Brashler 1991; Holman 1990: 185) and point toward a mid-late Middle Woodland occupation of the area. This temporal placement is supported by the prevalence of quadrilobate, thin-walled Hopewell Ware-like vessels present at the site (e.g., Figure A-6), although Havana Ware-like sherds are present in smaller quantities (Brashler 1991; Mangold 1981).

Figure A-5: Copper Awl and Copper Spoon from the Spoonville Site

Figure A-6: Hopewell Zoned Vessel from the Largest Spoonville Mound

Battle Point (20OT4)

The Battle Point site is located in the lower Grand River valley in the NW ¼ of the SW ¼ of Section 31 (T 08N, R 15W) and the NE ¼ of the SE ¼ of Section 36 (T 08N, R16W), Crockery Township, Ottawa County, Michigan. Although the site was utilized primarily during the 18th and 19th centuries (Martin and Mainfort 1985; Quimby 1966), it does have a small Middle Woodland component. Battle Point Middle Woodland ceramics are characterized by both Hopewell- and Havana-related types that appear to be locally manufactured and crudely fashioned (Brashler, Garland, and Lovis 1994). Based on the available evidence, it appears that the Middle Woodland Battle Point occupation occurred during the middle to latter portion of the period.

Boom Road (20OT240)

The Boom Road site (Hambacher, Monaghan, and Branstner 1999; Hambacher, Dunham, and Monaghan 1998) is bisected by Boom Road in the SE ¼ of the SW ¼ of Section 25, Spring Lake Township, Ottawa County, Michigan (T 08N, R 16W). The Middle Woodland occupation appears to have been ephemeral in nature, producing small amounts of crude Hopewell-like pottery sherds, Crockery Ware (Kingsley 1990), Hacklander Ware (Kingsley 1977, 1989), and stone tools and debitage (Hambacher, Monaghan, and Branstner 1999). The site appears to have been occupied during the latter half of the Middle Woodland period.

Paggeot Mounds (20OT89)

The Paggeot site (Baldwin 1984; Flanders 1978, 1979) is located in the SW ¼ of the NW ¼ of the SW ¼ of the SW ¼ of Section 31, Crockery Township, Ottawa County, Michigan (T 08N, R 15W). The site was discovered as the result of a salvage effort related to a sewer project.

Evidence of a former burial mound was discovered and the associated central burial pit contained ten individuals (all secondary burials) and various grave goods, including a platform pipe with a bird head effigy, deer metapodial pins, a turkey bone awl, a deer antler tine, three turtle shell dishes, twenty river pearl beads, a *Busycon* shell dipper, and two Hopewell Ware vessels (Flanders 1979). Interestingly, one of these vessels was a small globular jar that was placed within the mouth of the larger vessel and had drilled holes on the neck. The larger quadrilobate vessel was zoned with fine dentate stamping on the body and crosshatching and hemiconical punctates on a channeled rim. Paggeot likely represents a middle-to-late Middle Woodland site based upon the artifact assemblage (Kingsley 1999).

Sand Creek (20OT66)

The Sand Creek site is located in Ottawa County, Michigan. A single Naples Ovoid Stamped, barred variety, sherd (see Figure 5-6 in Chapter 5) was recovered from this site and is included in this dissertation. As discussed in this dissertation, until the discovery of this sample from Sand Creek, this early Middle Woodland pottery type was found at only one other site in Michigan (the Ada site in the Grand valley). More recent archaeological investigations, however, have discovered two additional samples of this pottery type, both from the Grand River valley at the Norton Mounds and Connor Bayou sites (Brashler, personal communication 2013). This is a significant finding since all four of these ovoid stamped samples are from Grand River valley sites, suggesting an earlier introduction and more intense use of this early Havana pottery type into west Michigan than previously believed.

Kalamazoo River Valley Sites, Michigan (n = 5 sites)

Armintrout-Blackman (20AE812)

Located on the northern edge of the Kalamazoo River in the NW ¼ of the NW ¼ of the SE ¼ of Section 11, Trowbridge Township, Allegan County, Michigan (T 01N, R 13W) is the Armintrout-Blackman site (Garland and DesJardins 2006; Spero et al. 1991a, 1991b). It was excavated from 1985 – 1988 by George Spero of Western Michigan University and the Kalamazoo Chapter of the Michigan Archaeological Society (Spero et al. 1991a). The Middle Woodland occupation of the site remained undated until now. A new date obtained as part of this dissertation firmly places the site in the early to middle Converse phase (see Chapter 5 for more information).

There are two distinct Middle Woodland village occupations present at the site which point towards a seasonal use of the area. The western portion of the site is dominated by Norton points made from exotic cherts and thick walled Havana-related ceramics totaling 15-20 vessels. These vessels are characterized by thick cordmarked and noded pots, cordwrapped stick impressed rims, deep circular punctates on the lower rim, and cordmarked vessels with smoothed rims and rounded lips (Garland and DesJardins 2006). The central and eastern portion of the site, on the other hand, is dominated by expanding stemmed points fashioned from mostly local cherts and approximately 25 thinner walled Hopewell and Baehr-like vessels in which zoning, plain rocker stamping, and combed and brushed surfaces predominate. Some incising and crosshatching on rims occurs as well (Garland and DesJardins 2006; Spero et al. 1991a).

Mushroom (20AE88)

The Mushroom site (Garland and DesJardins 2006; Mangold 1981) is located one mile upriver from the Allegan Dam on the north bank of the Kalamazoo River. The legal location of the site is the NW ¼ of the NW ¼ of Section 14, Valley Township, Allegan County, Michigan (T 02N, R 14W). The Allegan Dam Road passes directly through the center of the site, which was identified and surface collected in 1978 and extensively excavated in 1980 by Western Michigan University. Radiocarbon dates hint at a later occupation than the Armintrout-Blackman site and place the site within the middle to terminal Converse phase (Garland and DesJardins 2006).

The Middle Woodland occupation is characterized by a lithic assemblage consisting of five Norton Points (three made from Bayport chert) and several other corner-notched Middle Woodland types. Middle Woodland ceramics at the site are distinct from those found in the western Havana-related component at the nearby Armintrout-Blackman site. Mushroom ceramic attributes such as beveled lips, concentric curvilinear zoning, and thin dentate stamping are not present in the Armintrout-Blackman Havana-related component (Garland and DesJardins 2006). Mushroom site ceramics, conversely, are more similar to the Hopewell component at the Armintrout-Blackman site and the Spoonville site in the Grand River valley based upon the prevalence of plain rocker stamping, incising, crosshatched rims, and brushing and combing on exterior surfaces (Garland and DesJardins 2006; Mangold 1981).

Hart (20AE860)

The Hart site (Garland 2000; Garland and DesJardins 1999, 2006) is located in the SE ½ of the SE ¼ of the NE ¼ of the SE ¼ of the SE ¼ and the N ½ of the NE ¼ of the SE ¼ of the SE ¼ of the SE ¼ of Section 30, Heath Township, Allegan County Michigan (T 03N, R 14W). Hart's Middle Woodland component likely represents the earliest short-term occupation of the Kalamazoo River valley by Havana-related peoples, likely dating to the first century B.C. This is partly based upon the recovery of a Naples Dentate Stamped vessel with noding and a cordmarked exterior (see Figure 5-10 in Chapter 5) that was salvaged from the eroding Kalamazoo River in 1999. This vessel is very similar to another similarly decorated vessel recovered from the Swan Creek vicinity, which is located several miles upstream from the Hart site. The salvage of the Hart vessel led to subsequent testing of the site by the Kalamazoo Valley Chapter of the Michigan Archaeological Society in 1999 and 2000 (Garland 2000; Garland and DesJardins 1999).

Although most of the Middle Woodland occupation of the site was lost to erosion, additional Middle Woodland artifacts were recovered, such as two Snyders Points and potentially two additional Havana-like vessels (Garland 2000; Garland and DesJardins 1999). These artifacts, in conjunction with a radiocarbon date of Cal B.P. 2410 ± 60 (Beta-145464), support a very early Middle Woodland occupation of the site. Although the date is unusually early and came from charcoal from the base of a deep fire pit in which a Snyders Point and Middle Woodland sherds were recovered in the upper fill of the pit, it is not out of the realm of possibility considering the very early AMS dates from Jancarich and Prison Farm. Considering that the Hart Naples Dentate Stamped vessel possesses massive temper and a crudely finished surface more characteristic of Early Woodland ceramics (Garland and DesJardins 2006), it is possible that Hart represents the very first introduction or intrusion of Havana-related peoples into west Michigan. Later Hopewell Ware-like vessels are notably absent from the Hart site (Garland and DesJardins 2006).

Swan Creek sherd (no site #)

One Naples Dentate Stamped rim sherd (see Figure 5-9) that was found somewhere in the vicinity of the Swan Creek region was included in this dissertation. Stylistically, it is almost identical to the salvaged Hart vessel described above. The exact site location from which the

Swan Creek sherd originated is unknown. The sherd was donated to Western Michigan University approximately thirty years ago (Garland and DesJardins 2006).

Fennville (20AE54)

Fennville (Garland and DesJardins 2006; Rogers 1972) is located further down the Kalamazoo River from the Hart site in the NE ¼ of the NW ¼ of Section 20, Manlius Township, Allegan County, Michigan (T 03N, R15W). The small Middle Woodland Hopewellian component of the site was found by Rogers (1972) to be located 90 meters south of the predominate Late Woodland occupation of the site. The Hopewellian occupation includes ceramics with plain rocker stamping, incising, thin zone lines, and burnished exteriors (Garland and DesJardins 2006). This component is also likely represented by an untyped corner-notched point.

St. Joseph River Valley Sites, Michigan (n = 9 sites)

Rock Hearth (20BE306)

The Rock Hearth site (Garland 1990a; Garland and Clark 1981; Garland and Mangold 1980) is located on land owned by Andrews University along the modern floodplain of the St. Joseph River in the SW ¼ of the NE ¼ of the NW ¼ of Section 2, Oronoko Township, Berrien County, Michigan (T 06S, R 18W). The site was first discovered during a Phase I survey of the US-31 corridor in 1979 (Garland and Mangold 1980), which warranted further Phase II investigations (Garland and Clark 1981). The latter Phase II testing uncovered sherds from perhaps three Havana Cordmarked vessels (Garland and Clark 1981; Garland and DesJardins 2006). Besides cordmarking, other potential Middle Woodland sherds are limited to punctation as the only form of decoration. Two Middle Woodland Snyders points made from Wyandotte chert were also recovered at Rock Hearth. Overall, the Middle Woodland component of the Rock Hearth site appears to have been a short-term occupancy by one to two families, perhaps occurring during the summer (Garland 1990a).

Moccasin Bluff (20BE8/1)

The Moccasin Bluff site (Bettarel and Smith 1973) is likely the most intensively occupied Middle Woodland village in the St. Joseph River valley. It is located on the western bank of the St. Joseph River between the river and a line of bluffs to the north, west, and south in the SE ¼ of the NE ¼ of Section 23, Buchanan Township, Berrien County, Michigan (T 07S, R 18W). Despite being well known to local collectors and being heavily collected, field work was conducted by the University of Michigan in 1937, 1947, 1948, and 1961 (Bettarel and Smith 1973). More recent excavations by Michigan State University were completed in 2002 (O'Gorman 2003). The southern end of the site comprises the Middle Woodland component of the site, which included burial mounds and a camp located further south of these mounds (Bettarel and Smith 1973; O'Gorman 2003). This portion of the site appears to have been associated with a low marshy area/wetland (Mangold 2009; O'Gorman 2003).

Middle Woodland pottery from the Moccasin Bluff excavations and those contained within the Birdsell Collection (donated by John Birdsell) appears to be represented by very early Havana styles (e.g., Figure A-7), as well as grit-tempered Hopewell-like sherds (Bettarel and Smith 1973; Garland and DesJardins 2006; Mangold 1981a). An interesting aspect of the Havana-related ceramics is that they are similar to Early Woodland ceramics at the site. Specifically, many Early and Middle Woodland vessels share interior and exterior cordmarking, exhibit the same paste and temper (some mafic), and have similar wall thicknesses (with some Middle Woodland sherds exceeding the maximum width of Early Woodland sherds) (Bettarel and Smith 1973; O'Gorman 2003). A similar situation is encountered at the Prison Farm site in the Grand River valley, likely suggesting that both of these sites represent the earliest Middle Woodland occupations in their respective river valleys.

Figure A-7: Havana-related Samples from the Moccasin Bluff Site

Sumnerville Mounds (20CS6)

The Sumnerville Mounds group (Quimby 1941a) is the largest mound group south of the Grand River and is located on the Dowagiac Creek near the corners of Sections 29, 30, 31, and 32 of Pokagon Township, Cass County, Michigan (T 06S, R 16W). Consisting of at least nine burial mounds (based upon GLO survey notes), Sumnerville may have consisted of up to fifteen total mounds according to Eliot H. Crane (Dowagiac Daily News 1888). The site was investigated in 1878 by Dr. Bonine of Niles and in 1888 by Eliot H. Crane (Hunziker 1977). Crane named the various mounds at Sumnerville after the landowners: Walter, Merrit, Kibler/Kibbler, and Leeder. Later surveys of the site were conducted by Quimby in 1937 and Western Michigan University in 1987 and 1989 (Garland 1990b).

Artifacts are typical of those recovered from Hopewellian mounds elsewhere in Michigan and include copper awls and celts, diagnostic projectile points, deer bone awls, *Busycon* shells, polished slate gorgets, mica sheets, galena nuggets, red ochre, an ivory bear canine effigy, and Havana- and Hopewell-related pottery (Quimby 1941a). Based upon ceramic evidence (i.e., the presence of Havana types), Walter Mound 1 likely represents the first group of mounds built at the site. Some Havana sherds were recovered from Kibler mounds as well. Havana-related sherds at Sumnerville are more Goodall Tradition-related rather than Norton. Hopewell-related ceramics make up the majority ware category at the site, however, and are more similar to Norton Tradition styles (Garland and DesJardins 2006).

Projectile point forms include the Manker, Norton, and other untyped corner-notched types (Garland and DesJardins 2006). Overall, the lithic assemblage lacks Snyders Points and contains high percentages of Bayport chert use. Due to the presence of both Norton Tradition and Goodall Tradition assemblage traits at Sumnerville, Garland and DesJardins (2006) suggest that Sumnerville (and the rest of the St. Joseph valley) be designated as the “Goodall periphery,” highlighting the ambiguous nature of the region.

