POTTERS ON THE PENOBSCOT: AN ARCHAEOLOGICAL CASE STUDY EXPLORING HUMAN AGENCY, IDENTITY, AND TECHNOLOGICAL CHOICE

Bonnie D. Newsom
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POTTERS ON THE PENOBSCOT:
AN ARCHAEOLOGICAL CASE STUDY EXPLORING HUMAN AGENCY,
IDENTITY, AND TECHNOLOGICAL CHOICE

A Dissertation Presented

by

BONNIE D. NEWSOM

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

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Department of Anthropology
POTTERS ON THE PENOBSCOT:
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A Dissertation Presented

By

BONNIE D. NEWSOM

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DEDICATION

Dedicated to Claire, just for being there.
ACKNOWLEDGEMENTS

First and foremost, I want to express my deep appreciation for my advisor and committee chair, Dr. Elizabeth Chilton. She remained committed to my progress and success for a decade and provided me with wise counsel, gracious critique, and unwavering support. Not only has she enriched my thinking and skills as a Northeast archaeologist, but her lessons in advising and mentoring will accompany me throughout my career.

Likewise, I am indebted to my committee members, all of whom remained dedicated and supportive over the course of my program. I am grateful to Dr. H. Martin Wobst, for his commitment to Indigenous archaeologies and keen ability to stretch my thinking in deep and unconventional ways, Kathleen Brown-Perez MBA/JD, who encouraged me to publish and helped me maintain focus on contemporary social justice issues, and Dr. Alice R. Kelley, who shared her friendship, time, energy, encouragement, and geologic expertise with me without hesitation. Her knowledge of, and appreciation for, the geologic and human history of the Penobscot River valley goes unmatched.

It was an honor to work with this team of selfless individuals and exceptional thinkers. I regret that the distance between us limited our interaction as a group. I would have welcomed more time together thinking, conversing, and strategizing about all the topics this dissertation touches on. That being said, I am deeply appreciative of the time and accommodations my advisor and committee members made for me as I pursued a degree across geographical, social, and political boundaries.

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completed my program and I hope my efforts inspire them in meaningful ways. My husband, Les Newsom, deserves a special acknowledgment. He supported me unconditionally (and without complaint) throughout my PhD program and worked extremely hard to ensure that our family’s needs were met. Words cannot express how deeply I appreciate his investment in this work.

Finally, I must acknowledge my mother Leona Parker, my father Donald Parker, and my brother, Dean Parker, each of whom always believed in my abilities. I regret that they did not live to see me finish.
ABSTRACT

POTTERS ON THE PENOBSCOT: AN ARCHAEOLOGICAL CASE STUDY
EXPLORING HUMAN AGENCY, IDENTITY, AND TECHNOLOGICAL CHOICE

SEPTEMBER 2017

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Archaeology has a long history of dehumanizing the past by placing artifacts at the center of archaeological inquiry while neglecting human agency and the dynamic relationship between humans and their material culture. This is due, in part, to an over-reliance on normative approaches to archaeology such as typologies, culture histories, and artifact-centered research designs that disengage people from their technologies and erase them from archaeological interpretations of the past. This study humanizes past peoples by applying theories of agency, technological choice, and Indigenous archaeologies to an archaeological case study from Maine, U.S.A. With these theoretical principles as a framework, I evaluate a land-use model that suggests Native peoples in Maine organized themselves into distinct coastal and interior populations prior to European contact. By comparing potters’ choices along the ceramic production sequence, the study reveals spatial and temporal distinctions in pottery assemblages from the Penobscot River Valley in central Maine. These are interpreted as reflective of different contexts of ceramic production. Additionally, observations of potters’ choices through time show that changes in ceramic technology were not uniform throughout the Penobscot River valley and in some cases, ceramic recipes remained remarkably stable despite wide-spread changes in surface treatments or “decoration.” Finally, this study aligns with Indigenous archaeologies theory by empowering past potters in their material realm, thereby acknowledging their humanity.
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CHAPTER 1
HUMANIZING ARCHAEOLOGY THROUGH AGENCY, CHOICE, AND COMMUNITY ENGAGEMENT

Introduction

“When you change the way you look at things, the things you look at change” (Dyer 2004). This statement typically serves as a self-help mantra to inspire positive thinking. However, when applied to archaeological inquiry it can transform approaches to archaeological research. It can change our understandings of the past, move us away from practices that dehumanize past peoples and counter the colonizing effects of archaeological inquiry that disempower and marginalize past peoples and their descendants.

Archaeology has a long history of dehumanizing the past by placing artifacts at the center of archaeological inquiry while neglecting human agency or the dynamic relationships between and among humans and their material world. Part of this is due to an over-reliance on typologies as mechanisms for interpreting social phenomena, and by way of artifact-centered methodologies and research questions that neglect the dynamic relationship between people and material culture. It also occurs through applications of a Western values system that often privileges material culture over other aspects of the human experience (Smith and Wobst 2005).

Through these practices, archaeologists disengage humans from their technologies and erase them from archaeological interpretations of the past—essentially taking the “social” out of the social science of archaeology. To counter this disengagement, it is necessary to change the way we study the past by taking a “people first” approach to archaeological research placing people as active agents at the center of archaeological study. This, in turn, will change our understandings of past societies and will position people in their rightful place—at the center of their daily lives and at the forefront of our intentions.

Criticisms of dehumanizing archaeological practices are not new. Much of the backlash against processualist archaeology introduced in the 1960’s was rooted in a critique of how
archaeology neglects the role humans play in influencing their material, social, economic, spiritual, and political spheres. Processualist approaches to archaeological inquiry apply deductivist reasoning to establish “generalizations, functional regularities and general laws about human cultural behavior” (Watson 2008:30). As a result, past peoples become invisible and their agentive role within the interlocking spheres of their lives becomes marginalized or non-existent. Additionally, processualist approaches routinely turn to deterministic explanations for human behavior emphasizing factors external to humans (e.g., environment) as responsible for human action with little regard for the role of humans in shaping their own reality.

Brumfiel's (1992) critique of the ecosystem approach exemplifies the problem of deterministic interpretations of human behavior. She argues that ecosystem approaches obscure human elements such as gender and class by focusing too heavily on populations and adaptive systems, thereby neglecting human factors as contributors to the internal social negotiations that take place in cultural settings. She advanced several analytical principles that re-insert people into archaeological interpretations of the past in an attempt to “create a more humane archaeology…that will acknowledge the creativity and discretion” of human actors (Brumfiel 1992:560). At the same time, Brumfiel (1992:551) acknowledges the existence of both social and environmental constraints on human action.

Dehumanizing effects of archaeological research on past peoples is particularly common in studies of hunter-gatherer/forager societies. For example, typological classifications of stone tools and ceramics often mask material culture variation in the quest for “normative” patterns that create generalizations of the human condition through time and space. Applications of agency theory to hunter-gatherer research provide alternative understandings of human societies that have been subject to culture-historical interpretations and normative strategies for reconstructing past lifeways (Sassaman 1993, 2000; Dobres 1995a, 1999; Larsson 2009). This dissertation aligns with these efforts by changing the way we look at past peoples in the Northeastern United States.
“Seeing Differently”

This study places people at the center of archaeological inquiry by applying theories of agency and technological style to an archaeological problem. Designed to examine what and how we might “see differently” (Dobres 1999), this dissertation employs agency and technological style theories to examine choices made by potters during the Ceramic Period (ca. 3050-950 ¹⁴C yrs B.P.) in Maine in order to highlight the agency of potters in the ceramic production process. I use a prevailing land-use model as a testable model to demonstrate that by approaching an archaeological problem with human agency and technological style at the center of the research, archaeologists can open the “black box” (Whitley 1970; Brumfiel 1992; Dobres 2000) in archaeological research that encases and conceals the relational aspects of humans and their materiality.

The concept of the “black box” has several connotations dependent upon the context within which it is used. It typically refers to the space between inputs and outputs within a system where the observer is unable to see the inner workings of the transformation process. The concept of the “black box” in any application of the term often represents what is hidden, inaccessible, or obscured from view. In archaeological applications, Dobres (2000:234) defines the “black box” concept as a metaphor for “expressing the idea that social agency, meaning, and intersubjective relations have been effectively divorced from equal and simultaneous consideration with the material dimensions of ancient technological practice.” The point here is not to simply open the “black box,” but to make it obsolete by giving more visibility to people as part of the archaeological process.

The question then becomes, “How do we ensure that past human actors are appropriately situated within archaeological research?” The interplay of agency and technological style theories provides a framework that acknowledges the role of humans in shaping their lives and experiences, and offers an intellectual mechanism for exploring their role archaeologically.
Agency in archaeology has become a useful paradigm for humanizing archaeological research and is considered an advancing theoretical framework within the discipline (Dobres 2000; Dobres and Hoffman 1994; Dobres and Robb 2005; Dornan 2002; Joyce and Lopiparo 2005; Pauketat 2001). Agency theory acknowledges that humans influence their material and social spheres through their actions, decisions, judgments, choices, beliefs, and purposes—and those spheres are intimately connected. It moves archaeological inquiry beyond deterministic explanations of human behavior and normative interpretations of material culture toward more humanistic representations of the past. Technologies and materialities arise from, transform, and feed the social fabric of human existence and operate in concert with humans. Archaeological practice can illuminate human/material culture relationships by positioning the agentive role of people, by way of their choices, at the center of archaeological inquiry.

Archaeology has witnessed a wide range of applications of agency theory to archaeological inquiry (Dobres and Robb 2005; Gardner 2007; Joyce and Lopiparo 2005). This is appropriate given that agency-centered studies should be crafted to suit distinct and situational research topics and agendas (Dobres and Robb 2005). However, as Dobres and Robb (2005:160) point out, “many archaeologists now invoke agency as a philosophical basis for making sense of the human condition while trusting to analytic methodologies designed for previous generations of questions.” Sound archaeological practice and effective application of agency theory require human-centered approaches and demand a shift, not only in our theoretical approaches to archaeological problems, but also in our methodological approaches as well (Dobres and Robb 2005). It is ineffective to simply look for agency in our archaeological inquiry, we must frame our research in ways that acknowledge agency as part of the social fabric within which humans operate (Dobres and Robb 2005).

In order to validate agency theory as effective in understanding past peoples, our methodological tactics need to be designed to “get at” agency in carrying out our archaeological research. Technological style is a useful tactic to that end. Technological style theories can help
frame archaeological studies to ensure that agency and the relational aspects of humans and their materiality are realized and acknowledged. Technological style is defined as the “formal integration of the behaviors performed during the manufacture and use of material culture, which expresses social information” (Childs 1991; Lechtman 1977). As such, technological style resides in the processes of engagement between humans and their material products and carries social information and cultural meaning.

Lechtman (1977:5) pioneered the concept of technological style by recognizing that “the activities themselves which produce the artifacts are stylistic.” Lemonnier (1986:153, 1992) reaffirmed process-centered inquiries into human/materiality relationships by focusing on human choice within the technical system of the Anga of New Guinea. Lemonnier's (1986, 1992) ethnographic study of the distribution of technical traits among the Anga demonstrates that technical processes associated with material culture are socially meaningful and may reflect group identities. In essence, he shows that people’s technological choices are influenced by the cultural and social context within which they operate.

Building on this work, Lemonnier (1992) further emphasizes the role of choice in technical systems, suggesting that techniques have five interrelated components—matter, energy, objects, gestures, and specific knowledge. Specific knowledge is “the end result of all the perceived possibilities and the choices, made on an individual or a societal level, which have shaped that technological action” (Lemonnier 1992:6). Additionally, Lemonnier's (1992) “social representations” embody choice on several levels ranging from material selection to process selection. Lemonnier's (1992) interpretations of both “specific knowledge” and “social representations” are process-centered and as such, influence technological style.

Studies of technological style in both archaeological and ethnoarchaeological contexts have shown that the manufacturing process is important in addressing questions of human identity—oftentimes more so than finished products (Chilton 1996, 1998; Dietler and Herbich 1989; Gosselain 2000; Hegmon et al. 2000; Lemonnier 1986, 1992; Miller 1985; Stark et al. 2000).
These studies and Lemonnier’s philosophical framework are instructive as guiding paradigms for the archaeological inquiry of technological style. As such, they are applied here to a case study exploring technological style and agency in aboriginal ceramics. In the next section I present my objectives in carrying out this research.

**Purpose and Objectives**

The aim of this study is to humanize archaeological research and to change the way we look at past peoples with the intent of empowering them in their material realm. I achieve this by showing that agency and technological style can be effective theoretical tools for humanizing approaches to archaeological questions. To that end, I established two inter-related objectives for this study. First, I highlight the agency of potters in the ceramic manufacturing process using an attribute analysis of technological choice (Chilton 1996, 1998, 1999a) to examine aboriginal ceramics from three distinct ecological settings in Maine. This study reframes previous ceramic studies in the Northeast that have disempowered Native peoples and disengaged them from their material and social contexts through normative archaeological frameworks and strategies.

Second, I designed a case study guided by agency and technological style to test and evaluate the model that two distinct populations occupied coastal and interior environments in Maine during periods prior to European contact. As a prevailing land-use model in Maine, the two-population model has advanced as a model of socio-spatial organization linked to human adaptation to ecological settings. This dissertation moves beyond issues of ecological adaptation and situates the model within the context of human choice. Namely, I explore how potters’ choices compare when examined through time and across ecological settings and I interpret those choices within the realm of identity and socio-spatial organization in pre-contact Maine. The case study and the conceptual framework guiding my research are discussed more fully in the next section.
In Maine, the prevailing archaeological model for Ceramic Period (3050-450 $^{14}$C yrs B.P.) settlement patterns is one in which people organized themselves into two distinct populations inhabiting the interior and coast respectively. This “two-population model” was introduced by Sanger (1982, 1996a, 1996b) based on subsistence, seasonality, and site location data collected over the course of two decades of archaeological research on Maine’s coastal shell middens. Archaeological evidence indicates that Native people occupied coastal sites during multiple seasons of the year during the Ceramic Period—challenging Snow’s (1980) assertion that the early historical settlement pattern of summering on the coast and wintering on the interior was the aboriginal settlement pattern prior to European contact (Bourque 1971, 1973; Sanger 1971, 1982, 1996a, 1996b; Spiess et al. 1983).

Support for the two-population model is also evident in archaeological data showing distinctions in coastal and interior cordage twist patterns among fiber perishables used in pottery manufacture (Petersen 1996; Petersen and Hamilton 1984). In the construction of cordage, fibers are spun into strands then the strands are twisted together to form cordage. The end result is either “S” twist cordage, or “Z” twist cordage. In Maine, spatial and temporal patterns in cordage twist have been identified. Specifically, Early Ceramic Period (3050-2150 $^{14}$C yrs B.P.) pots from interior sites showed a dominant characteristic of “S” twist and weft cordage, whereas “Z” twist and weft cordage dominated coastal vessel lots (Petersen 1996; Petersen and Hamilton 1984).

Following a hiatus in cordage use on ceramics, distinctions in coastal and interior cordage twist patterns reoccurred during subsequent periods which led Petersen and Hamilton (1984:436) to suggest an in-situ continuity of coastal and interior populations for roughly 2000 years during the Ceramic Period.

While differences in cordage twist may, in fact, indicate two distinct populations, the act of twisting cordage is part of a complex suite of decisions, activities, and social relations linked to pottery manufacture and use. In Maine, the distinctions in cordage twist have never been explored.
within the context of all other ceramic manufacturing choices that factor into the pottery-making process. This has created a narrow view of the social dimensions of fiber perishables and pottery manufacture among Indigenous communities in pre-contact Maine.

Studies of aboriginal ceramics in Maine rely heavily on patterns of similarities or “sameness” within and across geographic regions, and while the cordage twist pattern identified by Petersen and Hamilton (1984) may support the two-population model, it masks a multitude of other choices potters make during the manufacturing process, as well as the social contexts in which they were made.

This study explores aboriginal ceramics in Maine through a wider lens in an effort to move beyond those predetermined variables and dehumanizing practices that have been used traditionally to identify social patterning through time and space. To that end, I have developed a conceptual framework consisting of three topics to explore relative to potters’ choices. They include: the social context of ceramic production; the correlation between cordage twist and other technological choices; and technological choice through time and collective social change. I discuss each of these below.

**The Social Context of Production**

If, as Sanger (1988) has suggested, coastal populations living during the Ceramic Period (3050-450 $^{14}$C yrs B.P.) in Maine employed a semi-sedentary mobility pattern and were distinct from people living in the interior, then ceramics from coastal settings should show consistency in technological style and display functional and technological characteristics that are conducive to living a semi-sedentary lifestyle (e.g. pots that are better suited for cooking over transport). Chilton's (1996, 1998, 1999a) comparative analysis of Algonquin and Iroquoian pots resulted in similar conclusions whereby she attributed uniformity in Iroquoian pots to a stable production context. Inspired by Chilton’s results, this case study also explores the social context of ceramic production by comparing technological choices along the *chaîne opératoire* among ceramic assemblages from three distinct locations.
The Relationship Between Cordage Twist and Other Technological Choices

As mentioned earlier, distinctions in cordage twist have been cited as being indicative of distinctions in group affiliation and learning networks (Petersen 1996; Petersen and Hamilton 1984). If, in fact, pottery and cordage construction occur in the same social context such as small family-based learning contexts, other patterns in choices along the ceramic production sequence should accompany the distinctions in cordage twist. To evaluate that supposition, I explored the relationship between cordage twist and other technological choices. This component of the study points to other technological choices that reflect social distinctions.

Technological Choices through Time and “Changing Together”

The broad temporal range of the ceramic assemblages selected for this study provided an opportunity to examine technological choices through time. As Rosenmeier (2011) suggests, one characteristic of group affiliation is the process of changing together through time. She writes: “generations are related even when there has been significant change to people’s lives, and related at a cultural scale when those changes are experiences shared by the group” (Rosenmeier 2011:3).

Included in this concept is change in material culture. The examination of potters’ choices through time within and between sites shows both stability and change among ceramic attributes in each setting. I assess these patterns through the lens of cultural affiliation and interpret these findings within the context of the two-population model.

Scholarly Contributions

This research makes several contributions to archaeology. At the regional level, I contribute to archaeological debates on how Native peoples organized themselves in Maine prior to European contact and provide a technology-based data set for future ceramic studies in the Northeast. More broadly, I validate the utility of people-centered methodologies to archaeological inquiry by applying concepts of agency and technological style to an archaeological case study.
Finally, I contribute to the critical discourse on humanizing archaeological research through an agency-centered approach.

**Social Engagement and Community Contributions**

In 2002, Van der Leeuw and Redman advocated for a more engaged discipline for archaeology—one in which members of the discipline “assume a more central role in understanding human-environmental relations and addressing problems of broad significance to the sustainability of our society” (Van der Leeuw and Redman 2002). The research proposed here is designed to do this in a localized and meaningful way by providing information and knowledge to an Indigenous community to aid in the diversification and revitalization of craft knowledge.

Early in the developmental stages of project design, I met with an advisory committee comprised of citizens of the Penobscot Nation—an Indigenous community in Maine whose homeland centers on the Penobscot River watershed. The group consisted of individuals with a variety of cultural, political, linguistic, legal, and environmental expertise. Meetings with the group highlighted the need for, among other things, knowledge revitalization and development in the area of ceramic manufacture and use.

The basketry tradition among Penobscot people thrives. Traditional ash basketry has supported tribal economies for generations and is a valued and respected art form. Unfortunately, traditional ash basketry materials are particularly susceptible to environmental change. A more immediate threat is the possible invasion of the emerald ash borer, an insect that destroys ash trees used extensively in the Penobscot basketmaking industry. Given this threat and the forecast for climate change and its impact on basketry materials (Daigle and Putnam 2009), the re-introduction of the pottery tradition into Penobscot lifeways may provide members with a viable alternative or complement to the basket industry in the event of irreparable resource decline. Since knowledge of the techniques associated with traditional forms of pottery manufacture is lacking within the community, this dissertation includes a model for the transmission of
archaeological knowledge to support the Penobscots’ effort to reclaim ancestral ceramic traditions.

The community contribution and engagement component of this research is inspired by an Indigenous archaeologies research paradigm defined as archaeology done with, for, and by Indigenous people (Nicholas and Andrews 1997). Implicit in that is an archaeology that is informed by Indigenous values and agendas (Wobst 2005). As noted by Wobst (2010:22), an Indigenous archaeologies approach contributes to a decolonizing practice by alerting archaeologists to their biases and encouraging them to “replace obviously biased representations with accounts that more sensitively report what is there and how it got to be that way, rather than filtering one’s observations through the colonizers'/administrators’ lens.” However, it is important to note that biases may not be obvious to the non-Indigenous person and it is through Indigenous archaeologies approaches that awareness of one’s biases emerges. Atalay (2006:292) suggests that Indigenous archaeology [ies] includes “research that critiques and deconstructs Western archaeological practice as well as research that works toward recovering and investigating Indigenous experiences, practices, and traditional knowledge systems.” The community-based goals in this research are a means to those ends.

The community engagement component of this study is considered an extension of the chaîne opératoire started by potters ancestral to the Penobscot people living today. Re-introducing ceramic knowledge into contemporary Penobscot lifeways is an agentive act that destabilizes existing spheres of archaeological knowledge control and repurposes it in ways that are meaningful and empowering to Penobscot people and their ancestors.

**Organization of the Dissertation**

This dissertation consists of eight chapters. In this chapter I have introduced readers to the problem of how archaeology dehumanizes past peoples by neglecting their agency within the context of their relationship with the material world. I have proposed that by positioning people as active agents in our archaeological approaches, we can illuminate their humanity by exploring
their choices, decisions, and actions. This, in turn, acknowledges their power and places people at
the forefront of our archaeological intentions. Chapter 1 also introduces my case study in which I
apply theories of agency and technological style in my evaluation of a socio-spatial land use
model from Maine.

Following this introduction, Chapter 2 provides an overview of agency theory. It presents
a historiography of agency theory in anthropology and archaeology highlighting early theoretical
contributions as well as contemporary application of agency theory to archaeological research.
Chapter 2 also reviews style theory in archaeology with a particular emphasis on technological
style. I review applications of technological style as have been presented in the literature by way
of archaeological or ethnoarchaeological research.

Chapter 3 presents my methodologies and methods. I begin by discussing the
methodological framework selected for this study, which includes concepts of chaîne opératoire,
micro-scale analyses, and attribute analyses of technological choice. I also present the analytical
procedures I used in this research. Included in this discussion is a review and justification of the
ceramic attributes selected for examination, a presentation of basic laboratory methods, a
discussion of vessel lot analyses, and an overview of scanning electron microscope procedures.