Dieffenderfer (20SJ179)

The Dieffenderfer site (Cremin and DesJardins 1994, 2001; Garland and DesJardins 2006; Steeby 1997) is located on the north bank of the St. Joseph River in the S ½ of the SW ¼ of Section 32, Constantine Township, St. Joseph County, Michigan (T 07S, R 12W). Dieffenderfer was excavated by Western Michigan University in 1993 and 1995, revealing a small Hopewell-related occupation (Steeby 1997). Five probable Middle Woodland Hopewell

Ware-like ceramic vessels were recovered, including plain rocker stamped rims from several vessels and two Brangenberg Plain-like rims. Brangenberg Plain types have not been reported elsewhere in Michigan and although they are found in the Kankakee, they are more common in Illinois and Ohio (Garland and DesJardins 2006). Based upon the available evidence, a mid to late Converse phase temporal designation seems appropriate.

Strobel (20SJ180)

The Strobel site (Garland and DesJardins 1995) represents a small Havana-related extractive camp utilized by one or two families on the Prairie River, a tributary of the St. Joseph River. It is located in the S ½ of the NW ¼ of the SW ¼ of Section 26, Lockport Township, St. Joseph County, Michigan (T 06S, R 11W). Strobel was test excavated in 1993-1994 by the Kalamazoo Valley Chapter of the Michigan Archaeological Society. Three Naples Zoned Dentate Stamped vessels and several corner-notched points (some Norton and *affinis* Snyders types) were recovered from these excavations but local collectors have also collected red-filmed ceramics, rims sherds exhibiting an interior bevel, and the base of the biface of a Dickson knife made from heat-treated Burlington chert (Garland and Desjardins 1995, 2006). Stylistically, the ceramics from the site suggest a slightly stronger influence and affiliation with Kankakee valley groups rather than west Michigan groups (Garland and DesJardins 1995).

Eccles (20SJ46)

The Eccles site (Dorothy and Garland 1981; Garland and DesJardins 2006) is located on the southeastern side of Portage Lake in St. Joseph County, Michigan. Portage Lake is adjacent to the Portage River, an important south-flowing stream that rises close to the Kalamazoo River and drains southward to the town of Three Rivers where the St. Joseph River meets two of its tributaries, the Portage and Rocky Rivers (Garland and DesJardins 2006). Two Middle Woodland vessels were recovered from the site by Western Michigan University. One is particularly unusual, exhibiting a deeply channeled and noded rim, while the second vessel is dentate stamped and curvilinear zoned. Eccles has not been extensively tested so the size of the Middle Woodland component at the site is unknown.

Scott Mound (20SJ2)

The Scott Mound (Quimby 1941a) is located in Colon Township, St. Joseph County, Michigan (T 06S, R 09W) and is several miles east of the Marantette Mounds (20SJ1). The singular Scott mound was excavated by E. H. Crane in the late nineteenth century (Cutler 1906; Everts 1887; Quimby 1941a). Unfortunately, nothing is known about these excavations, but documents available in the Grand Rapids Public Museum allowed Quimby (1941a) to provide a trait list of artifacts that likely originate from the Scott Mound. These include flint blades and drills, two polished slate gorgets, 1 engraved turtle shell, two cordage strands, fragments of a mussel shell, cut sheet mica fragments, red ochre, and a whole pottery vessel. There is ambiguity, however, in the origin of this vessel, which may be attributed to either the Scott or Marantette Mounds (Garland and DesJardins 2006; Quimby 1941a). The vessel is a Hopewell Zoned Rocker Stamped quadrilobate jar with a crosshatched and hemiconical punctated rim (Quimby 1941a: 117, 145; 1941b). Scott likely dates to the mid-late Converse phase in Michigan or the LaPorte phase in the Kankakee (Mangold and Schurr 2006).

Simpson (20KZ226)

The Simpson site (also known as the Simpson Paper or the Simpson Paper Company site) (Cremin and De Fant 1986, 1987; Cremin, De Fant, and Adams 1984) is located in the NW ¼ of the NW ¼ of the SE ¼ of the NE ¼ and the SW ¼ of the NE ¼ of the NE ¼ of Section 23, Schoolcraft Township, Kalamazoo County, Michigan (T 04S, R 11W). It is situated just north of Barton Lake, one of the more prominent lakes in the county (Durant 1880). Excavated in 1984-1985 by Western Michigan University, Simpson provides evidence of a potentially substantial Middle Woodland occupation of an interior lake locale that may be of particular interest for future excavations. Middle Woodland ceramics recovered from the site include two Naples Dentate Stamped rims from separate vessels, a zoned body sherd, a thick cordmarked body sherd, and small rim fragments with fingernail impressions (Garland and DesJardins 2006).

Schilling (20KZ56)

The Schilling site (Cremin, De Fant, and Adams 1984; Garland and DesJardins 2006) was tested in 1984 by Western Michigan University and is located in the S ½ of the NW ¼ of the SW ¼ of Section 4, Pavilion Township, Kalamazoo County, Michigan (T 03S, R 10W) and the SE ¼ of the SE ¼ of the NE ¼ of the SE ¼ of Section 5, Pavilion Township, Kalamazoo County, Michigan (T 03S, R 10W). Schilling is situated on East Lake and yielded two diagnostic Norton Points fashioned from Burlington chert, a large obsidian preform that was later found to have originated from Obsidian Cliff in Yellowstone National Park, and half of a Hopewell Rocker Stamped vessel (Garland and DesJardins 2006). The Hopewell vessel (Figure A-8) is relatively thin walled with a drilled hole present below a flaring rim. Plain vertical rows of rocker stamping cover the entire vessel, which produces a “herringbone pattern” on the exterior surface that is reminiscent of simple-stamped surface treatments in Ohio Hopewell wares (Garland and DesJardins 2006). Thus, Simpson provides tantalizing evidence for Ohio Hopewell migration or interaction occurring in the Portage River drainage of Michigan, presumably during the middle to late Converse phase.

Figure A-8: Hopewell Plain Rocker Stamped Vessel from the Schilling site

Galien River Valley Sites, Michigan (n = 2 sites)

Behner (20BE255)

The Behner site (Mangold 1981b) is located along the lower Galien River in extreme southwest Michigan. The legal location is the NE ¼ of Section 2, New Buffalo Township, Berrien County, Michigan (T 08S, R 21W). The site overlooks the northern edge of a large interdunal marsh that has historically been called Lake Potawatomi (Kissman 1976; Mangold 1981b). It was discovered by Mangold (1981b) as part of a survey of the Galien River basin. Middle Woodland artifacts found at the site include several Snyders-like points and fingernail-impressed ceramic sherds with some interior lip notching that Mangold (1997: 46) states "probably fall into the early Middle Woodland time frame." Other decorative ceramic traits present include punctation, crosshatching, brushing, and cordwrapped stick impressing (Mangold 1981a, 1981b, 2009).

Bobinski (20BE282)

The Bobinski site (Mangold 1981b, 2009) is located on a peninsula between the Galien River and Lake Michigan in the NE ¼ of Section 3, New Buffalo Township, Berrien County, Michigan (T 08S, R 21W). Like the Behner site, Bobinski is adjacent to Lake Potawatomi, an interglacial lake that drains to form a large marsh. Bobinski is less than 60 meters from a former group of at least three burial mounds that were destroyed by farming and looters in the mid-1800's (Kissman 1976).

Approximately 56 square meters were excavated by Mangold (1981b) in 1977-1978 at the Bobinski site. A total of 689 pottery sherds representing 11 vessels, easily the largest concentration at any other site within the Galien basin, were recovered. Although most of the pottery is too small to analyze, one major section of a Naples Cordwrapped Stick Impressed vessel was found (Figure A-9). Other vessels were decorated with cordmarking, punctates on cordmarking, incising over cordmarking, linear dentate stamping with nodes, and finger impressions on lips (Mangold 1981b, 2009). Very few lithic artifacts were recovered from Mangold's investigation of the site, but three projectile points (one expanded stem, one corner-notched, and one triangular), and two unifacial thumbnail scrapers were found.

Figure A-9: Bobinski Site, Naples Cordwrapped Stick Vessel (from Mangold 1981b: 44)

Kankakee River Valley Sites, Indiana (n = 17 sites)

Mud Lake (12LE14)

The Mud Lake site (Brown 1964; Mangold 1981a; Schurr 1999) is located in the SE ¼ of the SW ¼ and the SW ¼ of the SW ¼ of Section 33, Lincoln Township, LaPorte County, Indiana (T 36N, R 1W). Mud Lake is located on the eastern shores of a former lake by the same name, which is now drained. The site was reported to Glenn A. Black by Ernest W. Young in 1937. Although Young (1943) mentioned in his notes the presence of approximately eleven mounds (Brown 1964: 121; Young 1943), he recorded four total burial mounds on the original site form. There now appears to have been additional mounds in the immediate vicinity of these four mounds which comprised the entire Mud Lake mound group. These are represented by separate site numbers: 12LE12 (4 mounds), 12LE13 (2 mounds), and perhaps 12LE17 (Schurr 1999).

Like most northwestern Indiana burial mounds, the site is poorly known due to the damages incurred by sand mining, leveling for agricultural purposes, and looting (Schurr 1997, 1999). What is known from these sites derive primarily from surface collections that were collected by professional or avocational archaeologists or local residents. The University of Notre Dame visited the site in 1998 in order to explore the data recorded in Young's collection and notes (Schurr n.d., 1999). Schurr conducted a geophysical survey and identified the location of two possible mounds, one of which had an empty flanking trench adjacent to its central tomb. Interestingly, the only other flanking trenches in this region have been found at the Norton Mounds site in west Michigan and the Bellinger Mound (12SJ6) in northwest Indiana (Griffin et al. 1970; Mangold 2009; Schurr n.d.). Schurr recovered a litany of artifacts in and around the mounds and from former looters' fill, including Hopewell vessels, *affinis* Snyders points and other corner-notched points, large bifaces, one lamellar blade, and bone awls, among others (Mangold 2009; Schurr n.d., 1999).

The Mud Lake pottery collection in the Ernest W. Young collection at Illinois State Museum and the collection recovered from the University of Notre Dame's investigations shows a much greater time depth than that seen at the nearby Goodall site. Havana styles (especially Havana Plain and Naples Dentate Stamped), however, are most abundant at Mud Lake, which mirrors the situation at Goodall (Mangold 1981a; Schurr 1997, 1999). Minor frequencies of ovoid stamping, punctation, rocker stamping, and crosshatching occur.

Stillwell

The Stillwell site is an unrecorded site in LaPorte County, Indiana located north of the Mud Lake site (Mangold 2009). The exact location of the site is unknown and it is likely that it has not been excavated (Mangold, personal communication 2012). Stillwell site collections are housed at the Illinois State Museum and some ceramic samples were studied by Mangold (2009) in his dissertation. Early Havana-related ceramics predominate at the site, but Hopewell-related types are also present. Stylistically, the ceramic assemblage is more similar to Goodall Tradition styles than Norton Tradition styles, based upon the presence of both thick and thin dentate stamping more in line with Kankakee ceramics, curvilinear and circular zoning, and slipped ceramics.

Goodall (12LE9)

The Goodall site (Brown 1964; Faulkner n.d., 1960; Mangold 1981; Quimby 1941a) is the most popular mound group and habitation site in northwest Indiana, contributing the namesake for the former Goodall Focus and the current Goodall Tradition. It is located in the SE ¼ of the NE ¼ of the SE ¼ of Section 20, Union Township, LaPorte County, Indiana (T 35N, R 2W). Other related locales include the NE ¼ of the SE ¼ of the SE ¼ of Section 20 and the S ½ of the SW ¼ of the NE ¼ of the SW ¼ of Section 21, Union Township. Goodall once consisted of approximately twenty-two burial mounds, arranged in three groups (Mangold and Schurr 2006). Looters, in conjunction with erosion, terracing, and cultivation, destroyed many of the original mounds (Mangold and Schurr 2006).

Perhaps the first written description of the site dates to 1834, when Government Land Office (GLO) surveyors passed through the area. Some of the mounds were later explored by E.T. Coby in the nineteenth century (Robinson 1875) and by Dr. Higday in the late 1860s and early 1870s (Foster 1873). Young excavated Mound 22 between 1939 and 1943. More recent explorations of the Goodall site were conducted by Mangold in 1979 (Mangold 1981) and by the University of Notre Dame in the 1990s (Schurr 1993, 1996, 1998, 1999). These more recent investigations demonstrate that important archaeological data can still be gleaned from highly disturbed and destroyed mound complex sites such as Goodall (also see Schurr 1997).

Burial goods and artifacts recovered from Goodall include copper celts and awls, many diagnostic Middle Woodland points, lamellar blades, bifaces, flint scrapers, bone awls, a chert raptor effigy (see Mangold 2009: 128), polished slate gorgets, cut mica sheets, wolf jaws, platform and effigy pipes, mussel shells, a turtle carapace dish, galena, and grit- and limestone-tempered pottery, among many others (Figure A-10) (Faulkner 1960; Quimby 1941a, 1943).

Figure A-10: Goodall Site Burial Goods
(courtesy of Glenn A. Black Laboratory, Indiana University)

The Goodall site likely has the largest quantity of Havana-style pottery (Figure A-11) in the Kankakee, but Hopewell and Brangenberg types are also common in both mound and habitation contexts. Most of the Hopewell Ware sherds recovered from the 1990's University of Notre Dame excavations are limestone tempered, have crosshatched rims, and contain zoned rocker dentate-stamped decorations (Mangold and Schurr 2006; Schurr 1998, 1999). Interestingly, these differ from the plain and grit-tempered vessels found in the Young surface collection from the site, and hint towards a stronger connection to the Illinois Valley. Based upon the available ceramic data, a date for 100 B.C. – A.D. 200 seems reasonable to describe the date of activity at Goodall. In general, Goodall site pottery styles are characteristic of the time in which mortuary ceremonialism and participation in the Hopewell Interaction Sphere were at their peak (Mangold and Schurr 2006).

Figure A-11: Naples Zoned Dentate Stamped Vessel, Goodall Site
(courtesy of Glenn A. Black Laboratory, Indiana University)

Good's Ford (12LE7)

The legal location of the Good's Ford site (Brown 1964) is the SE ¼ of the NE ¼ of the NE ¼ of Section 29, Union Township, LaPorte County, Indiana (T 35N, R 2W). It is a habitation village located just south of the Goodall site. Very little is recorded or known about the site but the author observed that most of the diagnostic Middle Woodland sherds in the Young collection are dentate stamped with smaller quantities of cordwrapped stick impressing, ovoid stamping, noding, punctation, and rocker dentate stamping. Based upon the presence of both Havana and Hopewell-related ceramics at the site, Mangold and Schurr (2006) place the Good's Ford site in the Goodall phase (A.D. 1 – 200) of the Goodall Tradition.

Weise Mound (12PR35)

The Weise Mound (also known as "Indian Garden") (Faulkner 1960; McAllister 1932) is a very late (perhaps terminal or transitional) Middle Woodland site located about ½ mile from the Kankakee River on a sand ridge. The legal location of the site is the NE ¼ of the SE ¼ of the NE ¼ of Section 27, Pleasant Township, Porter County, Indiana (T 33N, R 6W). The mound was roughly 40 feet in diameter and 3 feet high. A 1908 excavation of the mound was conducted by Charles Wilcox who unearthed six skeletons. Twenty-four flint discs were later found just north of the mound when the land was first plowed in 1925 (McAllister 1932). The area surrounding the mound produced flint chips, projectile points, and zoned dentate stamped Hopewellian pottery.

McAllister (1932) later excavated the mound and the surrounding vicinity in 1931, and uncovered various burials accompanied with burial goods, such as pottery, 3 slate gorgets, 2 tubular copper beads, 1 copper plate, 2 shell beads, 1 platform pipe, and 25 projectile points.

The pottery included in this dissertation includes types such as Havana Cordmarked with noding, Hopewell Zoned Incised, and Hopewell Zoned Dentate Stamped varieties.

Lefty's Coho Landing (12PR526)

Pottery from one site (12PR526) discovered during an archaeological reconnaissance investigation for the Lefty's Coho Landing Project (Natt and Sipes 1998) is included in this dissertation. This site is located on two adjacent dunes in the SW ¼ of the SW ¼ of the SE ¼ of the NW ¼ of Section 36, Portage Township, Porter County, Indiana (T 37N, R 7W). The site evidences repeated short-term and seasonal occupational use of the southern Lake Michigan basin region. Several pottery samples from the site possess decorative treatments similar to those seen from the Middle Woodland component at the Moccasin Bluff site and at sites in northeastern Indiana (Natt and Sipes 1998; Schurr 1991). These samples were decorated with fine cordwrapped stick impressing, punctating, rocker stamping, and fingernail/crescent stamping (Natt and Sipes 1998). Two other nearby sites, 12PR527 and 12PR528, also contain Middle Woodland components with Havana Hopewell ceramics (Natt and Sipes 1998) but are not included in this dissertation.

Brems (12ST4)

The Brems site (known locally as "Indian Hill") (De Paepe 1959) is located in the NE ¼ of the SE ¼ of the SW ¼ of the NE ¼ of Section 7, Center Township, Starke County, Indiana (T 33N, R 2W). Brems is one of the largest village sites in Starke County and is located just north of the Yellow River. A burial was also reported at Brems in the Knox *Republican* on April 20, 1938, but very little detail exists regarding the contents of this mound (De Paepe 1959). Pottery is abundant at the site and includes many sherds that are similar to Goodall Tradition vessels. De

Paepe's 1959 survey of Starke County discovered some obvious Middle Woodland samples at Brems, including 1 crosshatched rim, 3 zoned and dentate stamped body sherds, and 1 dentate stamped rim sherd (De Paepe 1959).

The site was also well known by local collectors, one of which was John C. Birdsell of South Bend, Indiana, who eventually donated his collection to the University of Michigan in 1947. These materials were studied and listed in Appendices 13 and 14 of Bettarel and Smith's (1973: 186-187) Moccasin Bluff site report. Some of the Middle Woodland ceramics that Bettarel and Smith describe from the Birdsell collection from the Brems site include Naples Ovoid, Naples Cordwrapped Stick, Sister Creeks Punctated, Havana Zoned Dentate Stamped, Hopewell Zoned Rocker Dentate Stamped, and Havana Plain. Besides De Paepe's survey (1959) and Bettarel and Smith's (1973) examination of the Birdsell collection, very little else is known of the Brems site. Unfortunately, most of the diagnostic Middle Woodland ceramics listed by Bettarel and Smith from the Brems site at the University of Michigan could not be found by the author or the University staff.

12ST8

The 12ST8 site (De Paepe 1959) is located on a sand ridge overlooking an old lake bed in the NE ¼ of the NW ¼ of the NE ¼ of Section 25, North Bend Township, Starke County, Indiana (T 32N, R 1W). The site likely represents a small temporary hunting camp. One large section of a Havana Cordmarked rim with cordwrapped stick impressions on the interior lip was surface collected by De Paepe and is included in this dissertation. Other potential Middle Woodland artifacts found before De Paepe's survey of the county included corner- and side-notched projectile points and a T-shaped drill (De Paepe 1959).

Big Grape Island (12JS3)

Big Grape Island (Faulkner n.d.) is a habitation site located on the south side of the Kankakee River in the NE ¼ of the SW ¼ of Section 10, Keener Township, Jasper County, Indiana (T 32N, R 7W). According to the Indiana archaeology site form, it was investigated by Charles H. Faulkner at an unspecified date. A local collector, Murray Skinkle, donated a portion of his collection to the Glenn A. Black Laboratory of Archaeology at Indiana University, which included numerous Middle Woodland Havana and Hopewell series ceramics and probable Middle Woodland projectile points. Apparently, Faulkner's visit to the site also yielded the discovery of additional Middle Woodland ceramics.

Harper (12LA27)

The Harper site (Mangold 1981a) sits approximately 1 ¼ miles north of the Kankakee River in the SE ¼ of the NW ¼ of the SE ¼ of Section 30, Cedar Creek Township, Lake County, Indiana (T 32N, R 8W). According to the Indiana site form, the site was investigated by Charles H. Faulkner in 1963, who was pointed towards the site by Don Flatt, a local collector from Shelby, Indiana. Based upon examination of the ceramics from the site, the author believes the Middle Woodland component dates somewhere during the middle to late Goodall and LaPorte phases in Indiana and the late Norton and Converse phases in Michigan. Types such as Havana Cordmarked and Naples Dentate Stamped (with very thin stamping) are present.

Watson (12LA28)

The Watson site (Faulkner n.d.) is a habitation site located in the SW ¼ of the NW ¼ of the SE ¼ of Section 31, Cedar Creek Township, Lake County, Indiana (T 32N, R 8W). The Indiana archaeology site form states that it was visited by Charles H. Faulkner in 1963 and that

Don Flatt donated a portion of his collection from the site to Indiana University's Glenn A. Black Laboratory of Archaeology. Although it is rumored that some Hopewellian pottery has been found nearby, the donated collection appears to be overwhelmingly Havana Ware-related in character, including types such as Havana Cordmarked, Havana Plain, Havana Zoned, Naples Dentate Stamped, Sister Creeks, or Hummel Stamped. Other Middle Woodland artifacts from the site include numerous corner-notched points and a small celt.

Wunderink (12LA41)

The Wunderink village site (Faulkner n.d.) is located in the SE ¼ of the NE ¼ of the NE ¼ of Section 33, Cedar Creek Township, Lake County, Indiana (T 32N, R 8W). The site has been collected by Don Flatt and other local collectors and was investigated in 1963 by Faulkner. Flatt donated a collection from the site to the Glenn A. Black Laboratory of Archaeology that included Havana-related ceramics. One thick Havana-like rim decorated with thin dentate stamping is included in this dissertation.

Yahl (12LA21)

The Yahl site (Faulkner n.d.) is a habitation site located in the NE ¼ of the NW ¼ of Section 24, Cedar Creek Township, Lake County, Indiana (T 32N, R 9W). Don Flatt collected from the site for decades and Faulkner examined the site in 1963, according to the site form. Faulkner (n.d.: 16) states that, along with the Watson, Brown, Amey, Spry, and Schoon sites, the Yahl site contains the heaviest concentrations of Havana-related ceramics in Lake County. Types such as Havana Plain, Havana Cordmarked, Sister Creeks Punctated, Havana Zoned, or Naples Dentate Stamped are present at the site. A broken platform pipe has also been found from Yahl.

Schissler (12LA39)

The Schissler site is a habitation site located in the NE ¼ of the SW ¼ of the NE ¼ of Section 28, Cedar Creek Township, Lake County, Indiana (T 32N, R 8W). Don Flatt donated a portion of his collection from Schissler to the Glenn A. Black Laboratory of Archaeology. Faulkner later investigated the site in 1963. Middle Woodland ceramics recovered from Faulkner's survey and Flatt's collection included Havana Plain, Havana Zoned, and a Hopewell Rocker Stamped rim sherd with annular punctates (Figure A-12).

Figure A-12: Hopewell Rocker Stamped Rim & Havana Zoned sherd from Schissler Site

Schoon (12LA55)

The Schoon site (Faulkner n.d.) is located in the NE ¼ of the SW ¼ of the NE ¼ of Section 34, Eagle Creek Township, Lake County, Indiana (T 33N, R 8W). Faulkner (n.d.) notes the large numbers of Havana-related ceramics at the site, especially Sister Creeks Punctated. Other types observed by the author include Havana Cordmarked, Havana Cordwrapped Stick Impressed, Naples Dentate Stamped with nodes, or Hummel Dentate Stamped (some with curvilinear zoning). Faulkner (n.d.) also notes the rare presence of the Steuben Punctated type at Schoon. Hopewell-related ceramics are also present in the form of Hopewell Zoned (and non-zoned) Dentate Stamped and Montezuma Punctated types, as well as various sherds with incising, fingernail impressing, or thin line zoning decorative motifs.

Amey (12LA49)

The Amey site (Faulkner n.d.) is a habitation site located in the NW ¼ of the SE ¼ of the NW ¼ of Section 13, Eagle Creek Township, Lake County, Indiana (T 32N, R 8W). Amey has been a local favorite for collectors such as Don Flatt, Phil Dickey, Robert Reichert, and Terry Hand, all of whom excavated test blocks at the site in 1962. Faulkner also visited the site at an unspecified date. Although most of the Flatt and Dickey collections are composed of projectile points, numerous Middle Woodland pottery types were recovered. Havana-related types are common (Faulkner n.d.). The author has noted the presence of decorative motifs at Amey that include thin dentate stamping, plain rocker stamping, or thin line zoning. The site report also notes the presence of Havana Plain, Havana Zoned, Naples Dentate Stamped (some with nodes), and Hopewell Zoned Dentate Stamped types. Based upon the available ceramic data, the Middle Woodland occupation of the Amey site appears to have occurred relatively late in the Middle Woodland period (i.e., LaPorte phase).

Newton County (no site #, NE Co.)

Middle Woodland Havana and Hopewell series ceramics from Newton County, Indiana (originally surveyed by Hiestand 1951) are included in this dissertation. Although there is no site recorded and the exact origin of these sherds is unknown, Mangold (personal communication, 2012) believes these sherds come from a village site located in the Willow Slough State Fish and Game Area near Kentland, which is just south of the Kankakee River. This location is utilized as the approximate location of this ceramic collection and is sufficient for roughly estimating the social boundaries of communities in Newton County. The Newton County ceramics are good representatives of the Goodall tradition and include Havana Plain rims with noding, Havana Cordmarked rims, Naples Dentate Stamped (some with nodes) rims, Steuben Punctated rims, a Hopewell Crosshatched rim with hemiconical punctates, a Hopewell Plain rim with interior lip cordwrapped stick impressions, and a fingernail impressed (probable Sisters Creeks Punctated) rim. Interior beveled rims are present on several of these samples.

Marshall County, Indiana (n = 7 sites)

12MR4

12MR4 (Faulkner 1960, 1961) is one of the largest village sites in Marshall County. It is located on a sand ridge that terminates on the west bank of Out Let Creek in the SW ¼ of the SE ¼ of the NE ¼ of Section 32, Union Township, Marshall County, Indiana (T 32N, R 1E). Out Let Creek flows from Lake Maxinkuckee in the north southward to the Tippecanoe River. Charles H. Faulkner visited the site between 1954 and 1959, and recovered 1 copper awl, numerous projectile points, and numerous Middle Woodland sherds. The pottery assemblage can be described as rather crude, Havana-related types characterized by unusual combinations of cordwrapped stick impressing, fingernail punctation, large toothed dentate stamping of various widths, and zoning (Faulkner 1960, 1961). They appear to be "copies" of Havana-related types from the Kankakee. The site is likely a very early Middle Woodland site, perhaps the earliest in Marshall County.

12MR5

12MR5 (Faulkner 1960, 1961) is a small village site located west of 12MR4 in the NW ¼ of the SW ¼ of Section 30, Union Township, Marshall County, Indiana (T 32N, R 1E). It is located on the south end of a large drained lake bed (Lake Manatu) west of Culver on the Marshall-Starke county line. Havana Plain and Naples Zoned Dentate Stamped sherds were recovered by Faulkner (1961) from 1954 - 1958. The thin and light dentate stamping present on the Naples Dentate Stamped sherds suggest a middle-to-late Middle Woodland occupation of the site.

12MR10

12MR10 (Faulkner 1960, 1961) is located on the western shore of Lake Maxinkuckee in the SE ¼ of the SW ¼ of the NW ¼ of Section 28, Union Township, Marshall County, Indiana (T 32N, R 1E). The site was surface collected by Faulkner in 1957, who recovered a side-notched projectile point, 3 thumbnail scrapers, and Havana-related pottery sherds of the Havana Plain and Naples Dentate Stamped types (Faulkner 1961). Naples Dentate Stamped sherds are lightly stamped with thin toothed dentate stamps that are similar to 12MR5 sherds, and point towards a middle-to-late Middle Woodland occupation. Local historians also state that a mound was once located "in the vicinity of" 12MR10 and was excavated in the 1870s – 1880s (Faulkner 1960, 1961; McDonald 1908). Artifacts found in the mound included human remains, stone projectile points, and other “Indian trinkets” (McDonald 1908). Whether or not the mound was Middle Woodland is unknown.