Chapter 4 presents my case study. It begins with a discussion of the anthropological
underpinnings of Sanger’s (1982, 1996a, 1996b) two-population model, followed by a review of
the model’s archaeological development. This is followed by an overview of archaeological
ceramic research in the Northeastern United States. Here, I present the state of the current
research on socio-spatial models for the Ceramic/Woodland/Maritime Woodland periods. Chapter
4 also includes an overview of Ceramic Period research within the Penobscot River valley and
concludes with a discussion of Wabanaki oral narratives that inform the two-population model.
Wabanaki is a term derived from the Algonquian languages meaning “people of the dawn” or
“people of first light.” It is used as a collective reference for Indigenous peoples of Maine and
adjacent regions.
Chapter 5 situates the case study in space and time. I present the environmental setting of
the case study sites which includes an overview of the geologic and paleoenvironmental history.
Also included in this chapter is a culture historical overview of the Penobscot River valley. These
sections of this chapter are aligned with archaeological conventions in the region. I complement
these narratives with Penobscot legends. The legends articulate the environmental history of the
Penobscot River valley through a lens that is different from what is presented in traditional
archaeological style. My intent here is to acknowledge the value of both interpretations. This
multi-vocal approach is consistent with Indigenous archaeologies principles.

Chapter 6 presents a description of the sites and samples selected for the case study. I
begin this chapter with a description of each site. This includes a discussion of their geologic and
environmental settings, a summary of previous archaeological research conducted at each
location and my rationale for selecting each site. I also summarize the ceramic assemblages from
each location and discuss the temporal range of the assemblages.

Chapter 7 presents and evaluates the data and highlights technological patterns identified
in this study. I assess and compare aspects of vessel morphology, ceramic fabrics, vessel lot
surface attributes, and ceramic manufacturing scraps. I also offer an evaluation of the relationship
between cordage twist preference and other technological choices made by potters in the
Penobscot River valley. The data sets selected for this study vary in size and my analytical results
are useful as preliminary findings that should be used as a basis for future studies. The results
indicate that ceramics from three different locations within the Penobscot River watershed are
distinguished from each other in different ways.

Chapter 8 concludes this dissertation by discussing the anthropological implications of
my research findings. The interpretations I offer here are largely suggestive given the limitations
of the data set. The analytical results of this study are applied to the following: my evaluation and
assessment of the two-population model with a focus on the social context of ceramic production;
an assessment of the relationship between cordage twist patterns on aboriginal ceramics and other
technological attributes; and an evaluation of how these data inform our understanding of cultural affiliation and group identity-based choices made during the ceramic production sequence through time and space. I also offer suggestions for future lines of inquiry into this topic and discuss the benefits of combining agency and technological style theories with methodological approaches grounded in *chaîne opératoire* and micro-scale analyses. The implications for humanizing archaeology through a research design of this structure are also reviewed here.

Finally, this chapter presents an overview of the community-based component of this research. It is presented as a continuation of the *chaîne opératoire* as it relates to the human/ceramic engagement in Maine and offers a model for the re-introduction of ceramic technology and “specific knowledge” into Indigenous craft economies. I provide a framework for re-integrating ancestral technologies and “social representations” (Lemonnier 1992:79–80) into contemporary Indigenous communities. This, combined with research tactics that embrace agency, technological style, and Indigenous archaeologies, offers a multi-faceted approach to empowering Indigenous peoples and humanizing archaeological research.
CHAPTER 2
THEORETICAL FRAMEWORK

Introduction

This chapter provides an overview of the theoretical tools selected for this study. As a framework for supporting this dissertation, agency, technological style, and Indigenous archaeologies concepts capture the interdependent nature of the human-material culture relationship by emphasizing the role and power of human decision-making and action on the material world (and vice-versa by some accounts Gell 1998; Latour 2000). A study of archaeological ceramics from the vantage point of the maker and the community requires thoughtful application of subject-centered theory, which agency, technological style, and Indigenous archaeologies theories provide. The following includes a historiography and overview of the guiding paradigms supporting this research. I present this information to contextualize my research theoretically and to provide insight into its applicability to advancing the discipline.

In the following sections, I introduce the tenets of agency theory with a review of contributions of key agency theorists such as Mauss, Bourdieu, and Giddens. I consider agency within the realm of the social sciences and discuss why and how it has been applied to the social sciences. This is followed by an overview of technological style as a research paradigm complementing agency theory in this study. Here, I define technological style, review applications of technological style theory, and discuss the relationship between technological style and technological choice. I then present an overview of Indigenous archaeologies theory. I discuss its definition and provide a summary of its evolution in the discipline.

Habitus, Practice, Actions, and Agents

Agency theory has its intellectual roots in practice theory. Ortner (2006:16) characterizes practice theory as a “general theory of the production of social subjects through practice in the world, and of the production of the world itself through practice.” Early applications of practice theory relative to anthropological and sociological scholarship materialized through the work of
Marcel Mauss. Mauss, an early 20th century French social theorist, was the nephew and student of Emile Durkheim. He advanced two concepts linked to the behavior of individuals in society—“techniques” and “habitus” (Mauss 1935, 1973). Each of these concepts has some bearing on the present study.

Techniques, according to (Mauss 1948, 2006a:149) are defined as “an ensemble of movements or actions […] which are organized and traditional and which work together towards the achievement of a goal known to be physical or chemical or organic.” As (Schlanger 2006:18) points out, Mauss’s interpretation of techniques characterizes them as both “effective” and “traditional” – traditional being a knowledge, experience, or skill etc., introduced and developed through the process of transmission. Mauss (1973:75) refers to the body as “man’s first and most natural technical object,” and he underscores how individuals embody techniques. He also purports that human action is linked to the physical, psychological, and social spheres of one’s being (Mauss 1935, 1973). Through this tripartite approach, Mauss (1935, 1973) reinforces the dialectic between the individual and the social in terms of human action and views techniques as emanating from both spheres as opposed to one or the other.

In his article Techniques du corps, Mauss (1935, 1973), provides examples of physical techniques, such as childbirth, sleeping, walking, cleaning of the body, etc., noting the variation in techniques across cultures. He explains variation in terms of the cultural context within which one learns and grows.

Learning and growth are also influential on habitus—a second concept presented by Mauss (1935, 1973) within the realm of practice theory. He interprets habitus as human physical motions and actions that are influenced by culture and education, which become routinized in the individual through practice. He cites swimming as an example of how one’s body adopts a particular technique to perform in the water. This technique, according to Mauss, (1935, 1973) is shaped by the cultural context in which one learns to swim.
We can consider the contemporary, Western practice of family dinners as another example of a space where habitus occurs. In this context, when families eat together at a central table, each person (generally) is given individual eating and drinking utensils arranged in a particular way. An alternative practice would be for all members of the family to share one drinking glass or plate. Both techniques have their advantages and disadvantages but the practice is not evaluated that way by table setters because for many, the practice of setting the table becomes habit.

Our bodies and minds perform this activity as we have learned it although we are quite capable of choosing an alternative practice. For example, it would be awkward for many table setters to carry dinner plates on their heads, even though the technique of carrying things on the head is a viable carrying option for many people around the globe. This example illustrates how Mauss's (1935, 1973) view of habitus is interpreted as a routinized process influencing the mind and the body through socially-based indoctrination and practice.

All societies have cultural space where habitus exists, and material production such as ceramic manufacturing is one area where archaeology may witness a society's habitual acts. Mauss's philosophies underscored not only the presence of habitus in society, but also its potential for illuminating cross-cultural variation making it particularly useful to archaeologists seeking to address issues of identity and social boundaries (Dietler and Herbich 1998; Dobres 2000; Hegmon 1998).

Mauss's contributions to theories of human techniques and habitus provided a foundation for more contemporary practice theoreticians, namely Pierre Bourdieu and Anthony Giddens—both of whom offered alternatives to the polemic ideals of structuralism. In the social sciences, structuralism emphasizes the role of the social system in influencing culture and human behavior. Bourdieu, also a French social theorist, viewed structuralism as flawed in that it places heavy emphasis on the social system while neglecting the role of the individual as an integral part of that system. In his seminal work, Outline of a Theory of Practice, Bourdieu (1977) advocates for
a social science theory that synthesizes the relationship between individuals and social structures. He proposes that this relationship operates in a recursive fashion with human agents influencing the social structure and vice-versa (Bourdieu 1977:3).

To illustrate the interplay between social structures and human agents, Bourdieu (1977:3) discusses the act of gifting which he proposes is best analyzed by combining objectivist approaches that explore the underlying structure of social systems as well as the “explicit truth of the primary experience”--meaning the experience of the individual. Highlighting temporal elements of gifting as a facet of the Exchange, Bourdieu reifies the role of the individual noting that the time lapse between receiving the gift and reciprocating is a negotiated act that carries meaning and requires strategic decision-making, choice, and action. Hence, gift Exchange is not simply a routinized process of giving, receiving, and reciprocating shaped solely by an underlying social structure. Time in gift Exchange is negotiated and strategized by individuals. As such, the giver/receiver influences the process through actions influenced by personal decision-making and social context. Negotiating that temporal space is an act of agency that is both self-directed and socially influenced.

Building on Mauss (1935, 1973), Bourdieu’s agency-structure dialectic incorporates habitus which he likens to second nature and defines as “a socially constituted system of cognitive and motivating structures” that are relational to “agents’ interests” (Bourdieu 1977:76). He elaborates on Mauss’s presentation of habitus by emphasizing its recursive nature. In essence, he proposes that through individual and collective practices, the learned habits of individuals are shaped by, and contribute to, the social structure within which one lives and learns. He describes habitus as “history turned into nature” continuously relating agency and structure “through the production of practice” (Bourdieu 1977:78). Metaphorically, Bourdieu (1977:80) describes habitus as a “conductorless orchestra” created by individuals living and learning within a social structure and formulating a “regularity, unity, and systematicity to the practices of a group.” He
proposes that people adjust and correct actions based on common understandings, experiences, and values.

Bourdieu’s contributions to post-structuralist theories in anthropology are imbued with humanistic tenets. Hinting at concepts of emic and etic perspectives, he acknowledges the agency of people (subjects) being studied while reminding us that as observers, anthropologists must engage in self-reflection to break with deeply-rooted preconceptions and values that exist in ourselves and the discipline (Bourdieu 1977:2). His contributions to practice theory challenged deterministic models for interpreting human behavior and moved anthropology and sociology toward models that acknowledge the role of human beings in shaping their reality.

Like Bourdieu, Anthony Giddens, a British social theorist, offers the social sciences agency-related philosophies to build upon. The philosophies of the two are often drawn upon collectively when applied to archaeological inquiry. Giddens’ theory of structuration opposes dualistic tenets of structuralism and reinforces the recursive relationship between human action and social structure. In Giddens’ (1984:3) view, human action flows continually over time and space and replenishes the structure while being monitored and corrected “reflexively” by human agents.

Giddens elaborates on practice theory by addressing issues of consciousness. Specifically he distinguishes between two types of consciousness—“practical consciousness” and “discursive consciousness” (Giddens 1984:xxiii). According to Giddens (1984:xxiii), “practical consciousness” is representative of those knowledges and actions that are positioned within the consciousness but are not actively present in the thoughts of individuals. Drinking water from a glass, for example, is an act involving practical consciousness in that we are skilled in the activity but are not actively thinking about the techniques required to perform the act. With “discursive consciousness,” which he equates to one’s ability to verbalize an action, event or situation (Giddens 1984:45) an individual has an awareness of a specific action and can rationalize about it.
In traditional ash basketry among the Indigenous people of Maine and the Maritimes, the act of pounding the ash to form strips of wood may be considered a technique which falls within the practical consciousness category, but the basketmaker may be guided by a discursive consciousness in the construction of the basket, particularly if it deals directly with the integrity of the final form. However, within each of these situations there may be facets of the activity that fall in and out of the different levels of consciousness. This is likely the same with potters.

Giddens (1984:4) acknowledges the fluid nature of consciousness by stating that “the line between discursive and practical consciousness is fluctuating and permeable.” Notions of consciousness have arisen within the context of the two-population debate, specifically in interpretations of cordage twist patterns. These will be explored more fully in subsequent chapters.

Of the three practice/agency theorists discussed here, Giddens presented the most explicit conceptualization of agency for the social sciences. He defines agency “as the stream of actual or contemplated causal interventions of corporeal beings in the ongoing process of events-in-the-world” reinforcing the idea that people have an ability to act on, to shape, and to be influenced by events in space and time (Giddens 1979:55). In a recent reinterpretation of style, Wobst (1999:120-121) advances a similar concept with respect to material culture. He defines artifacts as “material interferences” that are entered into a social context that humans want to either change or maintain. Wobst (1999) bridges the agency/structure divide by positing the reflexive role of materiality. He notes, “once humans begin to materially interfere with each other, style is inseparably about society and about individuals” (Wobst 1999:121 emphasis original). This view extends Giddens’ concept of agency as interventions into the realm of materiality and archaeological practice.

By virtue of its focus on people as individual and collective actors, agency theory has evolved through the philosophies of these agency theorists to be a useful paradigm in humanizing archaeology. Archaeologists and other social scientists can draw upon Bourdieu and Giddens’
work to facilitate the emergence of human-centered approaches to research. This, in turn, will inspire theoretical and methodological alternatives to deterministic models of human behavior within archaeology.

I view the work of Mauss, Giddens, and Bourdieu as humanizing from another angle. Notably, each assumed the role of the public intellectual and used (or is using) that role to bridge academia and politics by addressing social problems. Schlanger (2006:14–15) attributes Mauss’s views on techniques to his “continuous and wholehearted engagement with modernity” and his “commitment to humane socialism.” Mindful of the social obligations of the academy, Mauss was an advocate for sharing social science knowledge with the public (Mauss 1927, 2006b; Schlanger 2006).

Bourdieu’s engagement with political issues evolved over time. According to Swartz (2003:791–792), Bourdieu resisted public intellectualism early in his career and he supported maintaining clear demarcations between the academic and the political. Over time, his position changed and he became a socially visible advocate for causes such as pension protection, higher education access and anti-globalization—all areas in which his social science knowledge could inform social justice causes.

Similarly, Giddens positioned himself as a public intellectual later in his career. Comparable to Bourdieu’s early academic life, Giddens maintained a distance between his intellectualism and political issues (Giddens 2007). However, in the 1980’s his position shifted (Giddens 2007). He was instrumental in establishing the Polity Press—a publishing company focused on topics related to humanities, social sciences, and political issues. Polity Press encourages publications accessible to a mix of academic and public readership. Since establishing himself as a public intellectual, Giddens has been politically visible in areas of labor, climate change, and globalization using his intellectual expertise to influence social change.

This practice of actively integrating academic and political spheres humanizes the social sciences in ways that go beyond centering our research on human agents. For archaeology,
agency is not simply a theoretical means to make humans visible in the archaeological record. It also provides a framework for how we behave as archaeologists within the context of our own social, political, and academic spheres. When approaching archaeology through the lens of agency, we expose and affirm the multiple facets of humanity that we encounter as social science intellectuals both through our research approaches and our social involvement. As a humanistic endeavor, this dissertation is positioned as an act of agency and is inspired not only by the theories of Mauss, Bourdieu, and Giddens, but also by their political roles as public intellectuals.

**Practice/Agency Theory in the Social Sciences**

The topic of subjectivity within archaeological research is not new. In the 1980’s, Hodder’s (1982) book, *Symbols in Action*, sparked a movement toward more reflective and diverse archaeological approaches and interpretations. In contrast to the culture historical and processual archaeological approaches popular in the 60’s and 70’s, Hodder (1982:212) proposed that material culture “transforms, rather than reflects, social organization according to the strategies of groups, their beliefs, concepts and ideologies.” Hodder’s work moved the discipline beyond processual archaeological approaches and advanced the relational aspects of humans and their material culture. Several of Hodder’s students approached anthropology in this vein by applying practice/agency theory to their research.

An early adopter of practice/agency theory was Henrietta Moore, a student of Hodder who explored space and gender among the Marakwet in Kenya (Moore 1986). Moore (1986) was interested in the relationship between symbolic forms and social context in Marakwet society (Moore 1986:xi). A prominent thesis in her study was to show the role of social actors (Marakwet men and women) in organizing domestic space (Moore 1986:8). She approached the study of space as text noting that in order to understand the meaning of text, one must consider the reader. In this case, Moore (1986) interpreted gendered agents as readers of text. She states, “the interdependence of meaning and interpretation, and the mutuality of exegesis and praxis, is particularly important with regard to the analysis of space (Moore 1986:189). Moore (1986)
suggests that in the male-dominated society of the Marakwet, the values contributing to inequity in gender representations inform notions of what is male versus female in the physical space. Moore’s work was innovative in terms of her “space as text” approach, and also because she incorporated practice/agency theory into the realm of materiality and social space studies.

Gender-related topics in archaeology were particularly influential in advancing agency theory in the social sciences generally, and archaeology in particular (Dobres and Robb 2000). The interplay between agency and gender studies emerged in archaeological research in the 1980’s (Dobres and Robb 2000). As a critique of processualist approaches to archaeological inquiry, feminist archaeology elucidated the androcentric nature of archaeological inquiry and offered alternative ways to study the past which included acknowledging gendered agents (Conkey and Spector 1984; Gero 1985). Conkey and Spector's (1984) advocacy for a more gendered archaeological research paradigm was a call to shift away from theoretical and methodological models that neglected gendered agents. They criticized processual approaches that placed too much emphasis on social systems while neglecting “individuals, small groups” and “choice” (Conkey and Spector 1984:22). Under the rubric of gendered archaeology, Spector's (1993) seminal publication *What this Awl Means* presents an interpretation of Dakota material culture that gives voice to people in the past as well as those in the present. Although presented as feminist archaeology, Spector’s (1993) work reflects the goals of agency/practice theory with an explicit focus on human actors. Her intent was to fill the void in archaeological research that neglects the human component of the past (Spector 1993:30). Spector (1993:30) criticized archaeological practice that fails to acknowledge the “unique individuals who created and used” the artifacts we focus on as archaeologists. These themes are reminiscent of agency theory and Spector was influential in moving the discipline toward humanistic and decolonizing practices.

Spector and Conkey were not alone in challenging the status quo in archaeology. Shanks and Tilley (1992), (who were also students of Hodder) were early advocates for theoretical approaches that reform archaeology with respect to agency and structure. They opposed dualism
and encouraged the exploration of the relational elements of humans and society in archaeological practice. They did so in concert with an explicit caution against placing the individual in an overly central role reminding us that individuals are “positioned in relation to other subjects, groups, institutions…” (Shanks and Tilley 1992:123).

Shanks and Tilley’s study of beer can design is often cited as an early effort to apply agency theory to material culture studies. This study explored and compared beer bottle labeling and advertisements in two different European countries. The authors proposed that variability in design strategies reflect social strategies relative to alcohol consumption. This work is interpreted by Dornan (2002) as representative of collective agency and illustrative of the notion that social groups can influence social structure. It was an important contribution because agency theory is frequently misinterpreted as representing individual actors when in reality agency exists at both individual and collective scales. However, Johnson (1989) criticizes this work on two fronts—one is a criticism of its neglect of the social agent and the other is a failure to consider social class as part of the interpretation of agentive behavior. These reviews point to the challenges in agency-themed studies in terms of balancing the role of the individual, the group, and social structure.

Applications of practice/agency theory in ceramic studies emerged in the early 80’s and have become increasingly common in recent years. One example is Miller’s (1985) ethnoarchaeological work with potters of Central India. Another student of Hodder, Miller (1985) designed a material culture study that blends multiple social science disciplines. His research explored style and ceramic variability through the human “categorization” process—a cognitive process in which people recognize and order their world (Miller 1985:6). His analysis was contextual and he aimed to position artifacts as categories and identify the “conditions of the creation of difference and equivalence, and to recognize that distinct objects may be created as representations of identical concepts” (Miller 1985:201).

Miller (1985:17) explored the ceramic manufacturing process among six Dangwara village households in Central India. In this study, he centralized the human/materiality
relationship in the research design, focusing heavily on ceramic variability. By examining multiple ceramic attributes and interviewing Indian potters, (Miller 1985:2) positioned the categorization process as a bridge between artifact variability and social variability acknowledging that material categories are not static because they are altered by the multiple facets of their social context.

Miller's (1985:162) study also showed that stylistic variability exists in the selection of particular dimensions, such as rim form and body profile and it is these conventional spaces for difference, as well as redundancy in potter’s choices, that create ceramic products recognizable to spatial dimensions. However, he noted that while consistent patterns in form and use existed among the pots analyzed, they “were only discernable from the investigation of the material itself” and not revealed through inquiry of the potters (Miller 1985:198). This reinforces the notion that attributes convey meaning differently to archaeologists and to potters.

Miller’s (1985) study was innovative in that he approached ethnographic research through a material culture lens. In doing so, he was able to demonstrate that social structure and human action converge on material culture, and material culture, in turn, influences social structure.

In more recent applications of agency theory to archaeological research, increasing sophistication in theory and methodology is emerging. Marcia-Anne Dobres (1995, 1999) has been a leading proponent of agency theory in archaeology. Her work on Late-Magdalenian artifact variation in the French Midi-Pyrenees focused on understanding the agency of past gendered relations through an examination of bone and antler technical processes situated in daily human activities. This work is in contrast to studies of Late Magdalenian designed to identify normative patterns across broad spatial and temporal dimensions.

Dobres (1995, 1999) identified patterning in material culture variation at Late Magdalenian sites that had gone undetected through previous archaeological studies. The visibility of these patterns emerged through a research design centered on social actors involved
in tool production. This approach challenged long-standing normative interpretations and demonstrated the utility of agency-based approaches to archaeological research.

Technology, techniques, and operational sequences are central to Dobres’ applications of agency theory to archaeology. She advanced and developed these concepts as a framework for exploring technology as “the experiential and situated practice of people engaging with each other while making and using material culture” (Dobres 2000:7). This framework challenges the “Standard View” (Pfaffenberger 1992) of technology which projects contemporary perspectives of technology onto technologies of the past—perspectives that position technological objects as “quantifiable” and “neutral” (Dobres 2000:33) with little relationship to social actors. Dobres (2000) and Trigger (1984) attribute this ethnocentric view of technology to the capitalist and colonialist views and values that have shaped archaeological knowledge and practice.

Dobres (2000:63) argues that technology is a “verb of action—and interaction” and a cultural space where humans are actively engaged in human-to-human and human-to-matter processes. Dobres’ work is influential to the framing of this dissertation. Like past Late-Magdalenian studies, most archaeological ceramic studies in Maine and Northern New England have been rutted in typological and culture historical framed research designed to arrive at geographically broad social patterns. This dissertation emulates her efforts to shift the paradigm away from normative strategies for interpreting human behavior to one that begins to reveal the agentive behavior that existed in the day-to-day lives of Native potters living in Maine prior to European contact. To that end, I draw upon technological style and choice as a strategy for “getting at” agency. I review these concepts below.