12MR78

In 1959, Charles H. Faulkner (1960, 1961) visited the 12MR78 site, a short-term encampment located in the NW ¼ of the SW ¼ of the NE ¼ of Section 27, West Township, Marshall County, Indiana (T 33N, R 1E). 12MR78 sits atop a sand ridge north of the Yellow River and has yielded two Hopewell Ware rim sherds (crosshatched with hemiconical punctates) that Faulkner (1960) guessed were either clay or limestone tempered, and therefore represented imports from the Illinois Valley. Interestingly, these two rim sherds are almost identical in style and paste characteristics to a rim sherd (Figure A-13) recovered from the 12MR115 site, which is discussed in Chapter 5.

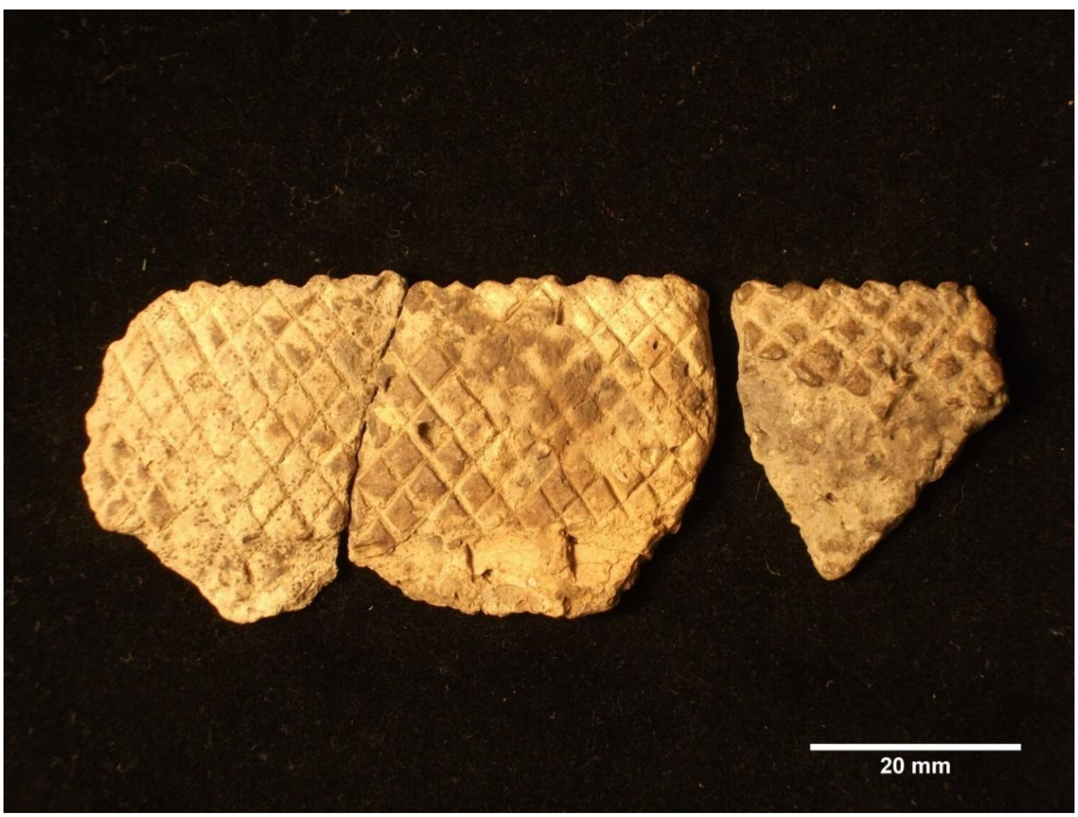


Figure A-13: Hopewell Rims from 12MR78 (left) and 12MR115 (right)

12MR115

12MR115 (Faulkner 1960, 1961) is a village site located in the SE ¼ of the NE ¼ of the SW ¼ of Section 21, West Township, Marshall County, Indiana (T 33N, R 1E). It is located on the same very long sand ridge that 12MR78 is located on. Before the site was visited in 1959 by Faulkner (1961), it was surface collected by Russell A. Quillen of Plymouth, Indiana, who recovered Hopewell series ceramics (Figure A-13) that were almost identical in paste and style to those recovered from the 12MR78 site. Faulkner (1961) speculated that these sherds were sand or clay tempered. Based upon the presence of Hopewell-related ceramics at both 12MR78 and 12MR115, a middle-to-late Middle Woodland temporal occupation seems appropriate for both sites.

12MR162

12MR162 (Faulkner n.d., 1960, 1961) is located on the southern edge of Wolf Creek near its confluence with the Yellow River in the SE ¼ of the SW ¼ of the NE ¼ of the NE ¼ of Section 31, Green Township, Marshall County, Indiana (T 33N, R 2E). Faulkner's (1961) survey of the site in 1959 and 1960 uncovered a handful of Middle Woodland pottery sherds of the Havana Plain and Havana/Naples Zoned Dentate Stamped types. The dentate stamped sherd possesses the thin dentate stamping characteristic of the middle-to-late Middle Woodland period.

12MR217

The furthest eastward extension of Havana-Hopewell occupation in Marshall County occurs at the 12MR217 site (Faulkner 1960, 1961), a village located east of the Yellow River in the NW ¼ of the NW ¼ of Section 16, Center Township, Marshall County, Indiana (T 33N, R 2E). Two historic period burials were uncovered in 1933 by WPA workers, who later donated the collections to Harry Lower, a collector from Plymouth, Indiana. These materials apparently also included a couple prehistoric ceramic sherds: one cordmarked sherd and one Sister Creeks Punctated sherd (Faulkner 1960). The latter annular punctated sherd was donated by Mr. Lower to Faulkner as part of his survey in 1959 and is included in this dissertation.

A group of small burial mounds were also said to have been located in the vicinity of 12MR217 (McDonald 1881). Faulkner (1961) interpreted the presence of the Sister Creeks sherd as lending credibility to the story of these burial mounds, which were destroyed in 1881 (McDonald 1881).

APPENDIX B

Glossary of Terms

Argillaceous Rock Fragments (ARF's). Hardened clay lumps that occur naturally in clay sources; often confused with grog temper.

B-fabric (birefringent fabric). The structural aspects of the clay matrix; the matrix may be composed of random birefringent zones or elongated birefringent streaks present in the paste, among others.

Birefringence. Changing optical properties such as a change in color or loss of color upon rotation of the stage under the petrographic microscope.

Body. The bulk composition of the vessel, including temper, clays, and all courser natural inclusions. It functions as a gauge of technology, function, and informs on the learned and shared "recipe" of ceramic production.

Decorative Repertoire. The percentages of each individual exterior and interior decorative element applied to pottery at each individual site. Sampling methodology employed in this dissertation.

Fabric. The constituents of fired pottery, including clay matrix, natural inclusions, or voids; excludes temper and surface coatings (e.g., slip). Synonymous with *paste* in this research.

Grog. Fragments of previously fired ceramics that are added to a clay as temper.

Natural Inclusions. Mineral grain inclusions that naturally occur within clay sources.

Optical Activity (of the clay matrix). A clay matrix that is birefringent; can include active (very birefringent), slightly active (marginally birefringent), or inactive (not birefringent) types.

Oxidation. An oxygen-rich firing atmosphere; frequently results in lightly colored pottery vessels.

Paste. The mixture of natural materials, clays, and courser inclusions naturally found in the raw sediments/clays collected by potters before tempers are added. Informs on the acquisition of raw materials (contrasting with the *body*).

Paste Vitrification. Formation of glass within ceramic paste during firing of pottery; occurs around 850° C.

Reduction. An oxygen-poor firing atmosphere; generally results in darkly colored pottery vessels.

Residential Community. Groups of people who are defined by coresidence or close residence, and regular face-to-face interaction. Expected to be common on the intraregional spatial scale (e.g., within river valleys). Archaeologically, a residential community may conform to either a village (a single archaeological site) or a neighborhood (a cluster of sites within a small area).

Slip. A fine clay-rich suspension (in water) applied to the surface of a ceramic vessel, either as a surface finish to produce a smoothed quality or as a decoration, in the fired or unfired state.

Sustainable Community. Regional social networks designed to offset and buffer against local subsistence shortages and local demographic variations. Plays a role in the long-term viability of a social group.

Symbolic Community. A group of individuals who emphasize symbols to actively define, communicate, and negotiate membership in a social group that transcends or crosscuts local residential groups for common political, economic, social, and/or religious purposes (e.g., mortuary ritual at burial mound sites).

Technical Style. The *choices* that artisans make that are represented in the way the end product (e.g., pottery) is made or achieved; or the learned "recipe" of artifact production.

Temper. Any non-plastic (non-clay) material intentionally added by the potter to the clay during ceramic construction. Examples of temper include grit/crushed rock, grog, or shell, among others. Temper generally reduces plasticity in the clay, improves workability of the clay, and improves firing properties.

Visual Style. The visible, elaborate types of decorations that are actively used to communicate messages and identity.

Void. Open space in pottery paste; informs on porosity.

APPENDIX C

Chapter 4 Tables and Figures

Key to Abbreviations used in Appendices:

sm = smoothed
cm = cordmarked
sm-o-cm = smoothed over cordmarked
burn = burnished
brsh = brushed
node = noded
dent st = dentate stamped
punc = punctated
cws = cordwrapped stick impressed
incis = incised
xhatc = crosshatched
fabr imp = fabric impressed
tool imp = tool impressed
ovoid st = Naples Ovoid Stamped
rock st = rocker stamped
dent rock st = dentate rocker stamped
zone = zoned lines
fnail imp = fingernail impressed
trail = trail lines
striat = striated

Kspar = Pottasium Feldspar

Table C-1: Muskegon River Valley Havana-Hopewell Exterior Sherd Decorative Repertoire

Site	n (%)	sm	cm	sm-o-cm	burn	brsh	node	dent st	punc
Brooks Mound	6	4 (66.7%)	2 (33.3%)	-	-	-	-	-	4 (66.7%)
Davis Swamp	48	28 (58.3%)	3 (6.3%)	16 (33.3%)	-	-	1 (2.1%)	1 (2.1%)	3 (6.3%)
Jancarich	129	114 (88.4%)	4 (3.1%)	6 (4.7%)	42 (32.6%)	42 (32.6%)	24 (18.6%)	14 (10.9%)	3 (2.3%)
Toft Lake	60	6 (10%)	40 (66.7%)	13 (21.7%)	1 (1.7%)	-	-	4 (6.7%)	-
Total Sherds	**243**	**152**	**49**	**35**	**43**	**42**	**25**	**19**	**10**
Percent		**62.6%**	**20.2%**	**14.4%**	**17.7%**	**17.3%**	**10.3%**	**7.8%**	**4.1%**

Site	n (%)	cws	incis	xhatc	fabr imp	tool imp	ovoid st	rock st	dent rock st	zone
Brooks Mound	6	-	-	2 (33.3%)	-	2 (33.3%)	-	-	-	3 (50%)
Davis Swamp	48	-	3 (6.3%)	-	-	1 (2.1%)	-	11 (22.9%)	3 (6.3%)	-
Jancarich	129	6 (4.7%)	1 (0.8%)	5 (3.9%)	-	2 (1.6%)	-	1 (0.8%)	-	12 (9.3%)
Toft Lake	60	2 (3.3%)	-	-	1 (1.7%)	3 (5%)	-	-	-	2 (3.3%)
Total Sherds	**243**	**8**	**4**	**7**	**1**	**8**	**0**	**12**	**3**	**17**
Percent		**3.3%**	**1.6%**	**2.9%**	**0.4%**	**3.3%**	**-**	**4.9%**	**1.2%**	**7.0%**

Table C-2: Grand River Valley Havana-Hopewell Exterior Sherd Decorative Repertoire

Site	n (%)	sm	cm	sm-o-cm	brsh	incis	dent st	punc	node	cws
Battle Point	11	10 (90.9%)	1 (9.1%)	-	-	2 (18.2%)	-	3 (27.3%)	5 (45.5%)	-
Boom Road	2	2 (100%)	-	-	-	-	1 (50%)	-	-	-
Converse Village	120	84 (70%)	8 (6.7%)	11 (9.2%)	5 (4.2%)	8 (6.7%)	16 (13.3%)	12 (10%)	4 (3.3%)	3 (2.5%)
Lower Lake	9	5 (55.6%)	1 (11.1%)	3 (33.3%)	-	1 (11.1%)	2 (22.2%)	2 (22.2%)	2 (22.2%)	-
Norton Mounds	47	40 (85.1%)	1 (2.1%)	6 (12.8%)	-	9 (19.1%)	22 (46.8%)	15 (31.9%)	-	3 (6.4%)
Paggeot	1	1 (100%)	-	-	-	-	-	-	-	-
Prison Farm	210	35 (16.7%)	57 (27.1%)	31 (14.8%)	1 (0.5%)	25 (12.4%)	34 (16.2%)	14 (6.7%)	74 (37.1%)	9 (4.3%)
Sand Creek	1	1 (100%)	-	-	-	-	-	-	-	-
Spoonville	110	74 (67.3%)	3 (2.7%)	28 (25.5%)	1 (0.9%)	10 (9.1%)	13 (11.8%)	9 (8.2%)	11 (10%)	3 (2.7%)
Total Sherds	**511**	**252**	**71**	**79**	**7**	**55**	**88**	**55**	**96**	**18**
Percent		**49.3%**	**13.9%**	**15.5%**	**1.4%**	**10.8%**	**17.2%**	**10.8%**	**18.8%**	**3.5%**

Table C-2 (cont'd)