**Technological Style**

As a complement to agency theory, style theory—specifically technological style, aids in framing this study. Style has received much attention in archaeology over the last three decades and several excellent reviews of style exist in the literature (Carr and Neitzel 1995; Conkey 1990; Conkey and Hastorf 1993; Hegmon 1992; Plog 1983). In Hegmon’s (1992) review she
acknowledges that style as an archaeological concept has been defined in a multitude of ways and she reaffirms the value of style studies as well as the value of multiple definitions. She notes that amidst the diverse approaches to style theory in archaeology two central themes unify approaches to style, both of which are relevant to this dissertation. These are “style is a way of doing something” and “style involves choice among various alternatives” (Hegmon 1992:517–518). These themes are pertinent to this research in that I am interested in how pots are made and the domains of choice in ceramic production. In the following discussion, I focus on technological style as a complementary approach to agency theory.

Lechtman and Merrill (1977) compiled an early edited volume dedicated to exploration of style and technology within archaeology and ethnology. In Lechtman’s (1977:5) introduction to the volume, she proposes that the process of producing artifacts is stylistic which positions style within the realm of production and creative action. She then goes on to discuss two points that influence how archaeologists should approach studies of technological style. First, she asserts that technological style is a space where cultural values materialize (Lechtman 1977:10). According to Lechtman (1977:10) technological style encompasses “attitudes of artisans toward the materials they used” as well as community-based attitudes toward both the technological process and the resulting material products. In presenting technological style this way, she highlights the role of both individual and structure in contributing to the process, which is aligned with the anti-dualism approaches espoused by Bourdieu and Giddens.

Second, the technological behavior used to manipulate elements in nature or society may vary dependent upon cultural context (Lechtman 1977:15) and multiple technological acts within a society may have different ideological inspiration. For example, the shift from mineral to shell temper in pottery manufacture may be motivated by pot performance among one group of potters, whereas another group of potters may shift to shell for political reasons. This calls for an awareness and consideration of the cultural processes, contexts, and histories that influence the act.
Since Lechtman and Merrill’s (1977) volume on technological style, archaeologists and ethnoarchaeologists have increasingly designed material culture studies with a technological style focus. Relevant here, is Childs’ (1991) study of African iron-smelting furnaces. Childs’ multifaceted approach to his research showed that technological style manifests itself in multiple ways. Theoretically, Childs’ research blends philosophies of style by combining a functional approach to style theory as proposed by Wobst (1977) and Wiessner (1983, 1985) with elements of Sackett’s (Sackett 1986) isochrestic variation, which places emphasis on the role of human choice in material culture variation. Childs (1991:341) couples his examination of human choice with exploration of other factors such as access to resources, ideology, technical needs, symbolism, etc., in presenting iron smelting as a process and product of the agency/structure dialectic. Childs’ study was an important contribution to the discipline and a solid example of how one can combine agency and structure with external influences to address anthropological topics. It also demonstrates that material culture can be complex units of stylistic information (Childs 1991:333). Smelting furnaces and the process of smelting are comprised of multiple components each containing cultural meaning. Childs (1991:333) distinguishes smelting furnaces from pots suggesting that a “furnace differs from a pot, then, because it involves the covariation and combination of several components and these reflect choices made in different cultural contexts.” I suggest that the two are not so different given that style is likely embedded in how one gathers the clay, kneads the clay, twists cordage, crushes rocks for temper, etc. The challenge for archaeologists is in identifying how technological style or “ways of doing” (Hegmon 1992:517–518) manifest themselves materially.

Similar to Childs’ (1991) research, Lemonnier’s (1992, 1993) contributions to technological style research have been significant. Lemonnier (1992:1) proposes that technologies are “social productions” similar to marriage rules or systems of Exchange. Because technologies reside in every aspect of social life, they are beacons of cultural meaning and worthy of anthropological exploration in and of themselves. He observes that technology studies in
archaeology are often designed to examine technology as a means to addressing social phenomena such as subsistence, cultural affiliation, or spatial distributions (Lemonnier 1993:2). However, these studies fall short in that they fail to explore the cultural meaning within the technologies themselves (Lemonnier 1993:2). Cordage twist analyses on aboriginal ceramics in Maine are a good example of this. They are often used to interpret social phenomena such as learning networks or social boundaries, but rarely do archaeologists explore why one twist might be preferred to another.

Lemonnier (1992, 1993) advocates for an anthropology of technological systems using the concept of chaîne opératoire. Citing Cresswell (1976:6), Lemonnier (1992:26) defines chaîne opératoire as “a series of operations which brings a raw material from a natural state to a manufactured state.” He elaborates on this definition by acknowledging that not all techniques result in an end product, but all transformation of matter involves an operational sequence (Lemonnier 1992). Ceramic manufacturing scraps are an example of the material remnants of a stage in the ceramic production process. As a by-product of ceramic production, they carry cultural meaning because they involve human choice, decision-making, and action. Even though they are not what we might consider the intended end product, they reflect aspects of a potter’s technological style and the cultural context within which that potter’s technological style is situated.

Technological style is the product of technological choices made within the context of natural and social constraints (Lechtman 1977). As such, technological style provides the researcher with a rich view of style by focusing on a combination of choices in the production process regardless of whether they are classified as passive, active, conscious, or unconscious (Lemonnier 1992, 1993).

Gosselain (1992) conducted ethnographic observations of contemporary potters to document the stages of ceramic production. He demonstrated that technological choice influences ceramic variation but is not reflected uniformly throughout all stages of the manufacturing
process. He notes that “because for some stages there are fewer technological options, and because other stages are more sensitive to technological innovation, it follows that the spatial distribution of techniques appropriate to these stages may be a poor indicator of cultural differences” (Gosselain 1992:582). This type of research encouraged a broader interest in technological choice with respect to ceramics and their social dimensions.

Studies conducted in strictly archaeological contexts focusing on technological style have been somewhat limited, but have proven to be an effective way to elicit information on past human social organization, cultural boundaries, and identity from material remains (Chilton 1996, 1998; Goodby 1998; Hegmon et al. 2000; Stark et al. 1998). In the Northeast, Chilton (1996, 1998, 1999b, 1999a, 1999c) employed theories of technological style in her analysis of aboriginal ceramics from three Late Woodland (1000-1600 A.D.) sites in New England and New York. Her analysis identified distinct differences in the technological choices made by Algonquian and Iroquoian potters showing that choices identified within the ceramic manufacturing process could be used to interpret social organization. Specifically, Chilton (1996, 1998, 1999a, 1999b, 1999c) focused on choices potters made relative to pottery components such as paste characteristics, shaping techniques, temper type etc. Through this approach, she identified a greater degree of diversity in ceramic attributes among Algonquian pots than was present among the Iroquoian ceramics. Chilton (1996) concluded that differences in Algonquian and Iroquoian pots reflected differences in the scale and context of ceramic production, the intended uses of pots, and the social basis for choices made during the ceramic manufacturing process (Chilton 1996:130). This diversity would not have been observable had she approached the study using pre-determined types based on a priori patterns of attributes defined by archaeologists (Chilton 1996).

Chilton’s research centered on humanizing past peoples by deconstructing and challenging typologies and normative approaches to archaeological interpretation. However, her research on Algonquian and Iroquoian pottery pre-dated some of the advanced agency and Indigenous archaeologies theories and methodologies available currently. This study emulates her
research, but does so within the context of a more sophisticated theoretical framework and social justice strategies. Complementary to the agency and technological style theories discussed above, Indigenous archaeologies philosophies also contribute to this research design. This adds another dimension to the research by empowering Indigenous peoples within the realm of archaeological inquiry. In the following section I provide an overview of Indigenous archaeologies theory and discuss its evolution within the discipline. Given that this study is situated in Maine, I also discuss the influence of Indigenous agency on Indigenous archaeologies locally.

**Indigenous Archaeologies Theory**

The standard narrative surrounding the emergence of Indigenous archaeologies theory is often linked to the post-processual movement within archaeology and to efforts to deconstruct the tenets of colonialism within the discipline. Indigenous archaeology was defined initially by Nicholas and Andrews (1997:3) as archaeology done with, for, and by Indigenous peoples. Since then, the definition has morphed to capture its multi-faceted multi-vocal, and introspective qualities. Today, not only is it referred to in the plural to reflect these characteristics, but it is recognized broadly as “an expression of archaeological theory and practice in which the discipline intersects with Indigenous values, knowledge, practices, ethics and sensibilities, and through collaborative and community-originated or –directed projects and related critical perspectives” (Nicholas 2008:1660).

Atalay (2012) and Watkins and Nicholas (2014) contextualize the history of Indigenous archaeologies with reviews of the historical, social, legal, and political underpinnings fueling the movement in North American archaeology. They cite several factors as influential to the development of an Indigenous archaeologies paradigm within the discipline. These include the rise of pluralism- and equity-based philosophies in archaeology such as feminist and class archaeologies. The advancement of these philosophies created space within the discipline for changes not only in who we see in the archaeological record, but who we see it with, why we look, and through what lens.
Agentive actions by Native peoples within the realm of cultural revitalization efforts, the Red Power and American Indian movements of the 1970’s, and Indigenous scholarship have also been catalytic to Indigenous archaeologies theory and practice (Atalay 2012; Watkins and Nicholas 2014). This was a period where Indigenous peoples in North America asserted themselves within the scope of their inherent rights and responsibilities which included territory, environment, children, religion, education, health, and culture. Archaeology was simply one spoke in a wheel of agency connected through a hub of sovereignty, self-determination, and survival.

In Maine and Eastern Canada, Indigenous agency within the realm of archaeology evolved over time and has its roots in graves protection. An early example of Wabanaki people vocalizing their concern for the protection of burial spaces occurred in 1770 when a group of Passamaquoddy representatives traveled to Campobello Island in Canada to meet with the Governor of Nova Scotia. Among the topics discussed at the meeting was a request by the Passamaquoddy for the removal of English settlers from an ancestral cemetery at St. Andrews (Caldbeck 1997). This action affirms the significance of ancestral relationships in Passamaquoddy worldview. It also indicates that Passamaquoddy people embraced a role of responsibility for the protection of ancestral space on the landscape.

Maliseets in Eastern Canada also asserted authority over cemetery space in the 18th century. Several burial spaces on the St. John River including a “burying ground at Ekougrahag,” as well as four acres with a cemetery at St. Anne’s Point, New Brunswick were included in land negotiations between Maliseets and the British (Deloria Jr. and DeMallie 1999).

These early acts of Indigenous agency over cemeteries highlight the importance of ancestral space to the Passamaquoddy and Maliseet communities. The specificity surrounding burials in negotiations between these communities and settlers is particularly telling. Not only does it convey the Passamaquoddy’s and Maliseets’ desire to protect such spaces, it also suggests that cemeteries and burials maintained a status worthy of such specificity. Additionally, both
instances reflect an Indigenous world view that inspired subsequent acts of agency within the realm of archaeological practice.

The early 20th century witnessed increasing scholarly interest in archaeological sites in the region. Red ochre burials drew particular interest. In a situation linked specifically to archaeology, Penobscot Nation leaders denied Warren K. Moorehead access to their homeland on Indian Island when he requested permission to excavate a red ochre burial (Moorehead 1922:220). Moorehead (1922:220) stated that “Penobscots are very tenacious of their tribal rights […].”

In sync with Indigenous rights movements throughout the country, Indigenous resistance to local archaeological practices in the region fluoresced during the 1970’s as well. Tribes became vocal and visible about cemetery and human remains violations. For example, in 1970 the Union of New Brunswick Indians protested archaeological excavations at the Cow Point burial site following reports of the excavations in a local newspaper (Sanger 1973). The newspaper erroneously reported a small pox epidemic in association with the cemetery. The publicity inspired significant public interest in the excavations putting the cemetery at an increased risk for looting and vandalism. The Union of New Brunswick Indians issued a press release threatening to close the excavations (Sanger 1973). However, following discussions with Indigenous representatives, Sanger (1973) continued excavations at the Cow Point site in consultation with local Indigenous leadership.

In 1972, another incident inspired by newspaper publicity led to tribal protests in Maine. In this instance, a local homeowner in Farmington Falls, Maine encountered Native American human remains during house renovations. According to the article, the landowner recovered skulls from six individuals along with other human bones. Some of the remains were exhibited at a local school. The Bangor Daily News reports that Penobscot Governor, Matthew Sappier received calls of concern from tribal members upset that the remains “were not being treated with respect” (Hertz 1972:23). Sappier and other leadership from the Maine tribes traveled to
Farmington Falls to take possession of the remains. Dr. David Sanger, who was an Associate Professor of Anthropology at the University of Maine, also attended the meeting between the landowner and the tribes. The remains were transported to the University of Maine for an evaluation and to confirm that they were, in fact, Native American. The disposition of many of the remains is unclear. However, the remains of one individual from Farmington Falls, Maine was returned to the Maine tribes through the Native American Graves Protection and Repatriation Act.

Then in 1973, the Maine State Museum displayed Native American human remains publicly and the Maine tribes protested the display. This action led to the remains being taken off display, and that same year the tribes negotiated for the Maine Indian Bones law. This State statute was enacted to mandate the repatriation of Native American human remains excavated from Maine. However, the statute lacked clear guidance on how to determine which tribe was to be the appropriate recipient of Native American remains. Enactment of this law prompted the return of some remains under the control of the Maine State Museum but not all.

The Maine Indian Bones Law was amended in 2002 to complement the Native American Graves Protection and Repatriation Act and to formalize the role of the Wabanaki Intertribal Repatriation Committee as a collective body authorized to accept repatriated remains on behalf of the four federally recognized Maine tribes. The amendment to the Maine Indian Bones Law was a direct result of actions by Donald Soctomah and Donna Loring, tribal representatives to the Maine State Legislature.

In the latter half of the 20th century, Maine witnessed increasing Indigenous agency around archaeological philosophies and practice. The establishment of Tribal Historic Preservation Officers (THPO’s) within the Passamaquoddy and Penobscot tribes inspired greater tribal control over archaeological resources. It also facilitated archaeology-based partnerships between tribes and academic and federal cultural heritage personnel—practices that continue to become increasingly common. Although Indigenous archaeologies is not often an explicit
theoretical framework in archaeological research carried out locally. In practice, the philosophical tenets of Indigenous archaeologies are becoming more common in areas of research, curation, and outreach.

Recent efforts by the Abbe Museum in Bar Harbor, Maine to decolonize their practices is an example of how Indigenous archaeologies philosophies are materializing locally. Similar to the events discussed above, Indigenous agency has been a key factor in the Abbe Museum’s move to decolonize their practices. Much of this agency has come through tribal participation as museum board members—a different but effective mechanism for influencing change in archaeological practice than what occurred in the 1970’s.

The foregoing narrative is included here to highlight Indigenous agency in the Indigenous archaeologies movement locally. It is a movement that would not exist without Indigenous peoples being engaged in the day-to-day negotiations associated with archaeology. It is included here for two purposes. First, it acknowledges the contributions of Indigenous peoples to the development of an Indigenous archaeologies paradigm. Scholarly efforts to shift the discipline toward a more inclusive archaeological practice have been instrumental. However, success of such a shift requires that Indigenous peoples be present, engaged, and vocal in archaeological arenas. This is not always an easy undertaking for members of communities plagued with social challenges that accompany marginalization. It is important to canonize their efforts here as contributors to the theoretical paradigm that informs this dissertation.

Second, as an Indigenous archaeologist based in the Northeast, I view this dissertation as a continuation of this archaeological story. Its goals to humanize people living in the past are very much in keeping with the goals of those past Indigenous agents acting to protect ancestral relationships, cultural heritage, and cultural space. As such, it is an act of Indigenous agency that supports the advancement of Indigenous archaeologies in the region.
Conclusion

To conclude, this chapter has presented an overview of agency, technological style, and Indigenous archaeologies theories as a guiding framework for this study. As archaeologists, we are trained to work with empirical evidence through material remains to advance our understanding of what it means to be human. My review of agency and technological style theories shows how these concepts have been advanced to understand the role of human action and decision-making in influencing the material record of the past. Agency and technological style theories can move us beyond deterministic interpretations of human behavior and normative strategies to reconstructing the past.

The discussion of Indigenous archaeologies theory reviews the various lines of inspiration to the Indigenous archaeologies movement in North America. Here I placed particular emphasis on the role of Indigenous agency in influencing change locally. With each generation of archaeologists, we move towards more sophisticated applications of theory, methodology, and methods. But we do not do that in a vacuum. External influences such as Indigenous agency contribute heavily to the evolution of our theoretical sophistication. In the remaining chapters of this dissertation, I attempt to continue this trajectory by blending agency, technological style, and Indigenous archaeologies theories to address an archaeological problem centered on potters in pre-contact Maine.
CHAPTER 3

METHODOLOGY AND METHODS

Introduction

In any archaeological study, theory, methodology, and methods are intertwined to provide a framework for approaching a research problem. Careful consideration of how one approaches a study is essential for moving the discipline forward and agency-themed case studies should employ methodologies and methods that are human-centered and “suggest new ways to see and make sense of” material patterns (Dobres and Robb 2005:161).

In Chapter 2, I established that this study is guided by human-centered theories of agency and technological style. Now I turn to the methodologies and methods that complement these approaches. Dobres and Robb (2005) remind us that methodologies and methods are different. Methodologies are philosophical, theoretically crafted and guide the selection of methods (Dobres and Robb 2005; Markoulaki 2009). Alternatively, one’s methods reflect the empirical aspects of the inquiry. In archaeology they are considered the “’bread and butter’ techniques of materials analysis” and generally include things such as use-wear analyses, geological sourcing, residue analysis, etc. (Dobres and Robb 2005:160). In this chapter, I discuss the methodologies and methods I used to carry out this study. I begin with an overview of my selected methodologies which include chaîne opératoire, technological choice, and micro-scale and macro-scale approaches. This is followed by a discussion of the analytical methods undertaken here.

Methodologies

The methodological approach employed in an agency-themed archaeological study should provide the analyst a means to view and interpret archaeological data relative to both the individual and the social structure within which individuals act. Joyce and Lopiparo (2005:365) write:

structured agency is exercised in sequences of practices that recapitulate and transform prior actions, sequences that we can recognize as structures at scales from the individual technical practice to the collective coordinated experience of long-enduring landscapes.
To explore human behavior as part of an agency/structure dialectic, I designed this analysis to “get at” human agency through an examination of the day-to-day actions and choices of aboriginal potters. I then situated those activities within a broader social context based on our current understandings of temporal and spatial patterning of aboriginal ceramic techniques in Maine. The chaîne opératoire, technological choice, and micro/macro-scale methodologies applied here humanize the research by way of an analysis of ceramic attributes reflective of human choice, action, and decision-making. I discuss each concept in detail below.

**Chaîne Opératoire and Technological Choice**

A primary feature of my methodological approach is the concept of chaîne opératoire or the operational sequence relative to technical acts (Dobres 1995, 2000b; Lemonnier 1992; Leroi-Gourhan 1993; Mauss 1935). As mentioned previously, it originated with Marcel Mauss (1935) whose philosophies acknowledged the interplay of the mind, body, and society in performing technical acts.

The chaîne opératoire concept was advanced in the social sciences in the 1960’s by Leroi-Gourhan (1993), a student of Mauss whose work focused heavily on topics related to techniques, technology, and human action (Audouze 2002). Leroi-Gourhan’s (1993) interest in examining operational sequences in human behavior was situated within his work on human evolution. White (1993) notes that Leroi-Gourhan acknowledged the existence of operational sequences in both human and animal behavior. However, Leroi-Gourhan recognized that humans are unique in that the operational sequences they engage in are linked to material transformations, are culturally influenced, and are essential to human survival (White 1993:xviii). Furthermore, Leroi-Gourhan (1993), advanced ideas related to the transmission of techniques from one generation to the next—a common theme in interpretations of ceramic patterns in Maine (Petersen 1996).

Building on Leroi-Gourhan’s work, Pierre Lemonnier (1992, 1993) developed studies using chaîne opératoire methodologies more formally for application within archaeological and
ethnoarchaeological contexts. Lemonnier (1992:26) advocates for an anthropology of technological systems and applications of chaîne opératoire methodologies.

A key element to Lemonnier’s presentation of chaîne opératoire is human knowledge or know-how. Lemonnier views knowledge and know-how as part of the agency/structure system. People’s technological knowledges and know-how are influenced by the social structure within which they operate (Lemonnier 1980:8 as cited in Audouze 2002:287). Additionally, an individual’s knowledge and know-how influences the social structure. A chaîne opératoire methodology in archaeological inquiry examines the “succession of mental operations and technical gestures, in order to satisfy a need (immediate or not), according to a preexisting project” (Perles 1987:23 as cited in Sellet 1993:106) and it frames what is selected for archaeological examination.

Bundled within Lemonnier’s (1992) definition of chaîne opératoire is the element of choice. In Lemonnier’s view (1993:6) “societies seize, adopt, or develop certain technical features (principles of action, artifacts, gestures) and dismiss others. Lemonnier’s (1992, 1993) interpretation of choice is intimately linked to the values and relationships within a given society. In this respect, technological choices are not strictly determined by function. They are products of social agents influenced by the cultural context within which people engage with technology and techniques.

Technological choices exist in every technical act performed by humans (Pfaffenberger 1992). When combined, chaîne opératoire and technological choice methodologies provide archaeologists a window into human engagement with materiality. Choice, according to Lemonnier (1993:7), “implies the existence of two or more possibilities, which must be compared in order to determine how they differ from or resemble each other[…].” To humanize a study of a chaîne opératoire, it is necessary to articulate the human role in the process; otherwise, we are simply observing and recording the material results of a sequence of human acts.

Methodologically, it is necessary to position those technical acts within the context of human
behavior (e.g. decisions, actions, gestures, language, structure) in order to interpret what we see archaeologically. Analysis of human choice in technological processes leads us to interpretations of technological style which is an aggregate of technical choices people make while engaging in the manufacture and use of material products (Lechtman 1977).

According to Lemonnier (1993:2, 6) technological choice is a “process of selection of technological features invented locally or borrowed from outside” which materializes when humans encounter multiple ways to act on the material world. Lemonnier (Lemonnier 1993:2) notes that humans do not always make choices that would appear to others to be the most logical or efficient decisions. This is because social and cultural factors that influence their engagement with the material world may outweigh the value of “logical” or “efficient” choices. Therefore, a technological choice inquiry explores the “interdependence of technical behaviors with logics that are mostly “non-technical” […] to determine how and to what extent societies play with the apparently overriding laws that govern their action on the material world” (Lemonnier 1993:2)

Lemonnier’s (1992, 1993) interpretation of choice is linked to the values and social relationships within a given society. Therefore, technological choices are not strictly determined by function, environment, or economies. They are products of social agents influenced by the cultural context within which people engage with material culture through technological acts and techniques. In that vein, technological choices carry social information linked to identity, gender, class, kinship etc., but not all choices are equal in terms of what they signify (Lemonnier 1986:176). While some may reflect identity, others may reflect economics and still others may reflect social status. One role of the archaeologist is to attempt to decipher the potential factors influencing technological choices.

Analysis of an archaeological chaîne opératoire is considered a “middle range” methodological approach (Dobres and Robb 2005) and equips us to link “material patterning to the agency of ancient social reproduction” (Dobres and Robb 2005:159). It is process-centered and provides the researcher with a means for identifying culturally prescribed transformation of
matter resulting from a sequence of human decisions, choices, and actions. Through these processes we can see agency at work in the material products of human/technology relationship.

In an exploration of style, technological choice provides the researcher with insight into individual and collective style through examination of a combination of choices in the production process regardless of whether they are classified as passive, active, conscious, or unconscious. At each stage of the human/pottery engagement, from selection of clay to pottery disposal, people play a role in determining the appropriate action to take. Decisions on how to “act” are complex and may be individual or collective, conscious or unconscious, influenced or influential, etc. As archaeologists, we often focus on the end product of those actions but neglect the processes associated with human engagement with material culture. That is because our archaeological investigations are often shaped by methodological strategies ill-suited for exploring processes linked to human/materiality relations.

Unlike typological analyses or culture historical studies exploring normative patterns in archaeological materials, agency studies employing chaîne opératoire and technological choice methodologies can illuminate variability and variation in past technological acts because they do not focus on defining spatial or temporal patterns of similarity. In the exploration of both individual and collective choices and sequential acts, these methodologies position the analyst in ways that allow for exploration at the level of human/materiality interaction. Recognizing that spatial and temporal variation may provide insight into pre-contact social units, this dissertation examines technological choice and style variation and variability at each of the selected locales. However, in order to be effective in these efforts, it is necessary to situate the analysis within both individual and societal contexts and histories. This requires a deliberate focus on scale and an explicit effort to incorporate a multi-scalar approach to the study. The following section addresses how considerations of scale frame this analysis.
Considerations of Scale

The scale at which archaeologists examine data requires careful consideration, particularly if one is seeking to understand social or technological patterns and boundaries. Typologies and culture-historical reconstructions tend to focus on broad temporal or spatial units. If we are to understand human behavior in terms of the recursive relationship between the agent and the social structure, then it is necessary to situate our analytical focus on both individual and societal actions and on the relationship between individual and societal scales.

According to Gardner (2007:2), agency theorists Giddens and Bourdieu combine micro-scale and macro-scale sociologies by advancing a framework that conceptualizes the recursive nature of the agency/structure relationship. The analysis presented here is aligned with this notion in that it is designed to acknowledge the role of individual agents in the ceramic manufacturing process and to situate them within a broader social context of the pre-contact ceramics industry in the Northeast. Approaching material culture analyses at the micro-scale level is an effective way to focus on human/materiality engagement processes (Dobres 1999) because it positions the analyst at the “level at which people engage with one another while making sense and acting upon their social material world” (Dobres 1999). This perspective emphasizes the active qualities of the human/materiality relationship within social groups and acknowledges the social negotiation that occurs during technical acts (Dobres and Hoffman 1994:213).

While the advantages of micro-scale analyses are evident, they are ineffective in understanding past human societies if examined in isolation because they focus on one part of the individual-structure equation. A focus on macro-scale processes is required also to understand the interplay that exists between agents and society. Dornan (2002:325) suggests that in order to be effective in applying agency to archaeological research, archaeologists should reflect on the relationship between “structural events and patterns of practice…unique micro-processes and macro-scale long-term processes and …observable consequence and less obvious intentionality.”
Applying a micro-scale approach to this analysis enabled me to identify, analyze, and interpret human decision-making relative to pottery manufacture at the individual level and situate these local manifestations of choice within macro-scale contexts. For example, at the micro-scale level I examined rim thickness for each ceramic vessel lot analyzed. In this case, individual potters must decide how thick the rim of the pot will be and this decision is influenced by a multitude of factors including vessel lot function and performance, clay availability, skill of the potter, social norms, aesthetics, etc. I examined this and other choices to identify variation within and across site locales and then situated these findings within the regional ceramic chronology—a macro-scale interpretation of aboriginal ceramics in Maine and the Maritimes. Approaching the study in this way positioned individual human practice and material production as relational to both social structures and individual action (Dornan 2002; 325).

As Wobst (2006:56) points out, “socio-spatial units are never complete, but forever in a process of construction.” Therefore, the social scales within which people operate are not static. This dictates that material culture not be viewed as “reflections” of social units and social scales inasmuch as contributions to either maintenance or change in social order (Wobst 2006:59). Here, one way I investigate social units is by acknowledging the cultural connectedness that accompanies people changing (or not changing) together in their material realm. This approach to change in the material record of Native people in the Penobscot River Valley creates an intellectual space to explore the process-centered characteristics of social units and social scales.

**Variability and Variation in Choice and Material Representations**

An important aspect of the methodological approach applied in this study is that it enables me to focus on variation and variability within the samples. This differs from normative approaches such as typologies that may mask variability in search of patterns of similarity (Binford 1965; Dobres 1999; Dobres and Hoffman 1994). Variability and variation are different. Variability is the ability of something to vary. In the context of archaeological inquiries dealing with human choice, variability can be substantial and influenced by many factors including
resource availability, social constraints and opportunities, and environmental conditions. Variation, on the other hand, denotes differences in the condition of something. Both are important here—variation for understanding differences in material remains under examination, and variability for understanding factors that limit or encourage material variation. Understanding technological differentiation between and among social actors can provide material evidence of cross-cultural relationships and show how techniques associated with the human/materiality relationship vary among individuals and groups (Brumfiel 1992; Dobres 1999; Dobres and Hoffman 1994). Stark (1999:29) cites two aspects of technological variability as important in explorations of social boundaries—temporal stability of technological practices and material manifestations of social differentiation among groups. She notes that “spatial variability should be evident […] at two scales: in the technological style that shapes each artifact class and in the suite of technological styles that constitute a culture’s technical system” (Stark 1999:29).

Costin’s (1999) study of crisoles in mortuary contexts from Peru serves as an example of how technological variation can reflect social phenomena and how intra-assemblage variation can be valuable to archaeological interpretations of social organization. Costin (1999) examined technological attributes among ceramic crisoles recovered from a single mortuary interment at San José de Moro. Crisoles are small ceramic vessel lots, either plain or with facial features, that are included as funerary objects among pre-hispanic societies on the North Coast of Peru. Within the assemblage she noted homogeneity in materials used to make the crisoles, but significant variation among other technological attributes such as shape, size, facial feature attributes, and rim form.

Based on her analysis, she concluded that the crisoles were made at a single location by multiple individuals who lacked ceramic manufacturing expertise (Costin 1999). When compared with other grave inclusions, she notes that ceramics within the interment also includes those that were mass-produced and the product of a single mold. Costin (1999:101) concluded that
materiality within this one interment reflect two social representations—one that is “personal and immediate, reflecting the direct involvement and participation of many people,” and a second that indicates commissioned items provided by the individual or group responsible for the funerary process. Costin’s research showed the interpretive value of material culture variation in an archaeological context.

**Ceramic Studies, Chaîne Opératoire, and Technological Choice**

Combining *chaîne opératoire* with technological choice methodologies in ceramics studies has proven to be effective in identifying material culture patterning and social units (Gosselain 1992, 2000; Mahias 1993). Stark (1999:26) acknowledges challenges in attempting to identify “ethnicity” in the archaeological record, but she points out that it is possible to identify patterns of technological variation and material evidence of social boundaries. In her research on Kalinga ceramic traditions and social boundaries, she examined technological attributes resulting from human choice along the ceramic manufacturing sequence. Kalinga pottery-making practices provide ethnoarchaeological evidence of a relationship between morphological variation in water jars and cooking pots and social affiliations linked to language and political alliances (Stark 1999). By examining the day-to-day technological choices among potters, Stark (1999) identified material representations of social boundaries. She concluded that non-iconological choices along the ceramic manufacturing sequence are valuable material indicators of social boundaries—often more so than material representations of iconological style (e.g. techniques such as tattooing which have explicit identity functions) (Stark 1999:42).

Gosselain (1992, 1998, 2000) has conducted extensive ethnoarchaeological research into ceramic manufacturing techniques and spatial and social distributions. In a broad regional study, he examined technological choice among potters in sub Saharan Africa. He compared technological choices linked to visible traits (e.g. decoration) with forming techniques which are not visible in the finished product. Gosselain’s (1992, 1998, 2000) research showed that the surficial techniques were more malleable and less restricted to social affiliations linked to
language and culture than were technological traditions such as forming techniques which tend to be more stable. Forming techniques were shown to align with linguistic and political social units.

Chilton (1996, 1998, 1999c) applied similar methodologies with success in developing solid interpretations of social phenomena. This study builds on these efforts and provides an analytical framework for future ceramics studies in the Northeast.

**Methods**

The analytical procedures applied to this study focus on ceramic attributes representative of potters’ choices made during the ceramic manufacturing process and emulates Chilton’s (1996) attribute analysis of technical choice. Chilton developed this analytical approach as part of a comparative study of Algonquian and Iroquoian pots in New York and New England. This type of analysis identifies “variation and covariation within and between objects” and does not “formulate a typology” (Chilton 1996:58). Attributes represent “the smallest analytical unit distinguished on a set of artifacts” (Borstel 1982:17) and are defined here as “one variable of a ceramic vessel lot, such as surface treatment, temper type, or rim shape” (Chilton 1996:56).

During the analytical process, attributes are described in terms of their “attribute states” which represent the values or descriptive characteristics of a variable such as “quartz” for temper, or “scraped” for surface treatment.

Attributes are frequently used to formulate types, particularly in ceramic analyses. However, typological classifications emphasize certain attributes over others often masking significant social information. Attribute analyses differ from typological analyses in that they place equal emphasis on all attributes and do not diminish the importance of variability in a data set (Petersen 1985). Typologies, on the other hand rely on clusters of attributes to organize material culture and explore social phenomena.

Typologies can be useful tools in classifying material culture and have been used most commonly to inform culture histories of a particular area. However, typological classifications can hinder an analyst’s ability to see diversity in material culture because they are designed to
group items based on similarities in attribute patterns. In ceramic studies, most typologies are developed using decoration and vessel lot form as defining characteristics. An attribute analysis, on the other hand, is more conducive to viewing the material record from the vantage point of the people acting on it because it is designed to examine multiple axes of artifact variables without imposing pre-conceived notions of the social relevance or importance of those variables.

Chilton’s (1996, 1999) methods “examine both technological and decorative aspects of material culture, both of which may exhibit ‘style’” (Chilton 1996:59) (emphasis original). Similar to Chilton’s (1996) research, both technological and decorative attributes are analyzed in this study. As Gosselain (2000) points out, technological choices relative to those characteristics that are visible in the final ceramic product such as surface finishes, may be more malleable and subject to different social influences than those that are less visible such as clay choice and preparation techniques. For example, he suggests that decorative applications tend to “fluctuate through time, be distributed widely through space, and to reflect those most superficial, situational, and temporary facets of identity” (Gosselain 2000:209). Whereas, other less-visible technological choices may reflect long-term or more stable social representations of identity. The most effective strategy for exploring identity through technological choices is to examine multiple attributes with an understanding of the different ways in which they inform questions of identity.

Temporal Assignments and Archaeological Interpretations

To align ceramic collections temporally, I used a regional ceramic chronology to guide the analysis but not shape it. Temporal assignments of ceramic vessel lots follow the Petersen and Sanger (1991) seven-part ceramic chronology for the Maine/Maritimes region (Table 1). This chronology reflects a culture-historical framework designed to identify normative patterns in ceramic data and the presence or absence of variation of those norms. Although Maine has done well to resist the importation of typologies from other areas, the seven-part regional ceramic chronology often serves as an initial classification tool in aboriginal ceramic studies and is based
on ceramic “homogeneity” across a broad region (Petersen and Sanger 1991:124). Ceramic studies in Maine typically focus on ceramic attributes that are identified as “most sensitive for ceramic differentiation” (Petersen and Sanger 1991:122) such as temper type (e.g. grit, shell), surface treatment, and decorative application (e.g. cord-wrapped stick, dentate). As a result, choices along the ceramic production sequence such as temper size, paste consistency, and orifice size may get overlooked during the interpretive process.

The Petersen and Sanger (1991) ceramic chronology has undergone very limited testing despite the authors’ vision of a model that would be tested with the accumulation of additional data. Kristmanson (1992) tested the chronology for its applicability in southwestern Nova Scotia and found a general alignment between selected Canadian collections and the Petersen and Sanger (1991) framework. To date, no concerted effort to refine the chronology has been undertaken. Although it has functioned well, the chronology has inadvertently shaped the analytical process by creating a “normative baseline” (Dobres 1999) that has become the analytical foundation for aboriginal ceramics in the Northeast. This analysis examines aboriginal ceramics from Maine through a wider analytical lens by including attributes of technological choice representing multiple stages of the manufacturing process, not just those that have been identified in the Petersen and Sanger (1991) ceramic chronology.

The Petersen and Sanger (1991) aboriginal ceramic sequence is useful in its presentation of broad spatial and chronological patterns in aboriginal ceramics in the Northeast. Its application in the present study situates ceramic vessel lots temporally and provides insight into coastal and interior ceramic distinctions through time. It also provides common descriptive language for Maine’s aboriginal ceramics to aid in future ceramic studies. The temporal assignments proposed here should not be construed as social units.

**Analytical Procedures**

This analysis included ceramic samples from four distinct localities situated within the Penobscot River watershed. Prior to this study ceramics within each assemblage were subject to
varying levels of analysis. The Eddington Bend site collection required the most extensive analysis since it had not been analyzed previously. The analytical procedures specific to this collection are discussed below.

Ceramics from the Knox site (Belcher 1988) and the ceramic collection from the Howland (Newsom 1999) area were subject to previous research and detailed analysis in the past. Some of the previous analyses were incorporated into this study. For each of these collections, I used previously established vessel lots and select attribute data. However, to ensure consistency in analytical procedures, some attributes were re-examined. Additionally, some attributes were analyzed for this study that had not been previously analyzed.

Ceramics in the Arthur Wood collection were assembled as part of a private collection and have undergone some general analyses by volunteers at the Abbe Museum in Bar Harbor, Maine where the collection is curated. Information such as temporal assignment, temper type, decorative application, and rim form were recorded previously. For purposes of this study, I formed vessel lots based on rim sherds in the collection and when apparent included body sherds in the vessel lots. Because much of the existing data focused on general temper and decorative attributes, the data sets were not compatible with attributes I selected for this analysis. Therefore, a complete analysis of attributes selected for study was conducted.

For all of the samples included in this study, vessel lots or rim lots form the basic unit of analysis. Vessel lots and rim lots are defined as “the reconstructed remains of discrete ceramic vessels” (Petersen 1980:11). Each vessel lot or rim lot reflects a “cumulative record of sequential attribute choices” (Chilton 1996:58). This type of analysis was chosen over a sherd analysis to reduce statistical misrepresentation of the assemblage and to allow for consistency in inter-site analytical comparisons. Rim lots differ from vessel lots in that they always include a rim and may or may not include associated body sherds. Alternatively, vessel lots may be reconstructed using rim and/or body sherds. The goal here is to analyze potters’ choices in a sample of discrete vessel

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lots and to avoid duplicative analyses of vessel lots. Whenever possible, the analysis of ceramic attributes included examination of both rim and body sherds.

Quantitative and qualitative data were recorded on each vessel lot. I recorded quantitative measurements to the nearest .01 mm using digital calipers. Measurements reflect maximum values on attributes such as rim thickness, cordage thickness, and dentate tooth size. Vessel lot orifice diameter was recorded to the nearest centimeter using a diameter chart. Each vessel lot was assigned a number and vessel lot data were recorded in a Microsoft Access data table. In some cases, I opted to record attribute states collectively across the entire ceramic sample to ensure a higher level of consistency in assessment. For example, density inclusion percentages and paste consistencies can be somewhat subjective classifications. By recording these attributes together at one time rather than within the context of other attributes, one can develop and maintain a familiarity with the levels of classification. This, in turn, encourages regularity in analytical assessments.

In addition to vessel lots, I also analyzed ceramic manufacturing scraps. Manufacturing scraps are fragments of clay that are created as part of the manufacturing process but are discarded and not included in the final product (Figure 18). Manufacturing scraps carry information about the manufacturing process and the sequence of actions leading up to the creation of a pot. For example, in some cases they are fired but lack temper—a factor that has implications for understanding the manufacturing sequence at each location. Analysis of manufacturing scraps provides a unique opportunity to view potter’s choices before the final product is created.

In analyzing vessel lots and manufacturing scraps, I placed special emphasis on inclusion (temper) analyses. To increase accuracy in the identification of inclusion types, 12 sherds were subject to Scanning Electron Microscopy (SEM) and Energy-Dispersive X-Ray Spectroscopy (EDS) analysis. Subsequent to SEM and EDS analyses, a detailed examination of inclusion characteristics was conducted using a 50X digital microscope. This process allowed for a higher
degree of accuracy in mineral and rock identifications than that which occurs based solely on macroscopic inspection.

**SEM/EDS Analysis**

SEM/EDS analysis on ceramic samples occurred in two separate but related efforts designed to aid in the mineralogical identification of aplastic inclusions in ceramic pastes. According to Freestone and Middleton (1987:21) applications of SEM/EDS analyses in archaeological research can aid in characterizing materials used in artifact manufacture. For example, SEM/EDS analyses can be useful in sourcing raw materials, reconstructing technological choices, and identifying post-depositional or other changes in material culture. The SEM/EDS analysis here focused on mineralogical characteristics of aplastic inclusions in the ceramic paste for identification and comparative purposes.

The SEM process uses concentrated beams of electrons projected onto a sample to interact with atoms within that sample. The process creates high resolution grey level images that provide the analyst with information on specimen texture and crystalline structure. A complementary application, Energy-Dispersive X-Ray Spectroscopy (EDS) is incorporated into the analysis to identify chemical composition of specimens. The SEM analysis was conducted using Tescan Vega XMU with EDAX Apollo EDS.

Initial SEM analyses were conducted on 10 sherds by Nicholas Ranco as part of his undergraduate capstone project. Ranco (2012) conducted SEM and EDS on ceramic samples from each of the three localities selected for this research. He examined polished sections of ceramic sherds to aid in the identification of material culture patterning within the Penobscot River watershed by way of inclusion (temper) analysis. He noted that SEM analysis revealed a fairly consistent presence of feldspars, biotite, quartz and albite. These minerals were common at all three locations (Ranco 2012).

With assistance from Dr. Martin Yates at the University of Maine, I conducted a second SEM analysis on a sample of 3 ceramic sherds from the Eddington Bend site. These sherds were
selected because inclusions were not readily identifiable through visual examination and the inclusions appeared to occur commonly in the Eddington Bend ceramic sample. Similar to Ranco’s (2012) study, this analysis focused on aplastic inclusions (temper) within select sherds from the collection and was designed to create a comparative reference to aid in the visual identification of aplastic inclusions. The purpose of this analysis was to ensure accuracy in the mineralogical identifications of aplastic inclusions.

**Analysis of the Eddington Bend Ceramics Collection**

The Eddington Bend ceramics collection is the largest in the study and required the most extensive analysis. The analytical procedure performed on this collection began with counting and cataloging all sherds. Generally, sherds were cleaned by dry-brushing. Sherds were not cleaned in instances where organic residues were visible. All sherds were catalogued using Microsoft Access and multiple sherds sharing identical proveniences were assigned a single catalog number. Information recorded during cataloging includes provenience; portion (e.g. rim, body, basal); count; surface treatments; general temper type (e.g. grit, organic, mixed), and comments with additional descriptive data. Throughout the cataloging process, rims and body sherds from the same provenience were compared to form rim lots. Subsequent to cataloging, rim lots were compared systematically to all other rims selected for analysis. This allowed me to identify vessel lots with multiple rim sherds and to avoid duplicate analyses of one vessel lot. Macroscopic comparisons were made based on examination of surface treatments/decoration, rim form, and ceramic fabric characteristics. Ceramic pastes were examined under a 10X binocular microscope to confirm vessel lot assignments.

**Ceramic Attributes Selected for Study**

Attributes selected for this analysis are defined in Tables 2, 3, and 4, and can be classified into three broad categories—ceramic fabric characteristics, morphological characteristics (see Figure 12 for illustration), and surface characteristics. These categories serve to organize and
interpret these data. It should be noted that others may classify attributes differently and these categories carry no assumptions about how the makers of the pots viewed these attributes.

Following Stark (1999:31-32) and Chilton (1996, 1998, 1999) this analysis focuses on ceramic attributes reflective of steps in the manufacturing sequence. Each attribute can be linked to technological choice and they include representations of choice in a range of technical acts from materials procurement and preparation to decorative forming techniques (Stark 1999:31-32).

**Notes on Terminology**

To avoid confusion and to facilitate analytical comparisons among researchers, the following terms warrant clarification:

**Decoration and Surface Treatment**

Decoration is defined by Rice (1987:144) as “embellishment of a vessel lot beyond the procedures used in forming the clay mass into the final vessel lot shape and finishing its overall surface.” Surface treatments are defined here as processes employed by potters to form and finish the exterior and interior surfaces of a pot and may include decorative elements. It is not always possible to determine if a potter applied a particular surface technique for aesthetic, functional, or performance-based purposes. Both terms are used here with the recognition that what is labeled as “decorative” may have functional or ceramic performance related purposes. For example, the technique of corrugating the surface of a pot or applying rocker-dentate impressions into the surface of a pot may be chosen by the potter to improve vessel lot performance during firing and cooking. Schiffer et al. (1994) suggest that a textured surface helps to impede micro-cracking that can occur in vessels during the firing and cooking processes.

**Temper and Inclusions**

According to Shepard (1956) “temper” refers to the process of adding non-plastic materials to the clay for ceramic production. The term implies an intentional act on the part of the potter. For the analyst, it may be difficult to distinguish between aplastic materials added to the clay by the potter and those that may be naturally occurring. Inclusions are “particulate matter,
usually mineral in nature, present in a clay or fabric, either naturally or added by the potter” (Rice 1987). Both terms are used here interchangeably. No attempt was made to distinguish between naturally occurring aplastics and those added by the potter.

**Organic and Shell Temper**

Ceramic studies in Maine have shown that the use of shell temper occurred at certain time periods during the Ceramic Period. The use of shell temper is particularly evident at sites situated in coastal settings as the tempering material is often preserved in ceramics recovered from Maine’s coastal shell midden sites. Frequently, it is assumed that ceramics recovered from sites in Maine’s interior displaying voids in the ceramic fabric were tempered with shell. However, because shell temper is generally not preserved, the tempering material cannot be identified conclusively by visual inspection. Voids with platy characteristics are likely remnants of eroded shell temper, but some ceramics with voids in the paste do not display these characteristics. A detailed examination of voids in the paste is necessary to distinguish between shell and other organic tempering materials. This level of examination was not conducted in this analysis, therefore, the terms “shell” and “organic” are used together or interchangeably throughout the text unless there is some interpretive rational for specifying one over the other.