Site	n (%)	fnail imp	xhatc	fabr imp	tool imp	trail	rock st	dent rock st	zone	ovoid st
Battle Point	11	-	-	-	-	-	4 (36.4%)	-	4 (36.4%)	-
Boom Road	2	-	-	-	-	-	-	-	2 (100%)	-
Converse Village	120	-	3 (2.5%)	-	3 (2.5%)	-	35 (29.2%)	14 (11.7%)	25 (20.8%)	-
Lower Lake	9	-	1 (11.1%)	-	-	-	-	-	1 (11.1%)	-
Norton Mounds	47	-	6 (12.8%)	-	11 (23.4%)	-	2 (4.3%)	-	29 (61.7%)	-
Paggeot	1	-	-	-	-	-	1 (100%)	-	1 (100%)	-
Prison Farm	210	5 (2.4%)	2 (1%)	6 (2.9%)	20 (9.5%)	1 (0.5%)	-	-	25 (11.9%)	-
Sand Creek	1	-	-	-	-	-	-	-	-	1 (100%)
Spoonville	110	-	4 (3.6%)	-	-	-	24 (21.8%)	3 (2.7%)	20 (18.2%)	-
Total Sherds	**511**	**5**	**16**	**6**	**34**	**1**	**66**	**17**	**107**	**1**
Percent		**1.0%**	**3.1%**	**1.2%**	**6.7%**	**0.2%**	**12.9%**	**3.3%**	**20.9%**	**0.2%**

Table C-3: Kalamazoo River Valley Havana-Hopewell Exterior Sherd Decorative Repertoire

Site	**n (%)**	**sm**	**cm**	**sm-o-cm**	**brsh**	**incis**	**dent st**	**punc**
Armintrout-Blackman	167	81 (48.5%)	78 (46.7%)	5 (3%)	2 (1.2%)	12 (7.2%)	5 (3%)	6 (3.6%)
Fennville	4	4 (100%)	-	-	-	1 (25%)	-	-
Hart	9	6 (66.7%)	-	4 (44.4%)	-	-	1 (11.1%)	-
Mushroom	18	11 (61.1%)	4 (22.2%)	-	-	6 (33.3%)	-	6 (33.3%)
Swan Creek	1	1 (100%)	-	1 (100%)	-	-	1 (100%)	-
Total Sherds	**199**	**103**	**82**	**10**	**2**	**19**	**7**	**12**
Percent		**51.8%**	**41.2%**	**5.0%**	**1.0%**	**9.5%**	**3.5%**	**6.0%**

Table C-3 (cont'd)

	n (%)	node	cws	fnail imp	xhatc	fabr imp	rock st	zone
Armintrout -Blackman	167	10 (6%)	2 (1.2%)	14 (8.4%)	2 (1.2%)	-	9 (5.4%)	2 (1.2%)
Fennville	4	-	-	-	-	-	2 (50%)	1 (25%)
Hart	9	2 (22.2%)	-	-	-	-	-	-
Mushroom	18	3 (16.7%)	1 (5.6%)	-	-	2 (11.1%)	1 (5.6%)	3 (16.7%)
Swan Creek	1	1 (100%)	-	-	-	-	-	-
Total Sherds	**199**	**16**	**3**	**14**	**2**	**2**	**12**	**6**
Percent		**8.0%**	**1.5%**	**7.0%**	**1.0%**	**1.0%**	**6.0%**	**3.0%**

Table C-4: St. Joseph River Valley Havana-Hopewell Exterior Sherd Decorative Repertoire

Site	**n**	**sm**	**cm**	**sm-o-cm**	**brsh**	**incis**	**dent st**	**punc**
Dieffen-derfer	5	5 (100%)	-	-	-	1 (20%)	-	1 (20%)
Eccles	3	3 (100%)	-	-	-	-	1 (33.3%)	-
Moccasin Bluff	179	134 (74.9%)	35 (19.6%)	4 (2.2%)	2 (1.1%)	4 (2.2%)	52 (29.1%)	16 (8.9%)
Rock Hearth	37	12 (32.4%)	19 (51.4%)	7 (18.9%)	-	-	-	4 (10.8%)
Schilling	1	1 (100%)	-	-	-	-	-	-
Simpson	8	4 (50%)	-	4 (50%)	-	-	2 (25%)	-
Strobel	5	4 (80%)	-	1 (20%)	-	-	1 (20%)	-
Sumnerville	16	11 (68.8%)	2 (12.5%)	2 (12.5%)	1 (6.3%)	5 (31.3 %)	4 (25%)	3 (18.8%)
Scott Mound	1	1 (100%)	-	-	-	-	-	1 (100%)
Total Sherds	**255**	**175**	**56**	**18**	**3**	**10**	**60**	**25**
Percent		**68.6%**	**22.0%**	**7.1%**	**1.2%**	**3.9%**	**23.5%**	**9.8%**

Table C-4 (cont'd)

Site	node	cws	fnail	xhatc	tool imp	rock st	dent rock st	zone
Dieffen-derfer	-	-	-	-	-	2 (40%)	-	-
Eccles	1 (33.3%)	-	-	-	-	-	-	1 (33.3%)
Moccasin Bluff	39 (21.8%)	18 (10.1%)	3 (1.7%)	-	17 (9.5%)	1 (0.6%)	-	34 (19%)
Rock Hearth	-	-	-	-	1 (2.7%)	-	-	-
Schilling	1 (100%)	-	-	-	-	1 (100%)	-	-
Simpson	-	2 (25%)	1 (12.5%)	-	-	-	-	-
Strobel	-	-	-	-	-	-	-	1 (20%)
Sumnerville	1 (6.3%)	1 (6.3%)	-	2 (12.5%)	1 (6.3%)	1 (6.3%)	1 (6.3%)	7 (43.8%)
Scott Mound	-	-	-	-	-	-	-	-
Total Sherds	**42**	**21**	**4**	**2**	**19**	**5**	**1**	**43**
Percent	**16.5%**	**8.2%**	**1.6%**	**7.8%**	**7.5%**	**2.0%**	**0.4%**	**16.9%**

Table C-5: Natural Inclusion Types in Havana Ceramic Samples

River Valley (N)	Kspar	Microcline	Plagioclase	Biotite	Muscovite	Chert	Opaques
Muskegon (33)	14 (42.4%)	11 (33.3%)	9 (27.3%)	2 (6.1%)	0	15 (45.5%)	14 (42.4%)
Grand (70)	25 (35.7%)	36 (51.4%)	41 (58.6%)	3 (4.3%)	6 (8.6%)	16 (22.9%)	0
Kalamazoo (34)	25 (73.5%)	25 (73.5%)	28 (82.4%)	3 (8.8%)	15 (44.1%)	26 (76.5%)	0
St. Joseph (59)	43 (72.9%)	35 (59.3%)	44 (74.6%)	0	30 (50.8%)	36 (61%)	0
Kankakee (128)	82 (64.1%)	34 (26.6%)	60 (46.9%)	21 (16.4%)	58 (45.3%)	75 (58.6%)	0
Grand Total (324)	189 (58.3%)	141 (43.5%)	182 (56.2%)	29 (9.0%)	109 (33.6%)	168 (51.9%)	14 (4.3%)

Table C-5 (cont'd)

River Valley (N)	Epidote	Hornblende	Pyroxene	Quartzite	Rhyolite	Perthite	Sandstone
Muskegon (33)	0	2 (6.1%)	13 (9.4%)	11 (33.3%)	0	0	0
Grand (70)	3 (4.3%)	17 (24.3%)	21 (30%)	31 (44.3%)	0	0	0
Kalamazoo (34)	2 (5.9%)	27 (79.4%)	2 (5.9%)	11 (32.4%)	0	0	0
St. Joseph (59)	3 (5.1%)	43 (72.9%)	1 (1.7%)	30 (50.8%)	7 (11.9%)	14 (23.7%)	0
Kankakee (128)	54 (42.2%)	48 (37.5%)	6 (4.6%)	54 (42.2%)	5 (3.9%)	2 (1.6%)	3 (2.3%)
Grand Total (324)	62 (19.1%)	137 (42.3%)	43 (13.3%)	137 (42.3%)	12 (3.7%)	16 (4.9%)	3 (0.9%)

Table C-6: Muskegon River Valley Temper Types and Percentages

Site (n)	Granite	Granodiorite	Gabbro	Grog + Granite	Granodiorite + Amphibolite	Granite + Diorite
Jancarich (28)	26 (92.8%)	-	1 (3.6%)	1 (3.6%)	-	-
Toft Lake (7)	5 (71.4%)	1 (14.3%)	-	-	1 (14.3%)	-
Davis Swamp (5)	1 (20%)	-	-	-	-	4 (80%)
Grand Total (40)	32 (80%)	1 (2.5%)	1 (2.5%)	1 (2.5%)	1 (2.5%)	4 (10%)

Table C-7: Grand River Valley Temper Types and Percentages

Site (n)	Granite	Granodiorite	Diorite	Gabbro	Grog + Granite	Granite + Gabbro	Granodiorite + Amphibolite	Amphibolite	Mica Schist
Prison Farm (25)	19 (76%)	1 (4%)	2 (8%)	-	-	-	2 (8%)	-	1 (4%)
Lower Lake 1 (7)	1 (14.3%)	1 (14.3%)	-	1 (14.3%)	3 (42.8%)	-	-	1 (14.3%)	-
Norton Mounds (10)	10 (100%)	-	-	-	-	-	-	-	-
Converse (7)	4 (57.1%)	-	2 (28.6%)	-	-	1 (14.3%)	-	-	-
Sand Creek (1)	1 (100%)	-	-	-	-	-	-	-	-
Spoonville (16)	7 (43.8%)	1 (6.25%)	3 (18.8%)	4 (25%)	-	-	-	1 (6.3%)	-
Battle Point (4)	4 (100%)	-	-	-	-	-	-	-	-
Grand Total (70)	46 (65.7%)	3 (4.3%)	7 (10%)	5 (7.1%)	3 (4.3%)	1 (1.4%)	2 (2.9%)	2 (2.9%)	1 (1.4%)

Table C-8: Kalamazoo River Valley Temper Types and Percentages

Site (n)	**Granite**	**Granodiorite**	**Diorite**	**Gabbro**	**Granite + Gabbro**	**Amphibolite**
Armintrout-Blackman (19)	18 (94.7%)	1 (5.3%)	-	-	-	-
Mushroom (6)	5 (83.3%)	-	-	-	1 (16.7%)	-
Swan Creek (1)	1 (100%)	-	-	-	-	-
Hart (9)	1 (11.1%)	-	-	4 (44.5%)	2 (22.2%)	2 (22.2%)
Grand Total (35)	25 (71.4%)	1 (2.9%)	-	4 (11.4%)	3 (8.6%)	2 (5.7%)

Table C-9: St. Joseph River Valley Temper Types and Percentages

Site (n)	**Granite**	**Granodiorite**	**Diorite**	**Grog + Granite**	**Granite + Amphibolite**	**Quartz Arenite Sandstone**	**Sub-Arkose Sandstone**
Simpson (7)	4 (57.1%)	2 (28.6%)	-	-	-	1 (14.3%)	-
Eccles (4)	4 (100%)	-	-	-	-	-	-
Strobel (5)	5 (100%)	-	-	-	-	-	-
Sumnerville (2)	-	-	-	-	2 (100%)	-	-
Moccasin Bluff (31)	22 (70.9%)	-	4 (12.9%)	2 (6.5%)	-	3 (9.7%)	-
Rock Hearth (8)	7 (87.5%)	-	-	-	-	-	1 (12.5%)
Grand Total (57)	42 (73.7%)	2 (3.5%)	4 (7%)	2 (3.5%)	2 (3.5%)	4 (7%)	1 (1.8%)

Table C-10: Kankakee River Valley Temper Types and Percentages
(*1 excludes mica schist tempered sample from this site)

Site (n)	Granite	Granodiorite	Diorite	Gabbro	Grog + Granite	Granite + Gabbro
Stillwell (10)	6 (60%)	1 (10%)	-	-	1 (10%)	1 (10%)
Mud Lake (15)	7 (46.7%)	4 (26.7%)	-	-	-	-
Goodall (22)	13 (59.1%)	2 (9.1%)	1 (4.5%)	4 (18.2%)	1 (4.5%)	-
Good's Ford (18)	14 (77.8%)	1 (5.6%)	2 (11.1%)	-	-	-
Brems (3)	-	2 (66.7%)	-	-	-	-
12ST8 (1)	1 (100%)	-	-	-	-	-
Lefty's Coho Landing (2)	-	1 (50%)	-	-	-	-
Weise Mound (8) *1	1 (12.5%)	3 (37.5%)	-	-	-	2 (25%)
12JS3 (1)	-	-	-	-	-	1 (100%)
Yahl (1)	1 (100%)	-	-	-	-	-

Table C-10 (cont'd)

Schoon (12)	8 (66.7%)	-	-	-	2 (16.7%)	-
Wunderink (1)	-	1 (100%)	-	-	-	-
Watson (7)	3 (42.9%)	3 (42.9%)	-	-	-	-
Amey (5)	1 (20%)	1 (20%)	1 (20%)	-	-	2 (40%)
Harper (2)	-	2 (100%)	-	-	-	-
Newton County (8)	6 (75%)	2 (25%)	-	-	-	-
Grand Total (116)	61 (52.6%)	23 (19.8%)	4 (3.4%)	4 (3.4%)	4 (3.4%)	6 (5.2%)

Table C-10 (cont'd)

Site (n)	**Quartz Arenite Sand-stone**	**Sub-Arkose Sandstone**	**Arkose Sand-stone**	**Unusual Feldspar**	**Amph-ibolite**	**Grano-diorite + Gabbro**
Stillwell (10)	-	-	-	1 (10%)	-	-
Mud Lake (15)	-	-	-	2 (13.3%)	-	2 (13.3%)
Goodall (22)	1 (4.5%)	-	-	-	-	-
Good's Ford (18)	-	-	-	-	1 (5.6%)	-
Brems (3)	1 (33.3%)	-	-	-	-	-
Lefty's Coho Landing (2)	-	-	1 (50%)	-	-	-
Weise Mound (8)	-	-	1 (12.5%)	-	-	-
Schoon (12)	-	-	-	-	1 (8.3%)	1 (8.3%)
Watson (7)	-	1 (14.3%)	-	-	-	-
Grand Total (116)	2 (1.7%)	1 (0.9%)	2 (1.7%)	3 (2.6%)	2 (1.7%)	3 (2.6%)

Table C-11: Marshall County Temper Types and Percentages

Site (n)	Granite	Grog + Granite	Granite + Gabbro	Gneiss	Micro-granite + Granite	Micro-granite + Granite + Arkose Sandstone	Diorite + Gabbro
12MR4 (9)	3 (33.3%)	-	-	1 (11.1%)	3 (33.3%)	1 (11.1%)	1 (11.1%)
12MR5 (2)	-	-	-	2 (100%)	-	-	-
12MR162 (1)	-	1 (100%)	-	-	-	-	-
12MR217 (1)	-	-	1 (100%)	-	-	-	-
Grand Total (13)	3 (23.1%)	1 (7.7%)	1 (7.7%)	3 (23.1%)	3 (23.1%)	1 (7.7%)	1 (7.7%)