**Conclusion**

This chapter has provided an overview of the methodologies and methods I used in carrying out this research. The interplay of chaîne opératoire, technological choice and multi-scalar approaches illuminates the human/technology relationship as it exists in an agency/structure dialectic. The methods undertaken here to analyze and compare the collections focus on ceramic attributes that represent potters’ choices along the production sequence. In the next chapter, I present my case study.
CHAPTER 4

SANGER’S TWO-POPULATION MODEL: CONTEXTUALIZING THE CASE STUDY

Introduction

This chapter presents my case study. As discussed in the introduction, I selected Sanger’s (1982, 1996a, 1996b) two-population model for Maine as an archaeological case study to explore concepts of human agency and technological choice. Sanger (1982, 1996a, 1996b) proposes that Native people living during the Ceramic Period (3050-450 $^{14}$C yrs B.P.) in Maine were organized into two populations distinguished by their adaptations to either coastal or interior environments. As an archaeological problem, the two-population model is well-suited to investigations of human agency and choice—-it focuses on human behavior, is temporally and spatially bounded, and is supported by multiple lines of archaeological evidence.

Anthropological models are understood best when situated within a contextual framework. To that end, I begin this chapter by retracing the anthropological history of the two-population model which has its roots in early ethnographic research in the Northeast directed toward understanding Wabanaki land tenure and mobility. It is important to note that this review is not an evaluation of the validity of anthropological theories of earlier times. It is presented as a thematic summary of concepts foundational to the two-population model.

Following my review of its anthropological underpinnings, I present the two-population model through an archaeological lens discussing its evolution and summarizing archaeological research on aboriginal settlement, subsistence and socio-spatial patterning in the Northeast. While some archaeological evidence from Maine suggests interior and coastal population distinctions during the Archaic period (ca. 3050-8500 $^{14}$C yrs B.P.) this discussion is focused on the Ceramic Period (ca. 3050-450 $^{14}$C yrs B.P.).

Next, I survey the regional landscape of socio-spatial settlement models in the Northeast focusing on the most recent 3000 years of Native American occupation of the region. Here, I review socio-spatial settlement and subsistence models that have emerged from studies west and
east of the Penobscot River. I organize this discussion around prominent river valleys in the Northeast. I conclude this chapter by situating my research within the broader landscape of anthropological and archaeological models advanced to explain Native American socio-spatial organization during the Ceramic Period in the Northeast.

**The Two-Population Model—Anthropological Underpinnings**

The anthropological underpinnings of Sanger’s two-population model for Maine and the Maritimes can be traced to early 20th century research exploring relationships between geographic features and territories or settlement patterns of Indigenous peoples in the Northeast. In particular, Frank Speck’s (1915) ethnographic research on Northeastern Algonquian peoples was foundational to subsequent studies of pre-contact land use and social organization among Native peoples. As an ethnographer, Speck researched at least twenty-five North American groups (Rogers 1985:ix) and compiled extensive accounts Native North American life. His research agenda included documenting cultural characteristics of Northeastern Algonquian peoples whose homelands encompassed the North Atlantic region in both the United States and Canada. He focused much of his work on the Wabanaki peoples of Maine with particular emphasis on the Penobscot Nation which resulted in the publication of *Penobscot Man* (Speck 1940, 1997)—an ethnographic account presented through an early 20th century anthropological lens.

Like many anthropologists of his time, Speck sought to capture what he viewed as fading lifeways among Indigenous peoples. However, he did not believe that extinction was imminent for Native peoples. In fact, he criticized those who “evidently aim to enhance the interests of their essays by emphasizing the moribund condition of the natives…” (Speck 1940, 1997:15). Speck’s ethnographic research documented multiple facets of Indigenous culture ranging from kinship systems, to oral narratives, to material culture. While Speck’s work is admirable with respect to the breadth of topics and peoples he published on, his work should not be viewed uncritically. His critics include Indigenous knowledge keepers, as well as some of his non-indigenous colleagues (see discussion below (Ted Mitchell pers. com. 1998; Eckstorm 1940; Morrison 1980; Siebert
Speck's interpretation of the antiquity of the Algonquian family hunting territory sparked substantial anthropological debate on aboriginal land tenure systems in the Northeast specifically, and more broadly, on the validity of private property ownership among hunter-gatherer societies (Cooper 1939; Hallowell 1949; Leacock 1956; Rogers 1963; Speck and Eiseley 1939). Later, Snow (1968:1145) supported Speck's assertion that family hunting territories were aboriginal and claimed that the fur trade “crystallized” the family hunting territory system as an extension of a preexisting economic strategy.
The debate surrounding the antiquity of the family hunting territory dominated the Northeastern Algonquian literature often overshadowing other characteristics of Indigenous culture—some of which are pertinent to the two-population model and the present study. Three themes, in particular, emerged from Speck’s studies that would resurface later to influence reconstructions of pre-contact land use in Maine. These include: the socio-spatial relationship between Algonquian peoples and Northeast river systems; the interconnection between Wabanaki peoples, their homelands and seasonal cycles; and the alignment of socio-cultural constructs with distinct ecosystems. In the following sections, I discuss each of these themes to provide context to the evolution of the two-population model. Special emphasis is given to Maine and the Penobscot River valley as the setting for this case study.

**Northeast River Valleys—Boundaries and Containers**

A central theme of Sanger’s two-population model is pre-contact socio-spatial organization among Native peoples of Maine and the Maritimes. In keeping with anthropological tradition in the region, the relationship between Indigenous peoples and the natural landscape figures prominently into the model. From Speck’s early ethnographic work among Northeast Algonquians to more recent archaeological inquiry, anthropologists have attempted to compartmentalize Indigenous groups spatially, temporally, and ethnically. Much of this work aimed to identify patterns of normative human behavior. Speck’s family hunting territory model is an early example of this, and it positioned Native peoples’ relationship to the natural world in ways that neglected the variability that accompanies agency and human choice.

Speck’s work in the northeast approached Algonquian socio-spatial organization on multiple scales. On a broad scale, he identified “two well-marked subdivisions” (Speck 1926:274) of Algonquian peoples within his “northeastern culture area” designation (Speck 1926:274). He distinguished northern groups from southern groups using the St. Lawrence River drainage as a boundary between the Wabanaki peoples of Maine and the Maritimes and Algonquian groups in
Labrador, Quebec, and Ontario. He noted cultural distinctions between these groups as well (Speck 1926).

On a more localized scale, Speck referenced geographic features such as rivers, lakes, and ridges as territorial boundaries between familial hunting spaces (Speck 1915, 1926). Denoting boundaries by way of natural features supported Speck’s supposition that family hunting territories represent a form of land tenure and ownership among hunting and gathering societies. It also positioned these features as social divides rather than social unifiers, thereby masking and neglecting the multitude of ways natural features and settings factor into the human experience.

Speck’s (1915, 1927, 1940) published accounts of family hunting territories included maps to document boundaries as well as descriptions of boundary management strategies such as demarcation practices for territorial limits, trespass or boundary violation protocols, or messaging strategies delineating familial space. These accounts supported his position on Indigenous land tenure and ownership. For example, in reporting on the hunting territories of Temagami First Nation (Timagami) families in Ontario, Canada, Speck states: “The districts of these family groups are fairly definite, bounded by lakes and rivers, ridges, and often groves of certain trees, being exceedingly well known and respected by all the hunters, under a very strong sense of proprietorship” (Speck 1915:297). Similarly, Speck (1915:302) describes Micmac hunting districts as surrounding “lakes, ponds, or sections of rivers, few being at any distance from the water” (Speck 1915: 302). According to Speck (1915:303), MicMac families employed more relaxed boundary maintenance practices than what occurred among Algonquian groups farther north.

In support of his proposed territory model, Speck also cited linguistic descriptions of family hunting parcels as evidence of proprietary attitudes toward land and hunting parcels. He claimed Algonquian groups frequently referred to territorial parcels as “my district” or “my hunting ground” (Speck 1926). In this vein, he observed that Penobschts referred to their hunting
territories using the term “nzi ’bum” (my river) underscoring the significance of the Penobscot River within Penobscot world view (Speck 1915:8). In his ethnography *Penobscot Man*, Speck (1940, 1997) reaffirmed the group’s river-centric view of territory describing lands between river systems as “unclaimed stretches of wilderness” (Speck 1940:7, 1997) again positioning the Penobscot River as central to Penobscot territory. This notion of riverine alignment and terrestrial distance between groups eventually became central to Snow’s (1968, 1973, 1980) model of socio-spatial organization among Wabanaki groups.

Building on Speck’s work, Snow (1968; 1980) reaffirmed population distinctions between groups north and south of the St. Lawrence and also formalized the concept of riverine alignment among Wabanaki peoples and other Indigenous groups throughout New England.

Taking his interpretation of Wabanaki socio-spatial organization a step further than Speck, Snow extended the river-based socio-spatial pattern into the pre-contact past.

In an early publication on the topic of hunting territories, Snow (1968:1143) proposed that territoriality among Wabanaki peoples of the Maritime Provinces and northern New England differed from that of other Algonquian groups—specifically emphasizing the centrality of river systems within Wabanaki culture. Whereas terrestrial spaces bounded by rivers, streams, and tributaries formed hunting territories among Algonquian groups north of the St. Lawrence River, Wabanaki groups such as the Penobscot, Passamaquoddy, MicMac, and Maliseet aligned their hunting territories with waterways “such that lakes and streams were at the nucleus rather than the periphery of each of them” (Snow 1968: 1146-1147). Snow (1980:2) likened river systems within Wabanaki homelands as “geographic containers of prehistoric communities” contrasting them with “buffer” space between rivers. Snow (1980:2) referred to this buffer as “zwischenraum (space)”, a socio-geographical construct necessary for human survival and maintaining ethnic distinctions (See Bourque 1989) for a review of the river-centric model for the Northeast).

The differences between Algonquian groups north and south of the St. Lawrence River inspired Snow (1973; 1980) to develop a settlement model for Wabanaki peoples and other New
England groups that positioned river drainages as “territorial cores” (Snow 1973:79). He proposed that these groups segregated themselves “according to river systems whenever possible” (Snow 1973:79). Snow (1973:82) also identified social divisions within river systems stating that “upstream and downstream units” existed in some cases. In the case of Maine and New Brunswick, Snow (1973:83) identified distinctions in ecological adaptations—namely that some groups were “better adapted to hunting and gathering in marine contexts than others.” Distinctions in human adaptation to different ecological settings re-emerged later in Sanger’s (1982, 1996a, 1996b) coastal and interior archaeological model.

In summary, the role of rivers among Indigenous groups in the Northeast has inspired anthropological interpretation of Native American socio-spatial organization for decades. They have figured prominently in the anthropological quest for identifying socio-spatial settlement patterns, ethnicity, and social boundaries among Indigenous groups. However, the relationship between Indigenous peoples and rivers in the region is complex and is shaped by spiritual, economic, kinship and social values. To view them as territorial tools falls short in understanding the full scope of a river’s social meaning to Native peoples. Additionally, much of this research presented Indigenous behavior as bounded and normalized. As we will see below, Sanger’s model (1982, 1996a, 1996b), while still very general, challenged notions of territorial alignment with river valleys among Indigenous peoples living in pre-contact Maine.

‘Round and ‘Round We Go--Wabanaki Movement and Seasonal Cycles

[...] they only come to the islands, and that only during some months in summer for fish and game, of which there is a great quantity. They are a people who have no fixed abode [...]. For they spend the winter now in one place and now in another, according as they find the best hunting (Champlain 1907:28).

In the quote above, Samuel de Champlain’s (1907) account of seasonal movement among Wabanaki peoples at early European contact provides a narrative backdrop to the second anthropological theme addressed here--the interconnection between Wabanaki peoples, their homelands, and seasonal change. The relationship between Indigenous groups in the Northeast
and the Earth’s seasonal rhythms has attracted anthropological attention for decades and while
Champlain’s account hints at a flexibility to peoples’ travels, over time reconstructions of
Wabanaki transhumance amid seasonal cycles normalized their movements into a routine of
summer on the coast and winter on the interior.

Anthropological reconstructions of seasonal movement among Indigenous peoples in the
Northeast are based on interpretations of ethnohistoric, ethnographic, and archaeological data.
Speck (1926) viewed seasonal movement between ecosystems as characteristic of Algonquian
culture in general. He documented a coastal to interior seasonal transhumance among Algonquian
tribes living both north and south of the St. Lawrence River—a strategy he claimed was necessary
for game conservation (Speck 1926:288).

Speck (1915) detailed this pattern among Wabanaki groups. Referencing the MicMac
peoples of the Maritime Provinces and Newfoundland, he writes, “In the old days the families
ordinarily spent the summer in villages located near the seacoast, and retired in the fall to their
proper hunting claims, where they had temporary camps at convenient intervals” (Speck,
1915:303). He documented a similar strategy for Penobscots, again stating that “in the old days”
Penobscots gathered at various locations along the Penobscot River in the summer and moved to
interior family hunting camps in the winter taking advantage of both coastal and interior
resources at different times of the year (Speck 1940, 1997:34-35).

In his version of the Penobscot calendar system, Speck (1940; 1997) offers additional
support for coastal and interior movement referencing seasonal availability of animal and fish
resources, some of which are linked to coastal or interior settings. In Speck’s view, the Penobscot
calendar represented an aboriginal system (Speck 1940, 1997:262). When queried by graduate
student Leona Cope about whether or not this was the case, he rationalized that because “seasons
were mentioned in all myths” the Penobscot calendar was not derived from the Euro-American
calendar system (Speck 1916).
While the foregoing examples routinize Wabanaki behavior according to the seasons, Speck also acknowledges some variation in Penobscot settlement strategies. In *Penobscot Man*, he indicates that his interpretation of Penobscot seasonal movement should be understood as a “general outline” because families may alter their movement by spending more time in the interior or stay on the coast for extended periods (Speck 1940, 1997:26).

Speck acquired his data on seasonal hunting practices from Wabanaki elders living in the early 20th century and repeatedly used the phrase “the old days” as a temporal reference (Speck 1915, 1918, 1940, 1997). The temporal extent of “the old days” is unclear at times. However, Speck (1940; 1997:301) states in his Penobscot ethnography that his accounts of Penobscot life refer to a post-contact period—namely the latter half of the 19th century. He did not intend for them to be a “reconstruction of the prehistoric past” (Speck 1940; 1997:301; Sanger 1996:524, 1997:iii).

However, the coastal-interior transhumance pattern described by Speck (1915, 1940) resurfaced in Snow’s riverine model (Snow 1968, 1973, 1980). He proposed (based on historical sources) that Wabanaki peoples resided in “permanent villages” along salt-water estuaries with families dispersing seasonally to interior forests in the winter and coastal locations in the late spring and summer (Snow 1980:45). This, according to Snow (1980:46), was the seasonal routine documented by the Jesuit Pierre Biard in 1616, and unlike Speck, Snow projected the transhumance model of summer on the coast and winter on the interior into the pre-contact past (Snow 1980). Snow interpreted the interior to coastal settlement model as “substantially the same as that which had prevailed just before the arrival of the first European fishing boats” (Snow 1980:46).

Coincident with Snow’s (1980) riverine model, the coast to interior seasonal transhumance model (Snow 1980) emerged and became the accepted anthropological reconstruction of Wabanaki land use and socio-spatial organization in both pre-and post-contact contexts. Since then, the accumulation of archaeological data has rendered it inaccurate and too

The problem with the seasonal transhumance model (and normative models of human behavior in general) is that it masks the richness of the human experience and fails to acknowledge the fluidity of human decision-making. In the following excerpts from the Jesuit Relations (Thwaites 1896-1901) Father Sebastien Rasles documents less stringent accounts of human movement and decision-making among Wabanaki peoples living on the Kennebec River in Maine. In a letter to his nephew, Fr. Sebastien Rasles (Rasles 1722; Thwaits 1900:84) recites the following incident involving hostile English forces:

I had remained alone in the village with a small number of old men and feeble folk, while the rest of the Savages [sic] were at the hunt. That time appeared favorable to the enemy for surprising me; and, with this in view, they sent out a detachment of two hundred men. Two Young Abnakis, who were hunting on the Seashore, heard that the English had entered the river; they immediately turned their steps to that quarter, so as to observe the movements of the English. Having perceived them about ten leagues from the Village, these Savages [sic] outran them by crossing the country, that they might inform me, and help the old men, women, and children to retire in haste.

In another account written to his brother, Father Rasles (Rasles 1723; Thwaites 1900:132) indicates that it was not uncommon for him to accompany Wabanaki peoples on their travels from the mission at Norridgewock to the coast. He details the following as their seasonal routine in the early 18th century:

After the Assumption [August] they leave the Sea, and return to the village to gather their harvest. They have from it something to live upon, although in a very wretched way, until after All Saints’ Day, [November] when they return a second time to the Sea. At that season they have very good food. Besides large fish, shell-fish, and fruit, they find bustards, ducks, and all sorts of game, with which the Sea is covered at the place where they encamp — which is divided into a large number of small islands. The hunters who go out in the morning to hunt ducks and other kinds of game sometimes kill a score at a single shot. At the Purification, [February] — or, at the latest, on Ash Wednesday, [February-March] — they return to the Village; it is only the Hunters who separate from the people and go to hunt bears, elks, deer, and beavers.

The social context of these accounts is very different from that which would have existed prior to European contact. By this time, Native peoples in the region had experienced an upheaval in their social systems as a result of war, disease, trade, genocide and spiritual destruction. I
include these examples not as evidence for any particular mobility or settlement pattern among Wabanaki peoples but to illustrate the influence of human choice and decision-making on archaeological visibility. Within these accounts, Native people take multiple trips to the coast, remain in a location while others from their group move, return to a place to ensure the safety of others, move collectively and separately across the landscape, divide themselves between landforms, responsibilities, and ecological settings and take action circumstantially. All of these actions, which are guided by agency and choice, affect archaeological visibility. Hence, in our interpretations of archaeological resources we need to acknowledge the full spectrum of factors influencing decision-making in the past and not reduce people to overly simplistic, patterned living.

To summarize, this section presented an overview of what is commonly referred to as the “seasonal round” and includes examples of how the relationship between Wabanaki peoples and seasonal change has been portrayed and documented. As anthropological underpinnings to socio-spatial modeling in the Northeast, reconstructions of Wabanaki mobility by Speck and Snow have become part of the dominant narrative that informs and shapes archaeological research in Maine. In the following section, I discuss the alignment of socio-cultural constructs with distinct ecosystems--the final theme I interpret as foundational to Sanger’s two-population model.

**Notions of Us and Them: Coastal and Interior Population Distinctions**

Early 20th century anthropological interest in the social dichotomy between coastal and interior peoples occurred in studies in the Arctic with a particular focus on “Eskimo” (Innu) and “Indian” distinctions (Hatt 1916). Speck’s (1915; 1926) Algonquian research included elements in this same vein. Citing recognition of this phenomenon among the Montagnais-Naskapi, Speck (1926:276) observed, “Indians realize marked differences between the bands occupying the interior and those near the coasts. The former are called ‘people of the interior’ (Notchimiwlnuts), the latter ‘people of the sea’ (Winipegwilnuts)” (Speck 1926:276).
Referencing similar characteristics among Wabanaki groups, Speck (1915:300; 1940:209) describes coastal and interior families among Penobscots claiming that the Penobscot’s water famine story distinguishes family clans aligned with marine animals from those aligned with terrestrial animals. This, according to Speck, influenced familial alignment with coastal and interior territories. He writes, “…we find the Lobster and Crab families with territories restricted to lower Penobscot bay, and the Sculpin and Sturgeon families further up along the river. The former were notable as seafaring people and subsisted chiefly upon sea food” (Speck 1915:300-301).

In speaking of “down-river” Penobscots or “aquatic families,” Speck (1940, 1997:211) suggests that these families are remnants of people moving in from the west along the coast with some staying in the coastal regions and others dispersing inland— a model similar to one presented recently by Burke (2000) for New Brunswick. Speck (1940, 1997:211) suggests that: “Mythically, the aquatic families seem to be the oldest. This together with […] more sedentary life of these down-river families might indicate that the Penobscot drifted into their present habitat from southern New England, following the line of the coast and working their way up the large rivers toward the interior.”

Distinctions between coastal and interior languages were identified as well. Siebert’s (1943:406) research among Penobscot speakers indicates that descendants of families from the lower Penobscot River and Bay shared some grammatical characteristics with the coastally situated Passamaquoddies, whereas interior families “use the pure Abenaki tongue” — an inland dialect. Additionally, Siebert (1980:124) cites variation in inland and coastal dialect as a complicating factor in producing the Penobscot Dictionary.

Terminology within the Penobscot language distinguishing those who live coastally versus those who live inland exists and provides some acknowledgement of people living in different settings. Of note are the following Penobscot terms and their meanings: “sopék"ino,” which translates to “coast dweller,” “kpahkiwino,” which translates to “forest dweller,”
backwoodsman, inland indian” (retrieved from https://penobscot-dictionary.appspot.com/entry/December 2016).

The terms presented above lack linguistic context and should not be construed as evidence for a cultural division between coastal and interior populations. However, as elements of an indigenous language, they express an awareness of socio-spatial differences in coastal and interior peoples. As anthropological research advanced in the area, Snow (1978:137) also reported differences in coastal and interior groups citing language distinctions among upstream and downstream family groups within the Penobscot and Kennebec river drainages in Maine (see Kenyon 1986 for a review).

This concept of distinctions in populations inhabiting coastal and interior settings has received anthropological and archaeological support over time. As a socio-spatial model it has remained at a very general scale of archaeological inquiry. However, human identity is not neatly bounded and notions of “us and them” occur at multiple scales of social engagement.

For example, Sanger (1996a, 1996b, 2005) emphasized that his use of the term “populations” should not be construed as being ethnic groups. Rather, the term references groups with different ecological adaptations. Robinson (2009:17) states that, “the problem of interior and coastal groups is complicated, involving a variety of different relationships. [...] the suggestion that interior and coastal populations may have existed in the past does not suggest separate and exclusive use of those environments.”

While site seasonality data may indicate the presence of people at a certain place and time, it will not tell us who settled there and how families or groups shared the space, if at all.

In this section I have reviewed notions of population distinctions as they have been presented in regional anthropological literature. These reconstructions rely heavily on normative interpretations of human behavior. As Father Rasles’ account suggest, people are not predictable and while some lines of evidence point to distinctions in populations it is important to consider how human choice, agency, relationships, and social change factor into notions of “us and them.”
Summary

Previous anthropological research in the area gave rise to three broad themes that are relevant to the two-population model. These themes are presented here to demonstrate the anthropological foundations of the present research. Although these themes emerged nearly a century ago, they still resonate in archaeological attempts to reconstruct pre-contact lifeways in Maine. Addressing these themes archaeologically is a challenge. Social boundaries, linguistic distinctions, socio-spatial relationships between peoples and landscapes are not static--they are always in transition and under negotiation at multiple social, spatial, and temporal scales. In Maine, archaeological exploration of social dichotomies among peoples in the pre-contact past is still in its infancy. However, efforts to date have been instructive. The following section provides an overview of the two-population model from an archaeological perspective.

Archaeological Inquiries into the Two-Population Model

In the late 1960’s and early 1970’s archaeological research along Maine’s coastline challenged the validity of a pre-contact seasonal transhumance model that placed Native peoples on the coast in the summer and in the interior during the winter. Coastal research initiated by Sanger (1971, 1982, 1986) and Stewart (1974) in Passamaquoddy Bay and the St. Croix estuary produced indicators of cold weather occupation including identification of seasonally specific species of birds and fish and the presence of pre-contact semi-subterranean house forms which Sanger interpreted as cold-weather dwellings. Sanger’s research established a foundation for later archaeological inquiries directed towards understanding indigenous settlement and subsistence strategies within coastal and interior zones in Maine and the Maritimes.

Bourque (1971, 1973) undertook similar research in Penobscot Bay whereby he examined both archaeological and ethnohistoric data to identify settlement and subsistence patterns among aboriginal peoples living on Maine’s coast. Faunal data generated from excavations at three coastal sites led Bourque to conclude that occupation at these locations occurred in late winter to early spring, and contrary to the seasonal transhumance model.
advanced by Snow (Snow 1973, 1980), evidence for summer occupation of these coastal sites did not exist between ca. 200-1150 A.D. (Bourque 1973:3).

Bourque coupled his archaeological research with a review of ethnohistoric sources referencing aboriginal settlement and subsistence strategies. He examined European narratives written prior to 1620 with the rationale that these early accounts would be more representative of Wabanaki life before contact than later accounts (Bourque 1973:3). In his interpretation of these data, Bourque (1973) proposed that the aboriginal settlement pattern shifted following European contact and prior to that period, Indigenous peoples wintered on the coast and summered on the interior—a pattern opposite of that proposed by Snow as the pre-contact settlement pattern.

Building on Bourque’s research and his own research in Passamaquoddy Bay, Sanger continued to explore Indigenous settlement and subsistence strategies within Ceramic Period contexts. He eventually proposed the two-population model challenging earlier models of pre-contact Indigenous settlement patterns (Sanger 1996a, 1996b). Sanger’s coastal research (1982, 1988, 1996a, 1996b) inspired a suite of graduate student theses designed to address material culture patterning, site seasonality, and pre-contact settlement patterns during the Ceramic Period (Belcher 1988; Carlson 1986; Chase 1988; Kellogg 1982, 1991; Mack 1994; Newsom 1999; Skinas 1987; Sommer 1997; Thomas 1995). These studies created a rich data set for interpreting how past peoples organized themselves on the landscape providing additional evidence contributing to the two-population question.

In more recent years, Sanger (2003) examined ethnohistoric and ethnographic evidence linked to Indigenous cosmology and bone disposal to inform the two-population model. He found that bone disposal practices among the Native people of Maine and the Maritimes indicate that proper disposal of beaver bone required burning or return of bone to the animal’s natural habitat to ensure a respectful and continuing human-prey relationship (Sanger 2003). Sanger (2003) examined archaeological faunal data to determine whether bone disposal practices during pre-contact times resonated with the ethnographic and ethnohistoric data. He concluded that coastal
inhabitants did not employ the practice of returning bones to their natural habitat, nor was burning bones a prevalent practice (Sanger 2003). However, interior sites showed a frequent association between bone and “fire-related features” (Sanger 2003:11) suggesting deliberate burning. Sanger’s (2003:13) findings prompted him to identify a “cosmological asymmetry” in the treatment of animal bone disposal among people living in coastal and interior settings supporting a model of distinct coastal and interior populations.

Perhaps some of the most compelling archaeological data supporting Sanger’s two-population model is the patterned distinction in cordage twist evident in surface treatments on aboriginal ceramics. In an overview of Early Woodland period ceramics and fiber perishables, Petersen and Hamilton (1984) identified spatial patterns in cordage twist based on impressions on ceramic vessels from the Northeast. They observed that fiber perishables attributable to “Adena” contexts showed a preference for “S” twist cordage (Petersen and Hamilton 1984:430). As an archaeological construct, the Adena complex delineates an Early Woodland mound-building culture originating in the Ohio Valley (Neusius and Gross 2014). Petersen and Hamilton (1984:430) report a dominance of “S” twist cordage in fiber perishables in interior Maine during the Early Woodland period as well. They contrast this to a preference for “Z” twist cordage in fiber perishables from coastal contexts. The pattern re-occurred in the Middle Woodland period leading Petersen and Hamilton (1984) to suggest “long term, in situ continuities at both coastal and interior locales in Maine” (Petersen and Hamilton 1984:436).

Robinson (1996a) indicates that the coastal and interior trends in cordage twist are cross-cut by patterns in stone tool technology that occur at different spatial scales. Social boundaries may be differentially visible in distinct classes of material culture. This is an important reminder of the complexity of social boundaries and material culture patterning. Trends in cordage twist patterns are valuable for archaeological inquiry so long as we recognize the tendency for them to direct our analyses in ways that might limit what we see as archaeologists.
In recent years, researchers examining fiber perishables in the Northeast have advanced this area of study significantly (see Drooker 2004). However, recent directed studies of these potentially important social signatures in Maine have been less forthcoming. Petersen and Wolford (2000:108) state that spin and twist associated with fiber perishables are not an “absolutely reliable marker of ethnicity in and of themselves.” However, when distinctions in spin and twist align with spatial boundaries, they generally carry social meaning (Petersen and Wolford 2000:114–115).

In Maine, the dichotomy between coastal and interior cordage twist fades in Ceramic Period 5 (ca. 950-650 14C yrs B.P.) and “Z” twist cordage dominates both interior and coastal ceramic assemblages (Petersen et. al 1984:10). The coastal-interior pattern reappears just prior to European contact (Petersen et.al 1984).

Supporting evidence for the two-population model continues to emerge through various studies. Betts and his colleagues (2016) note that in addition to supporting evidence in Maine, support for this model has emerged in the Canadian Maritimes as well. Regionally, more refined models of socio-spatial organization are taking shape. In the next section I survey the regional landscape of archaeological research directed toward deciphering the complexities of socio-spatial organization among Indigenous people in the pre-contact Northeast.

**Northeast Models of Pre-Contact Socio-Spatial Organization**

Research focusing on socio-spatial patterning among pre-contact Indigenous groups has occurred in areas adjacent to Maine and although studies designed specifically to address the models advanced by Sanger (1996a, 1996b) and Snow (1980) have been limited, research on Ceramic Period socio-spatial organization in the Northeast has been insightful (Black 2002; Bourgeois 1999; Godfrey-Smith et al. 1997; Boulanger and Hill 2015; Burke 2000; Chilton 1996, 1998, 1999a; Deal et al. 1991; Dincauze 1975a; Doyle et al. 1982; Goodby 1998; Kenyon 1983, 1986; Luedtke 1986; Petersen and Hamilton 1984; Petersen 1996; Pretola 2000, 2002). Several of these studies have generated localized models to explain how Native peoples organized
themselves on the landscape at different times during the Ceramic Period. In some regions, ceramic data are at the core of these explorations, where in other regions archaeologists have relied heavily on other lines of evidence. Taken collectively, these studies show an increasing sophistication in archaeological interpretations of socio-spatial organization during the Ceramic Period in the Northeast. In the following sections I review several regional studies that offer models of socio-spatial organization during the Ceramic Period in the Northeast. This review is not intended to be all-inclusive. The studies reviewed here were selected based on their regional, methodological and topical similarities to the present research. I organize the following discussion by major Northeast river valley beginning with the Connecticut and Merrimack Rivers west of Maine, then moving to the St. Croix and St. John Rivers in Eastern Canada. This is followed by a discussion of previous Ceramic Period research on the Penobscot River and Penobscot Bay. I conclude this chapter with an exploration of the two-population model through the lens of Penobscot oral narratives.

A note on terminology bares mentioning here. Ceramic Period, Woodland Period, and Maritime Woodland Period are regionally-specific terms applied to the same chronological unit—roughly the 3000 years prior to European contact. In the following discussion, I use terminology most-commonly used in the region being discussed.

**Aboriginal Ceramics Research in the Connecticut and Merrimack River Valleys**

Studies of aboriginal ceramics in New England states west of Maine are not often drawn upon for regional comparisons by Maine archaeologists. Traditionally, the Kennebec River has been interpreted archaeologically as a social boundary. This perceived boundary is evident in Champlain’s (1907) narratives and has also been documented through archaeological interpretations of material culture distributions (Robinson 1996a; Sanger 2005). As a result, archaeologists in central and eastern Maine have typically situated their studies within the context of the Maine/Maritimes, Maritime Peninsula, Far Northeast, or the Northern Gulf of Maine region. In the following review, I abandon this practice and explore studies informing socio-
spatial organization among Indigenous groups both east and west of Maine. While it may be true that groups practiced different subsistence strategies east and west of the Kennebec, interaction among families and shared philosophies on how to engage with the land and waters cannot be discounted. Additionally, regional similarities in ceramics and languages carry social meaning that warrants exploration. I begin this overview with a discussion of ceramics research in the Connecticut River valley.

**The Connecticut River Valley**

The Connecticut River originates at the Fourth Connecticut Lake on the New Hampshire/Canada border. Its path follows the geographic boundary between New Hampshire and Vermont, then cuts through Massachusetts and Connecticut and finally drains into Long Island Sound near Old Lyme, Connecticut. This river system has served human populations for millennia and it shares many similarities with the Penobscot River in this regard. Like the Penobscot, transportation, trade, fishing, logging and hydroelectric activities are significant in the River’s culture history.

Early research on Connecticut River Valley ceramics focused on defining ceramic traditions. Rouse (1940, 1945, 1947) and Smith (1947, 1950), established ceramic chronologies in Connecticut and coastal New York and these typologies were applied to aboriginal ceramics elsewhere in the region. These typologies have been assessed in recent decades by those who both support and reject them (Chilton 1996, 1999c; Goodby 1998; Lavin 1986, 1987; Lizee 1994). Chilton (1996, 1999a) asserts that typologies established for Connecticut and New York are often applied to interior regions of New England under the premise that local populations were influenced by groups from the south and west (Chilton 1999c). Additionally, typological classifications in the region have been equated with cultural groups—namely Iroquoian and Algonquian peoples. This practice has garnered criticism from regional ceramics researchers (Chilton 1991, 1996, 1998, Chilton 1999a; Dincauze 1975; Lizee 1994; Luedtke 1986, Pretola 1999).
Recent studies on ceramic assemblages from the Connecticut River Valley have advanced our understanding of past Native American social dynamics and settlement patterns and much of this work has focused on the Late Woodland and Contact periods. In her study comparing technical choices within and between Iroquois and Algonquian ceramics, Chilton (1996, 1998, 1999a) compared Late Woodland pottery from the Connecticut River and Mohawk River valleys in Massachusetts and New York, respectively. This research not only challenged regional typologies but also showed that pots made by Algonquian peoples reflected their social context when compared to pots made by Iroquoian potters (Chilton 1996; 1998; 1999a). The social context of Late Woodland Algonquian potters was one of mobile farmers who organized themselves into multiple loosely related groups with fluid social boundaries moving seasonally within their homelands (Chilton 1996, 1998, 1999a). Chilton’s interpretation acknowledges not only internal variation and diversity in ceramics as products of Algonquian social organization, but also the fluid nature of human choice in both settlement strategies and material culture.

In a related study, Pretola (2000, 2002) compared ceramics from Eastern New York and Southwestern New England also focusing on “Iroquoian” and “Algonquian” pottery distinctions from Late Woodland and contact period sites (ca. 1000-350 14C yrs B.P.). Pretola’s approach was designed to identify Iroquoian traits in Algonquian pots (Pretola 2002:203). Similar to Chilton, Pretola approached his study using a technological choice framework within which he focused on ceramic petrography and construction techniques. He compared aboriginal ceramics from four Northeast river valleys, including the Connecticut River Valley and he showed that while Algonquian potters in the Connecticut River valley incorporated decorative and morphological traits generally classified as Iroquoian into their ceramics, their construction techniques and material choices were local in character and did not mimic Iroquoian practices (Pretola 2002). This finding challenged assumptions of “unilateral diffusion and trade” of ceramic traits from New York (Pretola 2002:204).
Pretola (2000) acknowledges some general similarities in ceramic traits across New England. However, he points out that forms and styles “are often recombined in geographically specific ways that defy typological classifications” (Pretola 2000:180). Consistent with Chilton’s (1996, 1998) findings for the Connecticut River Valley, Pretola’s study revealed ceramic diversity with respect to material choice, decoration, and vessel lot morphology in his Southern New England sample (Pretola 2002:203).

Building on ceramic studies by Chilton (1996, 1998, 1999a, 1999b, 1999c) and Pretola (2000, 2002), Boulanger and Hill (2015) conducted a petrographic study of Contact period ceramics from the Fort Hill site in Hinsdale, New Hampshire. Boulanger and Hill (2015) identified differences in technological choices made by potters at Fort Hill and those to the south studied by Pretola (2000, 2002). In contrast to the stable practice of coil construction evident in assemblages examined by Pretola (2000), Boulanger and Hill (2015) found that potters at Fort Hill employed both slab construction and coil construction, with slab construction being the predominant choice among potters at the site. Stability in choices related to rim formation also was identified by Pretola (2000; 2002), whereas the assemblage from Fort Hill revealed three methods of rim formation techniques (Boulanger and Hill 2015).

Boulanger and Hill (2015:530) attribute the diversity of technological choices at Fort Hill to a “social fluidity” among Native groups living during the Late Woodland/Early Contact time period. Social upheaval resulting from the effects of European colonization created a situation where Native potters reorganized and realigned themselves socially and on the landscape. Boulanger and Hill (2015:530) conclude that “the greater variability in ceramic recipes and production techniques aligns well with expectations of a disruption of learning and tradition maintenance resulting from coalescence of individuals from disparate ceramic production traditions” (Boulanger and Hill 2015:530).

Studies of Late Woodland and Contact period ceramics from the Connecticut River Valley have the advantage of ethnohistoric sources informing archaeological interpretations.
(albeit generally from non-Indigenous perspectives). Understanding where Algonquian and Iroquoian peoples settled and having the ability to connect people, places, and pots creates an ideal setting for comparing pottery characteristics among different groups of potters. The studies reviewed here from the Connecticut River Valley provide solid evidence for fluid social boundaries among Indigenous peoples and support the value of technological choice as a methodological approach. When we explore pottery manufacturing choices in deeper time, things become more challenging. We lose the ethnohistoric literature and must rely on material remains and Indigenous oral narratives and testimony to interpret potters’ choices. This latter category of information has been ignored in ceramic studies in the Northeast. However, archaeologists conducting ceramics research in the Merrimack River Valley have explored socio-spatial organization by way of material culture patterning in their analysis of older ceramic assemblages. A selection of these studies is discussed in the following section.

**The Merrimack River Valley**

The Merrimack River flows through the present-day states of New Hampshire and Massachusetts. It begins at the confluence of the Winnipesaukee and Pemigewasset rivers in Franklin, NH and flows into the Atlantic Ocean at Newburyport, MA. While shorter than the Connecticut River, it likely served as an important travel route for Indigenous peoples moving between coastal and interior New England.

One of the first professional archaeologists to visit the Merrimack River Valley was Warren K. Moorehead (Moorehead 1931; Kenyon 1983). In April of 1930, Moorehead and his crew embarked on the “Merrimack Expedition”—an early survey of sites within and collections from the Merrimack River Valley. Moorehead (1931) published on this effort the following year but his descriptions of pottery from the region were sparse. Moorehead’s (1931) survey and subsequent archaeological research by others indicates that occupation of the Merrimack River Valley spans the pre-contact period (Kenyon 1983, 1986; Moorehead 1931; Spiess and Bradley 1996).
Archaeological research within the Merrimack River Valley in the late 20th century has offered more detailed ceramic data than that provided by Moorehead (1931). In particular, Kenyon’s (1983; 1986) research on archaeological ceramics from multiple sites within the Merrimack drainage was instrumental in shifting ceramic studies away from strict typological classifications and advancing our understanding of socio-spatial patterning of technological attributes in the region.

Kenyon (1983; 1986) designed her research to test Snow’s (1980) “riverine model” through a comparative analysis of Middle Woodland ceramics. Kenyon identified similarities and differences in ceramic attributes from distinct physiographic zones in the Merrimack River valley and she conducted her research under the premise that “…cultural traditions, in the form of interaction groups, can be recognized through assessment of artefactual similarity” (Kenyon 1986:24). In some ways, Kenyon’s (1983; 1986) study was consistent with normative approaches that seek to identify patterned similarities in material culture, yet her focus on attributes as opposed to types challenged typological methodologies commonly applied in regional ceramic studies.

Kenyon’s (1983; 1986) study revealed regional distinctions in technological choices made by potters. For example, she showed that inclusions in ceramic fabrics from the lower regions of the Merrimack River valley differed from the upper regions. She also identified upper and lower river valley distinctions in the percentage of inclusions in ceramic pastes, in design motifs and in design execution (Kenyon 1986:29). Kenyon interpreted these patterns as evidence for a “strong separation of Upper and Lower Valley ceramics” (Kenyon 1986:31). In terms of socio-spatial patterns among potters living during the Middle Woodland period, Kenyon (1986:33) concluded that:

Interaction probably occurred along the entire course of the river but only in a limited way. In the northern reaches of the valley, the drainage boundaries also appear to serve as containers for social interactions. This is revealed by similarity of ceramics found at tributary sites to ceramics found at sites on the main stem of the river. However, interactions do not appear to be contained within the drainage in the southern reaches of
the valley […] interaction arenas may have crossed drainage bounds and the cultural focus was not necessarily centered on the river itself.

In an effort similar to that of Kenyon, Luedtke (1986) compared ceramic attributes from multiple sites situated within the Massachusetts coastal zone. Luedtke (1986:114) included the ceramic assemblage from the Shattuck Farm site from the lower Merrimack River as part this study. With the goal of identifying “constant or similar” attributes in aboriginal ceramics, Luedtke (1986) compared Shattuck Farm ceramics to ceramics from island sites in Boston Harbor and sites on Nantucket Island (Luedtke 1986:114).

In terms of spatial patterns, Luedtke's (1986) findings suggested regional differences within the Massachusetts coastal zone. For example, she identified clinal trends in vessel lot thickness and rim form from north to south (Luedtke 1986:127). She interpreted regional variation in ceramic attributes as evidence of "ceramic micro-traditions " (Luedtke 1986:131). Localized pockets of ceramic traits were evident in Kenyon's (1986) study of the Merrimack River valley as well.

Based on her research, Luedtke (1986:132) proposed that archaeological ceramics as cultural indicators can reveal “macro-trends relevant to areas as large as the Northeast, and micro-traditions relevant only to individual river valleys.” Although this study was limited by small sample sizes and an under-developed ceramic chronology for the region at the time, it represents an exploration of socio-spatial organization among Native peoples based on technological choices made during the production of aboriginal ceramics. As such, this study and the other Connecticut River and Merrimack River valley studies presented here have advanced ceramics studies in the Northeast in remarkable ways—most notably in their use of Northeast ceramics as foundational to socio-spatial model development.

In the following sections I review Ceramic Period research east of the Penobscot River Valley focusing on the St. Croix and St. John River valleys (Figure 2). Like those Woodland
period archaeological studies west of the Penobscot River valley, these studies have also contributed to socio-spatial models in the Northeast.

**Aboriginal Ceramics Research in the St. Croix and St. John Rivers**

Archaeological studies contextualizing Maine’s pre-contact peoples with those to the east have been more common than with those to the west. Similarities in material culture, subsistence practices, mortuary behavior, and settlement strategies between Maine’s Indigenous groups and those occupying Maritime Canada suggest strong cultural connections. This has prompted similarities in archaeological models and approaches. This section reviews archaeological research east of the Penobscot River focusing on Maritime Woodland peoples living along the St. Croix and St. John Rivers.

**The St Croix River Valley**

The St. Croix River is situated on the eastern U.S. border between Maine and New Brunswick, Canada. It originates at the Chiputneticook Lakes in western New Brunswick and enters the Atlantic Ocean at Passamaquoddy Bay near St. Andrews. This area is the ancestral and contemporary homeland to the Passamaquoddy people.

Archaeological research in the St. Croix River valley has a lengthy history beginning in the 18th century (Sanger 1986). The earliest archaeological explorations in the area focused on the French settlement at St. Croix Island and were prompted by border disputes between the United States and Great Britain following the signing of the Treaty of Paris in 1783 (Sanger 1986:140; Tallman and Tallman 1972:69).

Subsequent archaeological efforts occurred in the area during the late 19th century. Of note with regards to aboriginal ceramics research is Mathew’s (1884) excavations at Phil’s Beach on the Bocabec River. Mathew’s (1884:14-18) narrative on pottery from the site was quite detailed for the time and included a description of the physical traits of the pottery as well as inferences about clay sources, gender roles, vessel lot thickness, pottery-making tools and social patterning in ceramic decoration. In comparing pottery from Phil’s Beach to sherds recovered
from Maquapet Lake in the New Brunswick interior, Mathew offers some early speculations about population distinctions between interior and coastal groups. He writes, “some of the patterns on the fragments of pottery from Bocabec are very much like those […] of Maquapet Lake, but the designs are not so elaborate; yet there appears to have been much in common between the men of the river and those of the sea shore, in this art as well as others” Mathew (1884:18).

Comparative ceramic studies such as those conducted within the Merrimack and Connecticut River valleys have yet to be undertaken in the St. Croix River valley. However, studies of ceramics from sites in Nova Scotia and the St. John River valley have occurred and cover a greater breadth of topics with regard to archaeological ceramics than what has occurred in Maine (Bourgeois 1999; Deal and Silk 1988; Deal et al. 1991; Godfrey-Smith et al. 1997; Kristmanson 1992; Kristmanson and Deal 1993; Stapelfeldt 2009).

In the St. Croix region, archaeological research on coastal and interior population distinctions has been quite extensive, particularly in the Passamaquoddy Bay area (Black 1992, 2002; Sanger 1982, 1986, 1987). These studies focused heavily on settlement, subsistence and seasonality data. Comparative studies of aboriginal ceramics from the St. Croix River drainage have not been undertaken to address socio-spatial patterning to the same extent as has other types of data.