Figure C-1: SPSS Bar Chart for Average Temper Size Indices (SSI) for all Havana Sites

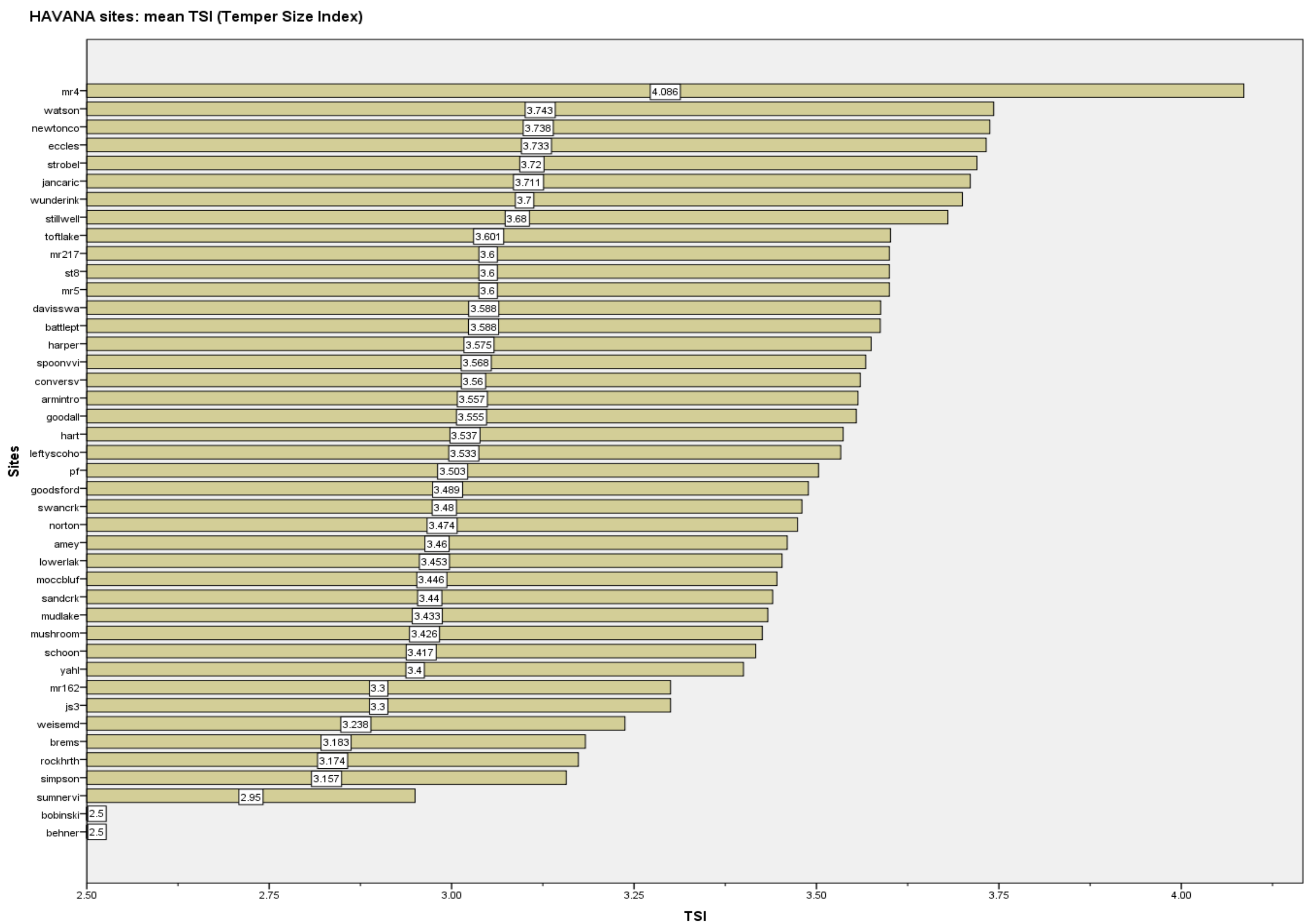


Table C-12: Muskegon River Valley Sites Optical Activity

	Jancarich	**Toft Lake**	**Davis Swamp**	***<u>TOTAL</u>***	***<u>%</u>***
Active	16 (76.2%)	4 (57.1%)	4 (80%)	***24***	***72.7%***
Slightly Active	4 (19%)	3 (42.9%)	1 (20%)	***8***	***24.2%***
Inactive	1 (4.8%)	0	0	***1***	***3%***
Total samples	21	7	5	***33***	

Table C-13: Grand River Valley Sites Optical Activity

	Prison Farm	**Lower Lake 1**	**Converse**	**Norton Mds.**	**Sand Creek**	**Spoonville**	**Battle Pt.**	***<u>TOTAL</u>***	***<u>%</u>***
Active	16 (64%)	5 (71.4%)	3 (42.9%)	1 (10%)	1 (100%)	7 (43.8%)	0	***33***	***47.1%***
Slightly Active	7 (28%)	2 (28.6%)	4 (57.1%)	9 (90%)	0	7 (43.8%)	4 (100%)	***33***	***47.1%***
Inactive	2 (8%)	0	0	0	0	2 (12.5%)	0	***4***	***5.7%***
Total samples	25	7	7	10	1	16	4	***70***	

Table C-14: Kalamazoo River Valley Sites Optical Activity

	Armintrout-Blackman	**Mushroom**	**Swan Creek**	**Hart**	***TOTAL***	***%***
Active	17 (94.4%)	5 (83.3%)	0	5 (55.6%)	***27***	***79.4%***
Slightly Active	1 (5.6%)	1 (16.7%)	1 (100%)	3 (33.3%)	***6***	***17.6%***
Inactive	0	0	0	1 (11.1%)	***1***	***2.9%***
Total samples	18	6	1	9	***34***	

Table C-15: St. Joseph River Valley Sites Optical Activity

	Simpson	**Eccles**	**Stro-bel**	**Sum-nerville**	**Rock Hearth**	**Moccasin Bluff**	***TOTAL***	***%***
Active	6 (85.7%)	2 (50%)	5 (100%)	1 (50%)	7 (87.5%)	21 (67.7%)	***42***	***73.7%***
Slightly Active	1 (14.3%)	2 (50%)	0	1 (50%)	1 (12.5%)	10 (32.3%)	***15***	***26.3%***
Inactive	0	0	0	0	0	0	***0***	***0***
Total samples	7	4	5	2	8	31	***57***	

Table C-16: Kankakee River Valley Sites Optical Activity

	Beh-ner	**Bobin-ski**	**Stillwell**	**Goodall**	**Mud Lake**	**Good's Ford**	**Brems**	**12ST8**	
Active	1 (100%)	1 (100%)	6 (60%)	17 (77.3%)	10 (66.7%)	15 (83.3%)	2 (100%)	1 (100%)	
Slightly Active	0	0	4 (40%)	5 (22.7%)	5 (33.3%)	3 (16.7%)	0	0	
Inactive	0	0	0	0	0	0	0	0	
Total samples	1	1	10	22	15	18	2	1	
	12JS3	**Weise**	**Lefty's Coho Landing**	**Harper**	**Watson**	**Yahl**	**Schoon**	**Schissler**	
Active	1 (100%)	7 (87.5%)	2 (100%)	2 (100%)	4 (57.1%)	1 (100%)	7 (58.3%)	0	
Slightly Active	0	1 (12.5%)	0	0	3 (42.9%)	0	5 (41.7%)	1 (100%)	
Inactive	0	0	0	0	0	0	0	0	
Total samples	1	8	2	2	7	1	12	1	
	Amey	**Newton Co.**	**Wund-erink**	**12MR 217**	**12MR 162**	**12MR4**	**12MR5**	***TOTAL***	***%***
Active	5 (100%)	3 (42.9%)	1 (100%)	1 (100%)	2 (100%)	1 (14.3%)	0	***92***	***70.2%***
Slightly Active	0	4 (57.1%)	0	0	0	6 (85.7%)	2 (100%)	***39***	***29.8%***
Inactive	0	0	0	0	0	0	0	***0***	***0***
Total samples	5	7	1	1	2	7	2	***131***	

Table C-17: Muskegon River Valley Paste Vitrification Presence

	Jancarich	**Toft Lake**	**Davis Swamp**	**TOTAL**
n	1	0	1	2
total samples	28	7	5	40
%	3.6%	0	20%	***5.0%***

Table C-18: Grand River Valley Paste Vitrification Presence

	Prison Farm	**Lower Lake1**	**Con-verse**	**Norton Mds**	**Sand Creek**	**Spoon-ville**	**Battle Pt.**	**TOTAL**
n	1	0	0	3	0	2	1	7
total samples	25	9	7	10	1	16	4	72
%	4%	0	0	30%	0	12.5%	25%	***9.7%***

Table C-19: Kalamazoo River Valley Paste Vitrification Presence

	Armintrout-Blackman	**Mush-room**	**Swan Creek**	**Hart**	**TOTAL**	**TOTAL**
N	1	1	0	5	7	2
total samples	18	6	1	9	34	25
%	5.6%	16.7%	0	55.6%	***20.6%***	***8.0%***
					Including Hart	Excluding Hart

Table C-20: St. Joseph River Valley Paste Vitrification Presence

	Simpson	**Eccles**	**Strobel**	**Sumn-erville**	**Rock Hearth**	**Moccasin Bluff**	**TOTAL**
N	1	0	0	0	3	3	7
total samples	7	4	5	2	8	31	57
%	14.3%	0	0	0	37.5%	9.7%	***12.3%***

Table C-21: Kankakee Valley and Marshall County Paste Vitrification Presence

	Brems	**12ST8**	**Stillwell**	**Goodall**	**Mud Lake**	**TOTAL: All sites**
n	1	0	1	3	9	37
total samples	2	1	10	22	15	130
%	50%	0	10%	13.6%	60%	***28.5%***
	Good's Ford	**Lefty's Coho Landing**	**12JS3**	**Weise**	**Amey**	**TOTAL: mid-upper Kankakee**
n	3	0	0	3	3	20
total samples	18	2	1	8	5	79
%	16.7%	0	0	37.5%	60%	***25.3%***
	Yahl	**Schoon**	**Schissler**	**Wunderink**	**Newton Co.**	**TOTAL: lower Kankakee**
n	1	2	1	0	3	16
total samples	1	12	1	1	8	37
%	100%	16.7%	100%	0	37.5%	***43.2%***
n	**Harper**	**Watson**	**12MR217 & 12MR162**	**12MR4**	**12MR5**	**TOTAL: MR Co.**
total samples	2	4	0	1	0	1
%	2	7	3	9	2	14
	100%	57.1%	0	11.1%	0	***7.1%***

Figure C-2: Bar Chart of the Mean Rim Thickness for all Havana-related Sites

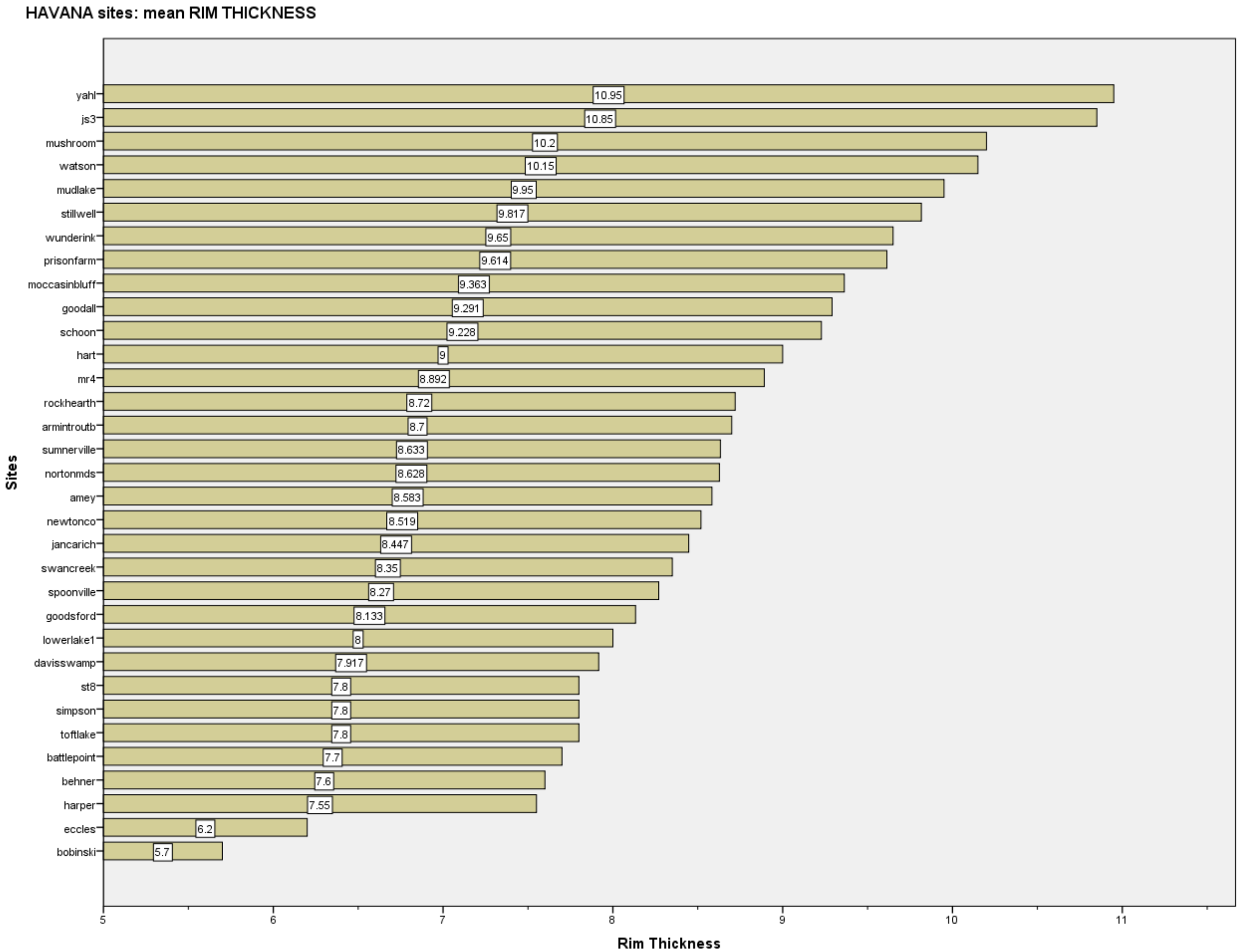


Table C-22: Mean Rim Thickness to Lip Thickness Ratio for Havana-Related Sites

Site (n)	Rim Thickness (mm)	Lip Thickness (mm)	Ratio
Toft Lake (1)	7.8	7.3	RimThk + 0.5
Lower Lake 1 (2)	8.0 ± 0.4	7.7 ± 0.2	RimThk + 0.3
Simpson (2)	7.8 ± 0.3	8.2 ± 0.4	LipThk + 0.4
Sumnerville (3)	8.6 ± 1.8	9.6 ± 1.3	LipThk + 1.0
Moccasin Bluff (14)	9.4 ± 1.1	8.8 ± 1.9	RimThk + 0.6
Behner (1)	7.6	7.05	RimThk + 0.55
Bobinski (1)	5.7	5.9	LipThk + 0.2
Stillwell (3)	9.8 ± 1.5	11.7 ± 1.0	LipThk + 1.9
Good's Ford (6)	8.1 ± 1.5	8.2 ± 2.6	LipThk + 0.1
Schoon (10)	9.2 ± 1.5	8.8 ± 1.9	RimThk + 0.4
Amey (3)	8.6 ± 0.3	8.8 ± 1.4	LipThk + 0.2
Newton Co. (8)	8.5 ± 1.5	7.9 ± 2.6	RimThk + 0.6