In addition to Sanger’s Passamaquoddy Bay research discussed previously, Black’s (1987, 1991, 1992) Canadian research program in the Passamaquoddy Bay region also focused on socio-spatial organization during the Maritime Woodland. Based on this research, Black (2002) synthesizes subsistence and settlement data from 16 Maritime Woodland sites situated along the mainland as well as on islands in Passamaquoddy Bay. In terms of socio-spatial organization, Black (1992, 2002) generally supports the two-population model and suggests that over time, Native people living in the Quoddy region transitioned from a “forager” model to a “collector” model as defined by Binford (1980:5-10) with this transition occurring between the Middle and
Late Maritime Woodland periods. In this scenario, the settlement pattern among Indigenous peoples:

[…] shifted from a pattern of residential mobility among warm and cold season-occupied—and perhaps year-round occupied—sites at both insular and mainland locations to one of residential mobility between warm season-occupied insular sites and cold season-occupied mainland sites (Black 2002:313).

Although comparative studies of archaeological ceramics have not been undertaken to assess the two-population model in the St. Croix drainage, the research by Sanger and Black has offered abundant seasonality data that challenge the seasonal transhumance model (Snow 1980). A comparative ceramic study would enhance these findings.

**The St. John River Valley**

Three branches of the St. John River in Northern Maine/Southern Quebec form its headwaters and this river lies within the ancestral homeland of the Wolastoqiyik or Maliseet First Nations people, an Indigenous group whose homelands transect the Maine and Canada borders. Blair characterizes archaeological research in the lower Saint John River as “spasms of research” with peaks in research occurring at different times since the 1880’s (Blair 2004:19).

Research on archaeological ceramics from the St. John River valley has been limited. Bourgeois (1999) analyzed ceramics from 14 sites along the St. John River to develop a ceramic chronology for the St. John River valley and compare the sequence to the Petersen and Sanger (1991) chronology. Based on this study, Bourgeois (1999) proposed refinements to the Petersen and Sanger (1991) chronology for the St. John River valley. For example, Bourgeois identified subdivisions within Ceramic Period 2 specific to the St. John River valley. He also offered some interpretations of social boundaries in the region and made connections between ceramic data and linguistic data. He writes:

Early ceramics in the Maritimes (ca. 2500-1850 B.P.) were relatively homogeneous. However, a stylistic discontinuity beginning after ca. 1850 BP suggests the development of a social boundary between two linguistic groups [Mi’kmaq and Maliseet]. Once established, this boundary seems to have persisted with minor fluctuation throughout the last 1300 years of the ceramic period (Bourgeois 1999:78).
In the interior of the St. John River valley, Burke’s (2000) study of Ceramic Period lithic technology combined archaeology with ethnohistory and cultural ecology to reconstruct settlement and subsistence strategies among peoples living on the interior of the Maritime Peninsula. Burke (2000) explored Ceramic Period social organization using three lithic quarry sources within the region as the basis for examining lithic procurement and exchange and production of stone tools. He approached the study defining “the interior of the Maritime Peninsula as an archaeological cultural geographic area,” Burke (2000:iii). Based on this research Burke (2000) offered some preliminary conclusions about Ceramic Period settlement on the Maritime Peninsula. Namely, he reaffirmed Sanger’s two-population model and proposed a “gradual process of divergence between these two populations” (Burke 2000:339) based on differing adaptive strategies. Burke’s (2000:339) research suggests spatial distinctions in Wabanaki groups with coastal groups becoming more sedentary over time while interior groups continued to engage in a highly mobile family-based lifestyle focused on hunting, gathering, and fishing.

**Aboriginal Ceramics Research in the Penobscot River Valley**

The Penobscot River valley is the focal point of the present study. This section reviews a selection of archaeological ceramics research in both interior and coastal settings within the Penobscot River valley. Although archaeological research on aboriginal ceramics is sparse when compared to some other topics, those studies that do focus on ceramics have been fruitful in contributing to a regional ceramics data set.

Archaeological inquiries of pre-contact aboriginal sites along the Penobscot River have occurred since the late 19th century. Much of the early focus was directed toward Native American mortuary practices—in particular the red ochre burials of the Archaic period. It was this early interest in graves that prompted Willoughby (1898) to publish on excavations of Native American burial sites at two locations near the mouth of the Penobscot River at Orland and Bucksport, Maine. These excavations were supported by Harvard University and the institution
included the collection from Orland in their exhibit at the World’s Columbian Exposition in Chicago in 1893 as an example of the Peabody Museum’s archaeological research methods (Willoughby 1898:387).

Subsequently, Moorehead’s (1922) archaeological expeditions in Maine included excavations throughout the Penobscot River valley. Like Willoughby, Moorehead’s efforts emphasized excavations of red ochre graves. Reference to aboriginal ceramics in Moorehead’s (1922) publication on Maine archaeology is superficial at best.

**Aboriginal Ceramics Research in Interior Settings of the Penobscot River Valley**

Walter B. Smith was a geologist in Maine with an interest in Maine archaeology. He assisted Moorehead on occasion with field work and also presented and published on archaeological topics. His early paper on pottery recovered from the Penobscot River Valley was more detailed than Moorehead’s (1922) accounts (Smith 1926). Smith’s (1926) ceramics descriptions included reconstructions of several vessel lots and his illustrations and photographs suggest pots representative of the Middle Ceramic Period. His observations were particularly insightful for the time. Smith (1926) made note of cooking residues on several sherds and speculated that Native people used pots to boil sap into maple syrup. He also made reference to drying time, the use of surface treatments as an aid for gripping the pots, and gender.

Drawing on his geology background, Smith (1926:19) identified quartz, micas, and feldspars in the clay matrix and surmised that Native people were using crushed granite as a tempering agent (Smith 1926:19). His descriptions of Penobscot River ceramics also emphasized morphology and he compared the shape of ceramic vessel lots to that of a “large hornet’s nest with the top cut off” (Smith 1926:27) and with openings ranging from 10” in diameter to a “little over an inch across” (1926:26, 28).

Smith’s (1926:29) appreciation of aboriginal pottery is evident in this paper. Consistent with anthropological thinking of the time, Smith (1926:29) views pottery-making as a stage of
cultural advancement and he remarks that “it illustrates their striving to create beauty of form, to
give expression to art instincts…my profound respects to the work of their hands!”

More recent Ceramic Period research within the Penobscot River valley has been driven
largely by cultural resources management studies. Research informing the two-population model
has been the by-product of comprehensive site reports often taking the form of localized studies
designed to build a comparative data set for broad regional comparisons (Mack 1994; Mack et al.

As part of a report on the Bob Site (Mack et al. 2002), a multi-component site located on
the Penobscot River in interior Maine, Mack et al. (2002) analyzed 41 vessel lots-- the majority of
which dated to the Early and Middle Ceramic Periods (ca. 3050-950 14C yrs B.P.). This analysis
was largely descriptive and guided by the Petersen and Sanger (1991) ceramic chronology.
Analysis of cordage twist impressions on ceramic vessel lots from the Bob site indicate a
preference for “S” twist during the Early Ceramic Period and “Z” twist during the Late Ceramic
Period (Mack et al. 2002:78). This is consistent with the pattern described by Petersen and

Although seasonality data are inconclusive (Mack et al. 2002:86) due to the fragmentary
nature of the faunal and floral data from the Bob site, notable is the presence of hazelnut in an
Early Ceramic Period feature dating to ca. 2300 14C yrs B.P. (Mack et al. 2002:86) which hints at
a fall presence on the interior. Additionally, ceramic manufacturing scraps recovered from the site
suggest a non-winter occupation of the site (Mack et al. 2002:94).

The level of ceramic analysis conducted on the Bob site assemblage is exceptional when
compared to most published reports from Maine, and some localized comparative observations
are made between the Bob site and other sites in its vicinity. This includes a reference to the
presence of quartz temper in CP1 and CP2 vessel lots at the Bob site as well as at sites in close
proximity to it (Mack et al. 2002: 92).
In a comparative study of Ceramic Period assemblages from the Penobscot River valley, I examined pottery attributes from riverine sites at Howland and Old Town, Maine. The sites at Howland are situated on the Piscataquis River—a major east-west artery of the Penobscot River. The sites selected for comparative data are situated on Pushaw Stream—a small stream that branches off the Penobscot River near Old Town, Maine. The comparative assessment of my study focused on ceramic attributes and was designed to identify similarities and differences in ceramics at the two locations. This research was conducted within a social interaction theoretical framework (Deetz 1965; Longacre 1964; Whallon 1968).

I observed several notable differences between the two assemblages. For example, surface treatments on vessel lots from the two areas differed. Specifically, exterior surface treatments (smooth, scraped, channeled, etc.) within the sample from Old Town sites were consistently smooth from CP2 to CP4 (Newsom 1999). In contrast, exterior surface treatments on ceramics from the Howland sites showed a preference for smoothed exterior surfaces but other forms of surface treatment such as scraping and channeling were also present (Newsom 1999:220-221). Also, inter-site variation in decorative application was present within the Howland sample (Newsom 1999:221), whereas inter-site similarity in ceramic design patterns occurred at the Old Town sites.

I interpreted these findings as indicative of multiple bands or family groups using the Piscataquis River and Howland sites for east-west travel (Newsom 1999:217). In contrast, the small stream location of the Old Town sites may have been an area used through time by closely related kin groups (Newsom 1999:221). Sample sizes were too small to support these interpretations with any confidence. However, this effort was an attempt to explain Native American land use and settlement patterns based on similarity and variation in ceramic attributes. Today, the theoretical tools we have available to us to frame such a study are more sophisticated and the present study employs different theoretical tools to build upon this early research.
Aboriginal Ceramics Research in Penobscot Bay

Published studies on archaeological ceramics from Penobscot Bay are few despite the fact that Ceramic Period sites are quite abundant and preservation of archaeological ceramics in coastal shell middens is often exceptional when compared to interior ceramic assemblages. Much of the Ceramic Period research on archaeological sites in Penobscot Bay has been directed toward site reports, geoarchaeology, and settlement and seasonality studies (Belcher 1988, 1989, 1994; Bourque 1971, 1973; Bourque and Cox 1981; Sanger and Kellogg 1989; Spiess and Hedden 1983). These Penobscot Bay studies have been informative and have shaped interpretations of socio-spatial organization for pre-contact coastal Maine. However, research on aboriginal ceramics has not figured prominently in archaeological research in Penobscot Bay.

One noteworthy ceramics study is Mack’s (1994) comparative analysis of pottery from three different sites in the littoral zone. This study is relevant here because she included ceramics from the Knox site in Penobscot Bay as part her analysis. She also included ceramics from the Todd site in Muscongus Bay and the Great Spruce Island in Chandler Bay (Figure 1). In an effort to understand socio-spatial organization among Indigenous groups living on the Maine coast, Mack (1994) used an attribute analysis methodology combined with the Petersen and Sanger (1991) chronological framework to guide her research. She made several noteworthy observations of similarities and differences between the assemblages for the CP2 time period. For example, she observed that castellated vessel lots were evident only in the Todd Site sample and channeling only occurs in the Knox site assemblage (Mack 1994:267). The Great Spruce island assemblage was unique in that none of the vessel lots displayed interior decoration near the rim—a characteristic evident in the other two assemblages. Morphologically, the three assemblages displayed strong similarities in average vessel wall thickness, rim form, and dentate tooth sizes (Mack 1994:267). The study was an appendix to Mack’s dissertation and not the primary focus of her thesis. Although the analysis was largely exploratory in nature and her findings were
inconclusive in identifying social boundaries, it marks an initial effort to identify social units using an attribute analysis on ceramics from Maine’s coastal region.

In a recent paper by Betts and his colleagues (2016), the authors draw several conclusions based on a review of seasonality and subsistence dates in the Northern Gulf of Maine. They write:

The evidence suggests that small groups of relatively mobile hunter-gatherers inhabited the interior of the watershed through the terminal Late Archaic and Maritime Woodland periods, and perhaps earlier; larger groups of more sedentary hunter-gatherers inhabited the coastal zone from the Late Archaic through the Maritime Woodland Period, and probably earlier (Betts et al. 2016:30).

Betts and his colleagues (2016:31) also suggest that during the Middle Maritime Woodland at ca. 1300 $^{14}$C yrs B.P., subsistence practices in coastal settings appear to change. They report that evidence of marine fish, birds and clams at coastal sites decline while evidence of seals and cervids increases (Betts et al. 2016:31). This transition occurs during CP4 (ca. 1350-950 $^{14}$C yrs B.P.)—a time when we begin to see an increase in the use of shell temper in aboriginal ceramics. The interconnections between a perceived subsistence change and changes in aboriginal ceramics during the Middle Maritime Woodland Period warrant closer examination.

In formulating their settlement and subsistence model for the Northern Gulf of Maine, Betts et al. (2016) draw upon Nash’s (1984:225) “mosaic” settlement and subsistence model in which he proposed that for Native peoples living in the Northeast:

[...] adaptation to resource variability within a framework of several ecological gates and cultural switches yields a mosaic of maritime adaptations—each a local expression of a flexible and generalized economic strategy which can be applied anywhere yielding only a different ratio of land/sea foods.

This socio-spatial model is tied to human response to environmental changes. However, it is not one that conveys an overly rigid Indigenous lifestyle. In fact, it acknowledges flexibility in human behavior with regard to resource availability. I would supplement this model with concepts of agency and human choice embedded within a context of social and environmental opportunities and constraints.
Regional studies discussed here offer further refinement of the socio-spatial models advanced by Sanger (1982, 1996a, 1996b) and Snow (1980). Key themes recurring throughout these studies include relationships between groups, flexible or fluid social and spatial boundaries, mobility, localized ceramic or other material culture traits and variable subsistence strategies. They generally reflect “next generation” (Nash and Miller 1987: 41) archaeological models or those evolved from previous models through applications of new data and insights. Similar to Nash and Miller’s (1987) re-interpretations of Micmac economies, the socio-spatial models discussed here move us away from normative interpretations of human behavior and toward archaeological manifestations of human agency. While this case study is designed primarily to test Sanger’s two-population model, other models discussed here are also considered with a particular focus on those developed through comparative ceramic studies.

The anthropological and archaeological narratives discussed above provide a perspective on Indigenous lifeways largely devoid of Indigenous views, perspectives, or opinions. Neglecting Indigenous views and voices on pre-contact anthropological topics has been a common practice in the Northeast. There are many reasons for this—marginalization of Indigenous knowledges, disassociation between past and present peoples, political disempowerment of Indigenous groups, social divisions between academia and Indigenous peoples, etc. In the next section I challenge the neglect of Indigenous voices by discussing the two-population model within the context of Indigenous oral narratives.

**Indigenous Insights into the Two-Population Model**

Anthropological and archaeological data are foundational to this research. However, they are not the only form of information available. During the course of my studies of the two-population model I would, on occasion, engage in conversation with members of the Penobscot community about the topic of my research. These conversations were casual, informal, and undocumented. They were also informative and insightful. Stories and recollections of Penobscots traveling to the coast to engage with summer tourists were common. However, they
were not exclusive. In fact, a multitude of relevant thoughts, experiences, and understandings emerged through these conversations including references to coastal families, Canadian travel, clamming and fishing, Moosehead Lake, familial and interpersonal relationships, and gatherings, just to name a few. These conversations provided a more humanistic view of the topic and illustrated the fluidity with which people engaged with places in the region.

My point here is two-fold. First, Penobscot people have a deep and historical relationship with the Penobscot River and they relate to the lands and waters intimately. The relationship between the Penobscots and their/our homeland is visceral. Therefore, the Penobscots are uniquely qualified to address human engagement with this space. Neglect of Indigenous perspectives on pre-contact lifeways in the region has not only disenfranchised Native people from their heritage, it has also created a very narrow view of pre-contact life.

Second, the accounts and offerings from people I spoke with were not rigid. They were multi-faceted and fluid. This is reminiscent of some of the socio-spatial models discussed above. Accounts of the intersection between Indigenous knowledges and science are becoming more commonplace and although Indigenous peoples have been articulating the utility of these knowledges for years, they have been dismissed by those who believe they are not relevant. How might the evolution of Northeast land use models be different today if Indigenous peoples had been part of the dialogue all along?

In an effort to complement the ceramics analysis undertaken here and provide a perspective uncommon to archaeological inquiry in the region, I propose that Indigenous oral narratives are logical domains for exploring past human experiences. What is presented here is not a comprehensive examination of oral narratives to support or refute Sanger’s (1996) two-population model. That is beyond the scope of this dissertation. Instead, I use an example of a Penobscot legend to convey how issues of mobility, social-spatial organization, and seasonality indicators manifest themselves through Indigenous forms of narration. Through this effort, I bring
an Indigenous voice to the archaeological problem and affirm the validity of oral narratives and Penobscot perspectives as credible sources of information.

In the discussion that follows, I review a story narrated by the granddaughter of Telis (Alice) Susep and recorded by Dr. Frank Siebert in 1936 (Siebert and Penobscot Speakers 1997). This example is from an unpublished two-volume manuscript of legends recorded in the Penobscot language. Penobscot philosophies on human/land/river relationships are embedded within the story as are references to seasons, subsistence, and land use.

The story is entitled “The Ghost Hunter” (Siebert and Penobscot Speakers 1997) and begins with a husband and wife traveling to the “interior” and setting up camp. The story describes the man behaving strangely and that this behavior continued “over the winter.” Reference is made to the man hunting deer, partridge and bear and ice fishing throughout the winter. In the spring, the woman learns that her husband died when they were setting up camp and that his ghost had been caring for her all along. The ghost instructs her to return to her “home” where her parents are and take furs and food to her family. After burying her husband’s body, she travels three days “downstream.” When she arrives at her village, everything is unloaded from the canoe and she rests at her parents’ place. The story ends by reiterating that her husband’s ghost watched over her during the winter.

Based on this short narrative, we can see that the concept of an “interior” place exists and that it is accessible by canoe. The story also suggests that movement to the interior occurred just prior to winter. The “interior” location is upstream of the woman’s parents’ home and it takes three days to travel between the places. However, not everyone moved. The narrative indicates that the couple traveled alone.

Elements of agency, choice, and unpredictability of the human experience are revealed within this story. Similarly, concepts of seasonal movement, activity areas, mode of transportation, and social organization are embedded in the account. These are all important references when attempting to understand Indigenous use of space. Exploration of oral narratives
as well as thoughtful and considerate dialogue with contemporary peoples add value to our interpretations of archaeological materials and should be a deliberate component of future archaeological inquiries in the region.

The narrative reviewed here adds an Indigenous voice to archaeological interpretations of the past. Although this particular story features movement into the interior, not all do. Some stories are situated on the coast, some reference the mountains and others reference far-off places. The goal here is not to evaluate the two-population model by way of oral narrative. That would require a well-concerted effort driven by Penobscot needs and research agendas. The intent is to illustrate how deeply embedded movement, relationships, and land/water engagement are within Penobscot philosophies and lifeways. It is this element of the story that is valuable to understanding socio-spatial organization in the Penobscot River Valley.

Conclusion

A broad array of scholarship has contributed to understanding socio-spatial organization among Native peoples living during the Ceramic Period in Maine. I have summarized some of this research here beginning with a review of the intellectual heritage of Sanger’s (1982, 1996a; 1996b) two-population model. This is a model that has a deep history in anthropological research in the region with its intellectual roots in the work of Frank Speck. I approached this history thematically, identifying three themes that reside within the anthropological reconstructions of past Indigenous socio-spatial organization. These themes have been a continual presence in archaeological research directed toward understanding pre-contact Native land use.

As I have discussed here, Sanger’s two-population model is complemented by regional and local studies exploring pre-contact socio-spatial organization during the Ceramic or Woodland Period. Studies to the east and west of Maine have helped refine the role of aboriginal ceramics in studies of pre-contact peoples and their relationships to space. Additionally, local archaeological research on seasonality, subsistence, site selection and ceramics are foundational to the current research.
Finally, this chapter presented an example of how Indigenous oral narratives can inform Sanger’s two-population model. I selected a Penobscot legend to demonstrate that Indigenous knowledges address key areas of interest complementary to inquiries into socio-spatial organization. Concepts related to movement, seasonality, inter-personal relationships, family structure, and hunting strategies are all embedded within the Penobscot legend I recounted. I include this legend here to validate its utility in exploring socio-spatial organization in the Penobscot River valley. Including it alongside anthropological narratives imparts a multi-vocal approach to the study.
CHAPTER 5
SITUATING THE CASE STUDY IN SPACE AND TIME

Introduction

Over the last 4 decades, research into the richness and complexity of the cultural and natural histories of the Penobscot River valley has been approached through interdisciplinary studies. Archaeologists, geologists, hydrologists and ecologists have created a detailed scientific narrative on the interconnectedness between Indigenous peoples and their dynamic natural surroundings. This approach has influenced regional archaeological practice in terms of what questions are asked of the archaeological record and how peoples’ choices and decisions are explored archaeologically. Generally, human choice has been explored in light of “external constraints” (Trigger 1991; Sanger et al. 2003) imposed on them environmentally. Theoretical frameworks emphasizing human agency and choice have not guided interpretations of archaeological sites and materials from within the Penobscot River watershed. In this sense, the present research unique yet complementary to previous studies by way of its emphasis on the actions and choices of social agents.

This chapter reviews the natural and cultural history of the Penobscot River valley. My intent here is to provide the reader with a context for this study that embraces multi-vocality. It includes a conventional scientific narrative that documents the environmental and cultural histories of the Penobscot River valley. Information on past environments and culture histories is typically presented to contextualize the pre-contact lifeways of Native peoples living along the Penobscot River. These narratives emphasize the presence of archaeological sites, their locations, content, and age within the cultural and natural sequences developed for the region. This information is valuable and is included here for two purposes. First, it situates this study within the research lineage of the region and reflects a local convention in archaeological reporting. Second, it provides an environmental and archaeological backdrop to the current study offering a glimpse into the history and homelands of the peoples at the center of this inquiry.
In addition to the environmental and archaeological histories, I also include Penobscot legends as complementary narratives surrounding the formation of the Penobscot River and associated natural features. These are intended to serve as humanistic and Indigenous “bookends” to the conventional scientific story, validating the views of the Indigenous peoples and acknowledging their value in scholarly practice.

The presentation of multiple narratives here reflects multi-vocality—an emerging tenet in Indigenous archaeologies. Presenting the spatial and temporal context of the study in this way promotes the interconnectedness of what is often seen as dichotomous narratives. It also enriches archaeological inquiry and affirms the value of our collective interests in past human lifeways.

I begin this presentation with the Penobscot legend of how the Penobscot River came to be. This is followed by a presentation of the natural and cultural history of the Penobscot River valley as interpreted through scientific study. I then conclude this chapter with a second Penobscot legend that describes how prominent natural features were formed in the region.