Figure C-3: Boxplot for Body Thickness (mm) of all Havana Sites

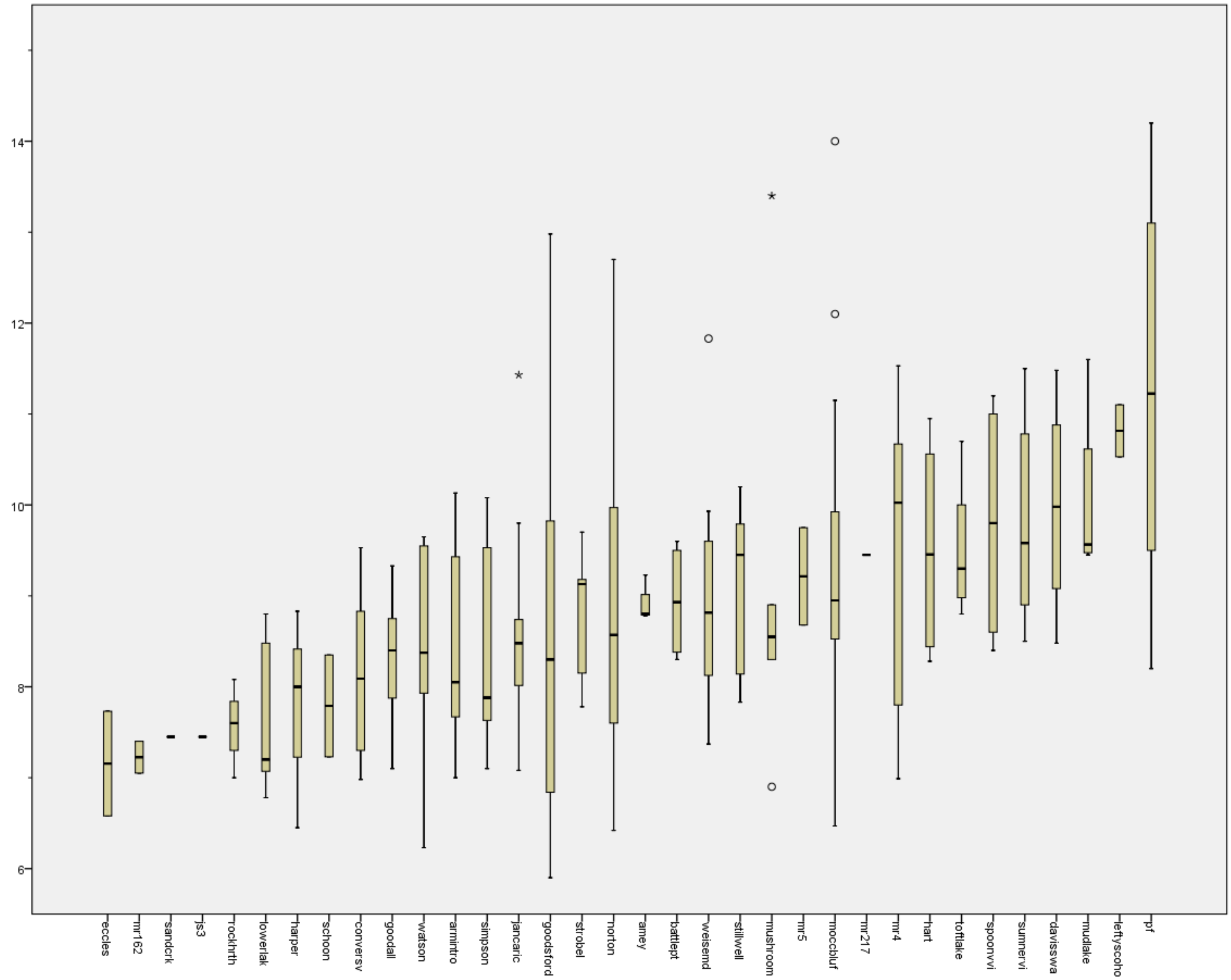


Table C-23: Lip Notching Presence for all Havana-related Sites

Site (n)	**CWS int lip**	**Tool impressed int lip**	**top lip CWS**	**top lip tool impressed**	**TOTAL: n (%)**
Jancarich (3)	-	-	1 (33.3%)	1 (33.3%)	**2 (66.7%)**
Toft Lake (2)	-	-	-	-	**0**
Davis Swamp (3)	1 (33.3%)	-	-	-	**1 (33.3%)**
Battle Point (2)	-	-	-	-	**0**
Lower Lake1 (2)	-	-	-	-	**0**
Norton Mds (25)	2 (8%)	2 (8%)	1 (4%)	8 (32%)	**13 (52%)**
Prison Farm (13)	2 (15.4%)	-	-	1 (7.7%)	**3 (23.1%)**
Spoonville (10)	2 (20%)	-	1 (10%)	-	**3 (30%)**
Armintrout-Blackman (8)	-	-	-	-	**0**
Hart (2)	-	-	-	-	**0**
Mushroom (2)	-	-	1 (50%)	-	**1 (50%)**
Swan Creek (1)	-	-	-	-	**0**
Eccles (1)	1 (100%)	-	-	-	**1 (100%)**
Moccasin Bluff (15)	2 (13.3%)	1 (6.7%)	2 (13.3%)	1 (6.7%)	**6 (40%)**
Rock Hearth (5)	-	-	-	1 (20%)	**1 (20%)**

Table C-23 (cont'd)

Simpson (2)	-	-	-	2 (100%)	**2 (100%)**
Sumnerville (3)	1 (33.3%)	-	-	-	**1 (33.3%)**
12MR4 (6)	1 (16.7%)	3 (50%)	-	-	**4 (66.7%)**
12ST8 (1)	1 (100%)	-	-	-	**1 (100%)**
Amey (3)	1 (33.3%)	-	-	-	**1 (33.3%)**
Bobinski (1)	-	-	-	-	**0**
Goodall (16)	7 (43.8%)	2 (12.5%)	1 (6.3%)	-	**10 (62.5%)**
Good's Ford (6)	-	-	1 (16.7%)	-	**1 (16.7%)**
Harper (1)	-	-	-	-	**0**
Mud Lake (11)	5 (45.5%)	2 (18.2%)	1 (9.1%)	-	**8 (72.7%)**
Newton Co. (8)	1 (12.5%)	1 (12.5%)	1 (12.5%)	-	**3 (37.5%)**
Schoon (10)	-	-	2 (20%)	-	**2 (20%)**
Stillwell (3)	1 (33.3%)	1 (33.3%)	-	-	**2 (66.7%)**
Watson (1)	-	1 (100%)	-	-	**1 (100%)**
Wunderink (1)	-	-	-	-	**0**
Yahl (1)	-	-	-	-	**0**

Table C-24: Interior Decorative Repertoires of Havana-Hopewell Samples by River Valley

River Valley (n)	sm	cm	sm-o-cm	fabr imp	cws	tool imp	brsh	striat
Muskegon (n = 243)	195 (80.2%)	37 (15.2%)	1 (0.4%)	1 (0.4%)	6 (2.5%)	-	8 (3.3%)	7 (2.9%)
Grand (n = 511)	456 (89.2%)	19 (3.7%)	2 (0.4%)	-	10 (2.0%)	8 (1.6%)	2 (0.4%)	14 (2.7%)
Kalamazoo (n = 199)	162 (81.4%)	33 (16.6%)	1 (0.5%)	-	-	-	-	3 (1.5%)
St Joseph (n = 255)	252 (98.8%)	-	-	-	6 (2.4%)	2 (0.8%)	-	4 (1.6%)
TOTAL (n = 1208)	1065 (88.2%)	89 (7.4%)	4 (0.3%)	1 (0.08%)	22 (1.8%)	10 (0.8%)	10 (0.8%)	28 (2.3%)

Table C-25: Natural Inclusion Types in Hopewell Ceramic Samples

River Valley (N)	Kspar	Microcline	Plagioclase	Biotite	Muscovite	Chert	Opaques
Muskegon (22)	20 (90.1%)	9 (40.9%)	12 (54.5%)	1 (4.5%)	0	15 (68.2%)	5 (22.7%)
Grand (49)	41 (83.7%)	28 (57.1%)	31 (63.3%)	1 (2.0%)	3 (6.1%)	30 (61.2%)	3 (6.1%)
Kalamazoo (17)	12 (70.6%)	14 (82.4%)	15 (88.2%)	3 (17.6%)	8 (47.1%)	15 (88.2%)	1 (5.9%)
St. Joseph (13)	9 (69.2%)	8 (61.5%)	8 (61.5%)	1 (7.7%)	11 (84.6%)	7 (53.8%)	0
Kankakee (39)	34 (87.2%)	14 (35.9%)	24 (61.5%)	11 (28.2%)	29 (74.4%)	27 (69.2%)	0
Grand Total (140)	116 (82.9%)	73 (52.1%)	90 (64.3%)	17 (12.1%)	51 (36.4%)	94 (67.1%)	9 (6.4%)

River Valley (N)	Epidote	Hornblende	Pyroxene	Quartzite	Rhyolite	Perthite	Sandstone
Muskegon (22)	0	0	4 (18.2%)	16 (72.3%)	1 (4.5%)	1 (4.5%)	0
Grand (49)	2 (4.1%)	16 (32.7%)	10 (20.4%)	25 (51.0%)	0	2 (4.1%)	0
Kalamazoo (17)	1 (5.9%)	15 (88.2%)	2 (11.8%)	1 (5.9%)	0	0	0
St. Joseph (13)	1 (7.7%)	10 (76.9%)	0	7 (53.8%)	1 (7.7%)	1 (7.7%)	0
Kankakee (39)	22 (56.4%)	21 (53.8%)	0	22 (56.4%)	2 (5.1%)	3 (7.7%)	2 (5.1%)
Grand Total (140)	26 (15.7%)	62 (44.3%)	16 (11.4%)	71 (50.7%)	4 (2.9%)	7 (5.0%)	2 (1.4%)

Table C-26: Muskegon River Valley Hopewell Samples Temper Types and Percentages

Site (n)	**Granite**	**Diorite**	**Granite + Diorite**	**Amphibolite**	**Granite + Gabbro**
Jancarich (7)	7 (100%)	-	-	-	-
Brooks Md. (4)	4 (100%)	-	-	-	-
Davis Swamp (11)	6 (54.5%)	1 (9.1%)	1 (9.1%)	2 (18.2%)	1 (9.1%)
Grand Total (22)	17 (77.3%)	1 (4.5%)	1 (4.5%)	2 (9.1%)	1 (4.5%)

Table C-27: Grand River Valley Hopewell Samples Temper Types and Percentages

Site (n)	Granite	Granodiorite	Diorite	Gabbro	Granite + Gabbro
Prison Farm (2)	2 (100%)	-	-	-	-
Lower Lake 1 (2)	1 (50%)	-	-	-	-
Paggeot (1)	1 (100%)	-	-	-	-
Converse (21)	15 (71.4%)	1 (4.8%)	1 (4.8%)	2 (9.5%)	1 (4.8%)
Boom Rd. (2)	-	2 (100%)	-	-	-
Spoonville (14)	10 (71.4%)	-	-	-	-
Battle Point (7)	7 (100%)	-	-	-	-
Grand Total (49)	36 (73.5%)	3 (6.1%)	1 (2.0%)	2 (4.1%)	1 (2.0%)

Table C-27 (cont'd)

Site (n)	**Granite + Amphibolite**	**Amphibolite**	**Lime-stone**	**Limestone + Grog + Granite**	**Limestone + Granite**
Lower Lake 1 (2)	-	1 (50%)	-	-	-
Converse (21)	-	-	1 (4.8%)	-	-
Spoonville (14)	1 (7.1%)	-	-	2 (14.3%)	1 (7.1%)
Grand Total (49)	1 (2.0%)	1 (2.0%)	1 (2.0%)	2 (4.1%)	1 (2.0%)

Table C-28: Kalamazoo River Valley Hopewell Samples Temper Types and Percentages

Site (n)	**Granite**	**Granodiorite**	**NO Temper**	**Limestone + Grog + Granite**
Armintrout-Blackman (4)	2 (50%)	1 (25%)	-	1 (25%)
Mushroom (9)	9 (100%)	-	-	-
Fennville (4)	3 (75%)	-	1 (25%)	-
Grand Total (17)	14 (82.4%)	1 (5.9%)	1 (5.9%)	1 (5.9%)

Table C-29: St. Joseph River Basin Hopewell Samples Temper Types and Percentages

Site (n)	**Granite**	**Granite + Diorite**	**Unusual K-spar**	**Grog**	**Limestone**	**Limestone + Granite + Gabbro**
Dieffenderder (5)	2 (40%)	-	-	1 (20%)	2 (40%)	-
Moccasin Bluff (3)	1 (33.3%)	-	1 (33.3%)	1 (33.3%)	-	-
Schilling (1)	1 (100%)	-	-	-	-	-
Sumnerville (2)	1 (50%)	1 (50%)	-	-	-	-
Bobinski (1)	-	-	-	-	-	1 (100%)
Behner (1)	-	-	-	-	1 (100%)	-
Grand Total (13)	5 (38.5%)	1 (7.7%)	1 (7.7%)	2 (15.4%)	3 (23.1%)	1 (7.7%)

Table C-30: Kankakee River Valley Hopewell Samples Temper Types and Percentages

Site (n)	Granite	Granodiorite	Diorite	Gabbro	Grog + Granite	Granite + Diorite
Stillwell (1)	-	-	-	-	-	-
Mud Lake (7)	5 (71.4%)	1 (14.3%)	-	-	1 (14.3%)	-
Goodall (3)	1 (33.3%)	-	-	1 (33.3%)	-	-
Good's Ford (2)	-	1 (50%)	-	-	-	-
Brems (4)	1 (25%)	-	1 (25%)	-	-	-
Weise Mound (2)	-	2 (100%)	-	-	-	-
12JS3 (1)	-	1 (100%)	-	-	-	-
Schoon (6)	5 (83.3%)	-	-	-	1 (16.7%)	-
Amey (1)	-	-	-	-	-	-
Newton County (3)	2 (66.7%)	-	1 (33.3%)	-	-	-
Schissler (1)	-	-	-	-	-	1 (100%)
Grand Total (31)	14 (45.2%)	5 (16.1%)	2 (6.5%)	1 (3.2%)	2 (6.5%)	1 (3.2%)

Table C-30 (cont'd)

Site (n)	**Quartz Arenite Sand-stone**	**Gneiss**	**Grog**	**Schist + Gabbro**	**NO Temper**	**Limestone**
Stillwell (1)	-	-	-	-	-	1 (100%)
Goodall (3)	-	-	-	-	1 (33.3%)	-
Good's Ford (2)	-	-	-	1 (50%)	-	-
Brems (4)	1 (25%)	1 (25%)	-	-	-	-
Amey (1)	-	-	1 (100%)	-	-	-
Grand Total (31)	1 (3.2%)	1 (3.2%)	1 (3.2%)	1 (3.2%)	1 (3.2%)	1 (3.2%)

Table C-31: Marshall County Hopewell Samples Temper Types and Percentages

Site (n)	**Granite**	**Grog**	**Grog + Limestone**	**Limestone**	**Quartz Arenite Sand-stone + Granite**
12MR10 (2)	2 (100%)	-	-	-	-
12MR78 (1)	-	1 (100%)	-	-	-
12MR115 (5)	1 (20%)	1 (20%)	1 (20%)	1 (20%)	1 (20%)
Grand Total (8)	3 (37.5%)	2 (25%)	1 (12.5%)	1 (12.5%)	1 (12.5%)

Table C-32: Muskegon River Valley Sites Optical Activity for Hopewell Samples

	Jancarich	**Brooks Md.**	**Davis Swamp**	***TOTAL***	***%***
Active	1 (14.3%)	2 (50%)	10 (90.9%)	***13***	***59.1%***
Slightly Active	6 (85.7%)	2 (50%)	1 (9.1%)	***9***	***40.9%***
Inactive	0	0	0	-	-
Total samples	7	4	11	***22***	

Table C-33: Grand River Valley Sites Optical Activity for Hopewell Samples

	Prison Farm	**Lower Lake 1**	**Converse**	**Spoonville**	**Paggeot**	**Boom Road**	**Battle Point**	***TOTAL***	***%***
Active	2 (100%)	2 (100%)	9 (42.9%)	7 (50%)	1 (100%)	2 (100%)	2 (28.6%)	***25***	***51%***
Slightly Active	0	0	9 (42.9%)	5 (35.7%)	0	0	5 (71.4%)	***19***	***38.8%***
Inactive	0	0	3 (14.3%)	2 (14.3%)	0	0	0	***5***	***10.2%***
Total samples	2	2	21	14	1	2	7	***49***	

Table C-34: Kalamazoo River Valley Sites Optical Activity for Hopewell Samples

	Armintrout-Blackman	**Mushroom**	**Fennville**	***TOTAL***	***%***
Active	4 (100%)	4 (44.4%)	2 (50%)	***10***	***58.8%***
Slightly Active	0	5 (55.5%)	2 (50%)	***7***	***41.2%***
Inactive	0	0	0	-	-
Total samples	4	9	4	***17***	

Table C-35: St. Joseph River Valley Sites Optical Activity for Hopewell Samples

	Dieffen-derfer	**Moccasin Bluff**	**Schilling**	**Sum-nerville**	**Behner**	**Bobinski**	***TOTAL***	***%***
Active	4 (80%)	2 (66.7%)	1 (100%)	2 (100%)	1 (100%)	1 (100%)	***11***	***84.6%***
Slightly Active	1 (20%)	1 (33.3%)	0	0	0	0	***2***	***15.4%***
Inactive	0	0	0	0	0	0	-	-
Total samples	5	3	1	2	1	1	***13***	

Table C-36: Kankakee River Valley Sites Optical Activity for Hopewell Samples

	Stillwell	**Goodall**	**Mud Lake**	**Good's Ford**	**Brems**	**12JS3**	**Weise Md.**
Active	1 (100%)	2 (66.7%)	4 (57.1%)	2 (100%)	4 (100%)	0	1 (50%)
Slightly Active	0	1 (33.3%)	3 (42.9%)	0	0	1 (100%)	1 (50%)
Inactive	0	0	0	0	0	0	0
Total samples	1	3	7	2	4	1	2
	Schoon	**Schissler**	**Amey**	**Newton Co.**		***<u>TOTAL</u>***	***<u>%</u>***
Active	4 (66.7%)	0	0	1 (33.3%)		***19***	***61.3%***
Slightly Active	2 (33.3%)	1 (100%)	1 (100%)	2 (66.7%)		***12***	***38.7%***
Inactive	0	0	0	0		**-**	**-**
Total samples	6	1	1	3		***31***	

Table C-37: Marshall County Sites Optical Activity for Hopewell Samples

	12MR10	**12MR78**	**12MR115**	***<u>TOTAL</u>***	***<u>%</u>***
Active	2 (100%)	0	1 (20%)	***3***	***37.5%***
Slightly Active	0	1 (100%)	4 (80%)	***5***	***62.5%***
Inactive	0	0	0	**-**	**-**
Total samples	2	1	5	***8***	

Table C-38: Muskegon River Valley Hopewell Paste Vitrification Presence

	Jancarich	**Brooks Md.**	**Davis Swamp**	**<u>TOTAL</u>**
n	0	0	0	0
total samples	7	4	11	22
%	-	-	-	***0%***

Table C-39: Grand River Valley Hopewell Paste Vitrification Presence

	Prison Farm	**Lower Lake1**	**Con-verse**	**Spoon-ville**	**Paggeot**	**Boom Rd.**	**Battle Pt.**	**<u>TOTAL</u>**
n	0	0	2	0	0	0	0	2
total samples	2	2	21	14	1	2	7	49
%	-	-	9.5%	-	-	-	-	***4.1%***

Table C-40: Kalamazoo River Valley Hopewell Paste Vitrification Presence

	Armintrout-Blackman	**Mush-room**	**Fennville**	**<u>TOTAL</u>**
N	1	1	1	3
total samples	4	9	4	17
%	25%	11.1%	25%	***17.6%***

Table C-41: St. Joseph River Valley Hopewell Paste Vitrification Presence

	Dieffenderfer	**Moccasin Bluff**	**Schilling**	**Sumn-erville**	**Behner**	**Bobinski**	**<u>TOTAL</u>**
N	0	0	0	0	0	0	0
total samples	5	3	1	2	1	1	13
%	-	-	-	-	-	-	***0%***

Table C-42: Kankakee Valley Hopewell Paste Vitrification Presence

	Stillwell	**Goodall**	**Mud Lake**	**Good's Ford**	**Brems**	**12JS3**	**TOTAL: All sites**
n	0	1	3	0	1	0	6
total samples	1	3	7	2	4	1	31
%	-	33.3%	42.9%	-	25%	-	***19.4%***
	Weise Md.	**Schoon**	**Schissler**	**Amey**	**Newton Co.**	**TOTAL: mid-upper Kankakee**	**TOTAL: lower Kankakee**
n	0	1	0	0	0	5	1
total samples	2	6	1	1	3	20	11
%	-	16.7%	-	-	-	***25%***	***9.1%***

Table C-43: Marshall County Hopewell Paste Vitrification Presence

	12MR10	**12MR78**	**12MR115**	**TOTAL**
N	0	0	0	0
total samples	5	3	1	13
%	-	-	-	***0%***

APPENDIX D

Chapter 5 Table of Radiocarbon Dates

Table D-1: New AMS Dates (in Bold) for Middle Woodland Sites in Michigan and Indiana

Lab Number	Site	Site #	CONVENTIONAL AGE	CALIBRATED AGE/RANGE	Dated Sample
M-1982	Jancarich	20NE113	2260 +/- 140 BP	Cal BC 790 to AD 20	Charcoal below sherds
Beta-327507	**Jancarich**	**20NE113**	**2110 +/- 30 BP**	**Cal BC 200 to BC 50**	**Havana Plain**
Beta-113899	Prison Farm	20IA58	2100 +/- 40 BP	Cal BC 195 to 5	Havana Plain
Beta-113897	Prison Farm	20IA58	2090 +/- 70 BP	Cal BC 355 to 290/ Cal BC 230 to AD 70	Naples Zoned, Dentate
Beta-327503	**12MR4**	**12MR4**	**2030 +/- 30 BP**	**Cal BC 110 to AD 30/Cal AD 40 to AD 50**	**Havana/late Early Woodland? Zoned, Incised**
Beta-327505	**Moccasin Bluff**	**20BE1**	**2030 +/- 30 BP**	**Cal BC 110 to AD 30/Cal AD 40 to AD 50**	**Havana Cordmarked**
Beta-113898	Prison Farm	20IA58	2020 +/- 60 BP	Cal BC 175 to AD 110	Havana Cordmarked
M-1938	Schumaker Mound	20NE107	2030 +/- 140 BP	Cal BC 390 to AD 315	Charcoal from burial pit
Beta-148361	Converse	20KT2	1970 +/- 40 BP	Cal BC 50 to AD 110	Hopewell Zoned, Dentate Rocker St.
Beta-153908	Converse	20KT2	1960 +/- 40 BP	Cal BC 40 to AD 120	Hopewell Dentate Rocker St.
Beta-83091	Prison Farm	20IA58	1960 +/- 40 BP	Cal BC 35 to AD 130	Havana Cordmarked
Beta-69939	Arthursburg Hill	20IA37	1960 +/- 70 BP	Cal BC 32 BC to AD 125	unclear
M-1493	Norton Mound C	20KT1	1960 +/- 120 BP	Cal BC 58 to AD 240	Charcoal from base of mound

Table D-1 (cont'd)

Beta-153907	Converse	20KT2	1950 +/- 40 BP	Cal BC 40 to AD 130	Hopewell Zoned, Incised
M-1965	Palmiteer Mound	20NE101	1960 +/- 140 BP	Cal BC 370 to AD 380	Charcoal from Mound 2
Beta-327500	**Stillwell**	**unre-corded**	**1920 +/- 30 BP**	**Cal AD 20 to AD 130**	**Havana Zoned Dentate St.**
Beta-113900	Prison Farm	20IA58	1910 +/- 80 BP	Cal BC 50 to AD 265/ Cal AD 290 to 320	Charcoal from Feature 1
Beta-113894	Prison Farm	20IA58	1910 +/- 40 BP	Cal AD 25 to 220	Hopewell Rim
Beta-148359	Converse	20KT2	1890 +/- 40 BP	Cal AD 40 to 230	Havana Cordmarked
Beta-113896	Prison Farm	20IA58	1890 +/- 40 BP	Cal AD 55 to 235	Havana Cordmarked
Beta-65120/ CAMS-8329	Zemaitis	20OT68	1890 +/- 60 BP	Cal AD 110 to 249	Hacklander Ware
Beta-64946	Arthursburg Hill	20IA37	1880 +/- 60 BP	Cal AD 76 to 236	unclear
Beta-6557	Zemaitis	20OT68	1870 +/- 70 BP	Cal AD 75 to 240	unclear
Beta-113895	Prison Farm	20IA58	1860 +/- 60 BP	Cal AD 45 to 330	Charcoal from Feature 32
M-1490	Norton Mound H	20KT1	1850 +/- 100 BP	Cal AD 71 to 324	
Beta-327506	**Prison Farm**	**20IA58**	**1850 +/- 30 BP**	**Cal AD 80 to AD 240**	**Havana Dentate, Incised, noded everted rim**
M-1428	Spoonville village	20OT1	1840 +/- 120 BP	Cal AD 66 to 341	unclear
Beta-231474	Davis Swamp	20MU132	1820 +/- 40 BP	Cal AD 90 to 260/ Cal AD 290 to 320	unclear
Beta-327504	**Armintrout-Blackman**	**20AE812**	**1820 +/- 30 BP**	**Cal AD 130 to AD 250**	**Havana Smoothed-over Cordmarked, noded**
M-1488	Norton Mound H	20KT1	1790 +/- 120 BP	Cal AD 71 to 426	Charcoal from upper mound

Table D-1 (cont'd)

Beta-327502	**Schoon**	**12LA55**	**1780 +/- 30 BP**	**Cal AD 140 to AD 260/Cal AD 270 to AD 330**	**Havana Zoned Dentate St.**
Beta-153909	Converse	20KT2	1770 +/- 40 BP	Cal AD 140 to 380	Hopewell Rim
M-1427	Spoonville village	20OT1	1735 +/- 110 BP	Cal AD 148 to 426	unclear
	Mushroom	20AE88		Cal AD 265	unclear
Uga-2347	Mushroom	20AE88		Cal AD 410	Hearth Charcoal associated with Hopewell Plain Rocker St.

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