**The Formative Years of the Penobscot River Valley**

The formation of the Penobscot River is a prominent event in the history of Penobscot homeland. This prominence is acknowledged by people in multiple ways. Diverse narratives surrounding the formation of the Penobscot River are not mutually exclusive. In fact, they share a common purpose and contribute to the overall story of the human/land/water relationship. I begin here with a Penobscot legend that features Gluskabe, the Penobscot culture hero. There are many stories of Gluskabe and his contributions to the world. The stories featured here illustrate his role in shaping Penobscot homeland. The legend of the frog monster is the first narrative presented here. It details the creation of the Penobscot River and its tributaries and also articulates the origins of Penobscot water clans.

**The Story of Gluskabe and the Frog Monster**

While traveling, Gluskabe came upon a village where the people were sick and dying from a lack of water. Gluskabe asked the people what was causing them such hardship and they
told him a giant evil frog living up-river was holding back the water and keeping it from the people. Gluskabe told the people he would help them by making the evil frog give the people water so that no one else would die of thirst. So Gluskabe and the people of the village traveled up-river to where the frog lived. When they arrived Gluskabe asked the frog “Why do you keep the water from our people and make them so sick? I can’t allow this to happen, I will make you give the people water for them to share.” Gluskabe then grabbed the evil frog and broke his back. Now all bullfrogs have broken backs. But the frog was very strong and a broken back did not make him give up the water, so with his axe Gluskabe chopped down a giant birch tree so it would fall on the monster that was depriving the people of water. Down the tree came, right on top of the evil frog, killing him dead. Suddenly the water flowed from the evil frog creating the Penobscot River and the branches of the birch tree became tributaries feeding the mighty water source. The people were happy and drank the water, desperate to quench their thirst. Some were so thirsty that they jumped into the river and turned into water beings like fish and turtles. Some of the people took the names of their relatives who became water beings and then they settled all along the Penobscot River. This is how the Penobscot River came to be. (Author’s amended narrative based on Speck’s (1918b) translation of a story shared by Newell Lion).

**Deglaciation and the Penobscot River Valley**

In the foregoing narrative, non-human forces transformed a landscape into one in which humans could thrive. The same is evident in the deglaciation history of the Penobscot River valley which typically begins with the Laurentide Ice Sheet (LIS). The LIS covered the entire state of Maine reaching its maximum extent between 18,000 and 20,000 years ago (Denton and Hughes 1981). Between 14,000 and 13,000 $^{14}$C yrs B.P. the ice sheet receded from the central Maine coast and exposed the lower and central regions of the Penobscot River Valley (Dorion 1997; Kelley and Sanger 2003). As the ice sheet receded, the weight of the LIS depressed the land and marine waters inundated the region. One result of the inundation is a blanket of much of
the land surface with glaciomarine sediments, including the Presumpscot Formation (Bloom 1960)—a glaciomarine clay that would eventually supply aboriginal potters prior to European contact as well as post-contact 19th and 20th century brick-making in the region.

At approximately 12,000 years ago, the ice sheet had receded, and isostatic adjustment caused the exposed land surface to rebound above sea level. Marine waters regressed, relative sea level fell, and surface drainage began to shape the Penobscot River Valley (Stuiver and Borns 1975; Kelley and Sanger 2003; Kelley 2006). Lowering of sea level created a low-stand at approximately 60 m below current level—a factor contributing to the down cutting of the Penobscot River and ultimately to its formation (Belknap et al. 1987; Barnhardt et al. 1995; Kelley and Sanger 2003).

The dynamic processes associated with deglaciation and river formation created a landscape of diverse landforms and natural features. Kelley (2006) notes that differences in topographic relief and river velocity created mid-channel islands north of Old Town, Maine while a more terraced riverine environment emerged below Old Town. Each of these settings is represented as settlement choices by Native peoples at the center of this study.

In Penobscot Bay, environmental processes following deglaciation resulted in sea level changes that factored into pre-contact Indigenous land use as well as archaeological site preservation. Isostatic and eustatic adjustments coincident with the deglaciation process contributed to sea level fluctuations in Penobscot Bay. A rapid sea level decline of roughly 60 m accompanied isostatic uplift at 12,500 14C yrs B.P. (Barnhardt et al. 1997; Kelley et al. 2010). Within roughly 1000 years, sea level rose to 20 m below present, then trended upward more slowly continuing to present levels. With respect to the temporal focus of this study, relative sea level ranged from 2 m to 1 m lower than present levels between 3000 and 1000 14C yrs B.P. (Barnhardt et al. 1997; Belknap et al. 1987; Kelley et al. 1992, 1995). Sea level rise has eroded many shoreline archaeological sites and a warming climate will accelerate these processes, jeopardizing the integrity of cultural spaces along the coast.
Recent research off the coast of Maine has correlated a “slowstand” in sea level changes between 11,500 and 7,500 years ago with development of potentially habitable landforms now underwater (Kelley et al., 2010). Kelley and his colleagues (2010) conducted an interdisciplinary study designed to reconstruct landforms off-shore that may have offered a suitable living environment near Bass Harbor, Maine—an area east of the study area where mid-Holocene artifacts have been recovered by offshore fishermen (Price and Spiess 2007). Based on geologic reconstructions of relic undersea landforms, combined with evidence of freshwater peat fragments and mudflat fauna, Kelley et al., (2010) identified beach, tidal flat, and lakeshore environments that were once exposed. At lower sea levels, these areas would have been conducive for human habitation and resource procurement suggesting that changes in sea level are responsible for the poor representation of early to mid-Holocene period coastal sites.

Professional efforts to reconstruct evolution of the lands and waters in the Penobscot River valley through archaeology, geology and climate studies have been extensive, with the Penobscot River Valley being one of the most thoroughly studied areas in the state in this regard (Kelley 2006; Kelley and Sanger 2003; Sanger et al. 2001; Sanger et al. 2003; ). The following sections are based on this research program and provide an environmental context to the current study. Topics covered here include an overview of the bedrock and surficial geology of the region as well as paleoecological reconstructions.

**Geologic Setting**

In this section, I discuss the geologic setting for the study. This information is presented to provide insight into the breadth of geologic resources available to potters and their families in the Penobscot River valley. I discuss the bedrock geology first, then review the surficial geology. This is followed by a summary of the geomorphic divisions identified for the Penobscot River valley.

The bedrock geology of the Penobscot River valley is characterized by a combination of igneous and metamorphic rocks (Osberg et al. 1985; Kelley and Sanger 2003). The bedrock
sequence from north to south along the Penobscot’s main stem is diverse. In the upper portion of
the study area near the confluence of the Penobscot and Piscataquis Rivers, the bedrock is
comprised primarily of Devonian and Silurian age meta-sedimentary rocks with intrusive igneous
rock comprised of granites, granodiorites and gabbros also present.

The central portion of the study area is underlain by bedrock dominated by Ordovician-
Silurian age metasedimentary rock such as marine sandstones and slates (Osberg et al. 1985).
Outcrops of low-grade metamorphic rocks (granulites and phyllites) within this portion of the
study area have been linked to Archaic Period quarrying activities (Sanger et al. 2001) indicating
that Native peoples were knowledgeable of and skilled with the characteristics of local lithic
resources.

The coastal portion of the Penobscot River drainage is underlain by multiple rock types.
A major feature here is the Coastal Volcanic Belt—a major rock formation of Silurian and
Devonian age that extends from Nova Scotia to Massachusetts (Brookins et al. 1973). The most
common volcanic rocks in this region are andesites and rhyolites (Brookins et al. 1973). Plutonic
rocks of Devonian age and metamorphic rock units also occur in the Penobscot Bay area. Plutons
are comprised primarily of granites and diorites and occur on the outer islands of the Bay as well
as in mainland areas. Metamorphic units include rock types such as gneiss and schist primarily in
the western portion of Penobscot Bay (Osberg, et al. 1985).

The bedrock geology in the area underlies a complex surficial geologic record of the
Penobscot River valley which has been studied extensively as a result of cultural resources
management, hydroelectric dam removal, and geoarchaeological research in the region.
Pleistocene and Holocene-age deposits cover much of the bedrock in the region. Many of the
geologic units within the study area formed as a result of ice retreat and the glacio-marine
inundation associated with the recession of the LIS. The Presumpscot Formation (Bloom 1960),
the most widespread geologic unit in the study area, is characterized by a very fine-grained, blue-
gray clay deposited when ocean waters inundated the river valley (Thompson and Borns 1985).
The timing of the marine inundation in the northern portion of the study area is inferred from a radiocarbon date of 12,270 ± 120 ¹⁴C yrs B.P. on marine shell recovered from a gravel pit in South Lincoln, Maine, just north of the study area (Stuiver and Borns 1975).

Coarse glacio-marine deposits of sand and gravel occur in the river valley, as well. These features illustrate the position of the shoreline as the ocean fell across the land (Thompson and Borns 1985). Three eskers trend generally northwest to southeast in the river drainage area. These features were formed from a series of tunnels draining sediment and melt-water from the LIS.

Kelley (2006) describes four geomorphic divisions within the Penobscot River drainage, each distinguished by different geologic attributes and localized geomorphology. They include: the Headwaters Division, the Island Division, the Rapids Division, and the Tidal Division (Kelley 2006). The Headwaters Division occurs in the northern-most portion of the river near Mt. Katahdin and the east and west branches of the Penobscot River. This division is characterized by its mountainous terrain and steep river gradients. The Headwaters Division is outside the spatial scope of this study. However, it represents a setting Indigenous peoples likely engaged with.

The Island Division occurs in the northern portion of the current study area and extends from Medway to Old Town, Maine. Metamorphic bedrock in the upper portion of this division is eroded easily and as a result, the land surface exhibits rolling topography within a broad valley setting (Kelley 2006:22). Granitic batholiths east of the river in this area constrict the river’s movement eastward (Kelley 2006; Osberg et al. 1985).

The surficial geology in this division is dominated by glaciomarine clay and underlying till. As the name suggests, islands are common in this division, and those on the main stem of the Penobscot are part of the Penobscot Nation’s territory. This segment of the river includes both low elongated islands and islands with slightly more relief (Kelley 2006). Modern alluvial processes, ice rafting, erosion, and contemporary human activity make interpretation of the stratigraphy on these islands challenging. With respect to the current research, archaeological sites in the Howland area occur within the Islands Division.
The Rapids Division is located south of the Islands Division. Notable differences exist between the two divisions. For example, there are fewer islands in the Rapids Division. Rapids and falls formed by quartz-rich beds trending across the Penobscot River (Kelley 2006:28) also distinguish this Division from the Islands Division. High fluvial terraces occur in this section of the river, and provide evidence of river-induced down cutting of glacial deposits (Kelley 2006). One of these terraces hosts the Eddington Bend site, which is included in this study. The quartz-rich beds in this region may have served as a temper source for Indigenous potters.

The final geologic division of the Penobscot River Valley is the tidally influenced division, which begins near Bangor, Maine and extends into the Penobscot Bay region (Kelley 2006). It is here that the river and sea meet, creating a unique ecological and geological presence on the landscape. The underlying bedrock in this division differs from the previous section of river and as a result, falls and rapids do not occur here (Kelley 2006). Additional features in this segment of the river include high bluffs of glacial till and fluvial sediments as well salt marshes (Kelley 2006). The coastal sites selected for this study occur in Penobscot Bay. However, the setting for these sites is beyond the range defined for the Tidal Division. These sites are situated within the Island Bay complex, which is comprised of broad embayments with granitic islands such as Pell Island. Intertidal features include fine and coarse-grained mud flats, as well as exposed rock (Kelley et al. 1988).

In conclusion, the geologic research discussed here has shown that the Penobscot River valley is complex with variation in rock units, sediments, and geomorphology occurring along the course of the river. The bedrock influences how landforms and waterways take shape over time creating a pallet of sorts that people engage with. People can choose to modify their land and waterscapes or not. Either way, Native peoples in the Penobscot River Valley lived with bedrock outcrops that formed rapids on the river and served as navigational features, fishing assets, or challenges to travel. Additionally, granite outcrops and/or cobbles provided temper for pottery, and other lithic sources within the drainage served as material for tools, adornments, or gifts.
The surficial geology reflects remnants of glacial and post-glacial processes that Native peoples experienced. Landforms created through these processes offered Native families a variety of places to settle as they navigated the waters of the Penobscot River. Whether it was a high terrace near a bedrock outcrop, or an island in the river or in Penobscot Bay, these landscape features were more than simply “good places to camp.” They were places of cultural meaning—places where babies were born, meals were shared with friends and relatives, games were played, prayers were said, relationships were forged or broken, and relatives laid to rest.

As a major geologic unit throughout the study area, the Presumpscot Formation (glaciomarine clay) offered Native potters an exceptional resource for making ceramic vessels. Exposed deposits of blue-gray clay along the river bank were likely known places to potters. Similar to a basketmaker’s knowledge of black ash tree stands or sweetgrass patches, accessible clay deposits may have factored into movement decisions and socio-spatial organization. Both seasonal fluctuations in water levels and changes in water levels over time likely influenced access to these resources. Situating the Presumpscot Formation spatially and socially informs our understanding of the human/clay relationship. It probably played an important role in the lives of Native peoples regionally.

Geologic features were integral to the lifeways of Indigenous peoples in the region. This is particularly applicable to peoples at the center of this study who required an intellectual sophistication in the geology and geomorphology of their homeland to carry out their day-to-day movements, relationships, and activities. Our understanding of the geology of the Penobscot River Valley aids us in validating that sophistication.

**Paleoenvironmental Reconstructions**

Paleoenvironmental studies of the Penobscot River valley help reconstruct the environmental context within which Native peoples lived. Like geology, paleoenvironmental reconstructions aid us in expressing the sophistication of past peoples’ intellect with regard to ecology. They also help us to see into a peoples’ future (Wobst, pers. comm. 2008) and identify
the ways in which people acted (or didn’t) through subtle and not-so-subtle environmental changes.

The Gluskabe story above identifies changes in the relationship between people and water-based fauna that occurred after the river began to flow. Wabanaki oral narratives also illustrate the role of many plant and animal species in Indigenous lifeways. These are paleoenvironmental narratives through a Penobscot lens. This section presents a complementary narrative by reviewing paleoenvironmental studies centered on the Penobscot River valley. It offers a glimpse into the environmental setting within which Indigenous peoples acted and historicizes their engagement with their ecological surroundings.

Paleoenvironmental studies in Maine have addressed broad patterns in environmental reconstructions as well as more localized scenarios. Davis and Jacobson (1985) reconstructed early Holocene landscapes in Northern New England through analysis of pollen and macrofossils from lake sediment cores and correlated them with published ice-front positions and sea level changes. They showed that a tundra-to-woodland-to-closed forest sequence occurred between 14,000 and 9,000 $^{14}$C yrs B.P. with parts of the Northeast experiencing these changes differentially depending upon the position of the retreating ice sheet. This dynamic environment provided people with multiple ecological settings within which to operate. Davis and Jacobson (1985) showed that the ecology of the Penobscot River valley included tundra species as well as mixed poplar and spruce woodland at roughly 12,000 $^{14}$C yrs B.P. By 10,000 $^{14}$C yrs B.P., the Penobscot drainage was populated by closed forests, which included a greater variety of hard and soft-wood species such as oak, elm, pine, birch, ash and other taxa. It may have been during this time that Native families in the region began their partnership with species such as spruce, pine, birch, ash and other flora, honing skills that would, over millennia, support Indigenous perishable fiber industries and other plant-based practices.

Following deglaciation, coastal and interior landscapes developed regional characteristics that are evident in environmental reconstructions based on paleoecological data. Research in the
central Penobscot River Valley (Almquist-Jacobson and Sanger 1995) and on the coast (Schauffler and Jacobson 2002) show environmental distinctions in coastal and interior settings. In the central Penobscot River Valley, paleoenvironmental data were generated through a study of pollen and charcoal records from Mansell Pond near Milford, Maine. Paleoenvironmental reconstructions developed from this research span roughly 9000 years of Penobscot River environmental history. The environmental sequence from the Mansell Pond data begins at ca 9500 $^{14}$C yrs B.P. as an open woodland setting with poplar, larch, and spruce dominating the forests. This forest transitions to one that fluctuates between pine and hemlock dominated forests until ca 4700 $^{14}$C yrs B.P. when a mixed hard and softwood forest replace it abruptly (Almquist-Jacobson and Sanger 1995).

The Ceramic Period paleoenvironmental sequence generated from the Mansell Pond study (Almquist and Sanger 1995) shows an evolution of a forested landscape that is more subtle than earlier periods. The sequence begins with a northern hardwoods/hemlock mixed forest at ca. 3050 $^{14}$C yrs B.P. Then at ca. 2000 $^{14}$C yrs B.P. species such as hemlock, beech, ash and maple decline and poplar, juniper and larch increase. This change coincides with a shift to colder climates throughout North America (Gajewski 1987; Russell et al. 1993).

Research by Schauffler and Jacobson (2002) offers a set of coastal and inland palynological data that complements the Mansell pond research and presents localized floral sequences for Penobscot Bay and other areas in Maine. Their study compared pollen records from forested “hollows” in coastal and inland settings to regional pollen records. They focused heavily on examination of the spruce sequence throughout the last five millennia (Schauffler and Jacobson 2002). Similarities in pollen data from their coastal and inland samples indicate a spruce-tundra woodland early in the Holocene and an increase in spruce during the late Holocene (Schauffler and Jacobson 2002:241). Contrasts between the coastal and interior pollen records compiled by Schauffler and Jacobson (2002) are evident. For example, their results suggest a long-standing presence of spruce forests on the coast since the mid-Holocene (Schauffler and
Jacobson 2002:245). This contrasts with pollen records from inland samples, which indicate that spruce did not dominate these inland areas until roughly 1000 years ago.

Schauffler and Jacobson (2002:241) included samples from two forest hollows on Isle au Haut in Penobscot Bay. These data point to a pollen sequence with well-established spruce populations from roughly 4500-5000 years ago. They also show an increase in spruce and alder between 1000 and 1500 years ago, suggesting a cool and moist climate.

Archaeologists often focus on lithic quarry sites as key features for influencing human mobility. However, places with floral resources such as spruce forests may have been destination locales as well. Ethnohistoric evidence highlights a multitude of uses for spruce. Spruce root is a strong and commonly-used lashing material. It is used today by contemporary Wabanaki people for building canoes and making baskets. Additionally, spruce root provides cordage for drying racks and shelters. Spruce boughs provide bedding materials and mats, the gum of the tree can be chewed and used as a sealant, teas can be made from the bark, and spruce tips are a source of vitamin C (Prins and McBride 2007). Spruce-dominated forests were likely important resources for both food and material necessities. When considering aboriginal settlement strategies, understanding changes and variability in the forest canopy may aid in reconstructing socio-spatial organization. As such, they represent an important part of the contextual backdrop to this study.

As we have seen from the studies discussed here, paleoenvironmental reconstructions occur at multiple scales with general trends observed through time and space (Davis and Jacobson 1985). Equally visible are localized paleoenvironmental sequences which reflect the landscape’s mosaic-like qualities (Almquist-Jacobson and Sanger 1995; Schauffler and Jacobson 2002). Paleoenvironmental research within the Penobscot River valley documents the physical settings that Indigenous families inhabited through time. Of note is the utility of paleoenvironmental reconstructions in understanding relationships between people and place. They move us beyond simplistic narratives that present human behavior in light of single resources, to narratives that acknowledge and explore human engagement with a varied environment.
Paleoenvironmental studies also provide us a glimpse into the future and past of Native peoples. For example, the studies discussed here suggest both subtle and abrupt climate changes in the past. These shifts become part of peoples’ histories and may inform their subsequent decisions and actions. They are important pieces to understanding the lived histories of peoples who would eventually incorporate pottery into their daily lives. They are presented here as a backdrop to the human story which I present in the next section.

**Connecting People and Place—Families in the Penobscot River Valley**

This section reviews our current archaeological understanding of human occupation of the Penobscot River Valley. Previous archaeological research within the region produced a story typically organized and presented chronologically. This is the approach I take here.

The culture history of Maine documents roughly 10,000 years of human occupation of the Penobscot River Valley with people living in both interior and coastal settings. Archaeologically, this time span is divided into a series of chronological periods including the Paleoindian Period (ca. 11,000–9500 ¹⁴C yrs B.P.), the Archaic Period (ca. 9500–3000 ¹⁴C yrs B.P.), the Ceramic Period (ca. 3000–400 ¹⁴C yrs B.P.), and the Contact Period (ca. 400 ¹⁴C yrs B.P. – 200 ¹⁴C yrs B.P.). Subdivisions are recognized within each taxonomic unit. Chronological distinctions are defined based on radiocarbon dating and changes through time and space with respect to material culture, site location, subsistence strategies, and in some cases, mortuary distinctions. Chronological units vary slightly among regional archaeologists and the discussion presented here follows Sanger (2005) (Table 5). In the following sections I discuss each of these periods in detail emphasizing archaeological reconstructions for Native lifeways in the Penobscot River Valley.

**Paleoindian Period—Families on a Dynamic Landscape**

The Paleoindian Period (ca 11,000–9500 ¹⁴C yrs B.P.) represents the earliest archaeological evidence of human occupation of the Penobscot River Valley and by convention is divided into early (11,000-10,000 ¹⁴C yrs B.P.) and late (10,000-9,500 ¹⁴C yrs B.P.) sub-periods.
Much of Paleoindian Period research in the Northeast has been directed toward understanding the timing and method of early colonization of the region. Reconstructions of lifestyles of Paleoindian Period peoples living in the Northeast commonly emphasize resource acquisition and rarely divert from the standard interpretation of highly mobile groups seeking out fine-grained lithic sources and food resources (see Chilton 2008 for critique).

Materially, the Paleoindian Period is characterized by distinctive bifacial stone tool technology typified by parallel flaking and fluting techniques. Changes in biface form and technology are used to define early and late sub-periods and a notable shift in biface production techniques occurs at ca. 10,000 \(^{14}\text{C}\) yrs B.P. when parallel flaking on bifaces continues to occur, but the signature fluting technique of the early period (ca. 11,000-10,000 \(^{14}\text{C}\) yrs B.P.) falls out of practice. In addition to the fluted and parallel-flaked point technology, unifacial end and side scrapers, gravers and pieces esquilles are often part of peoples’ tool kits during the Paleoindian Period. However, these tool forms receive much less archaeological attention than projectile points of the period.

Fine-grained lithics such as cryptocrystalline and volcanic rocks tend to be the material of choice for people living during this time (Spiess, et al. 1998). Agates from the Minas Basin area of Nova Scotia, Mt. Jasper rhyolites from New Hampshire, and cherts from the Munsungan Lake area of Northern Maine are common lithics used for Paleoindian Period stone tool manufacture.

Archaeological evidence for Paleoindian Period peoples living in the Penobscot River Valley is sparse and is restricted to the latter half of the time period between 10,000 and 9,000 years ago. To date, only two sites of this time period have been identified. One occurs along Blackman Stream, a small tributary of the Penobscot River in Bradley, Maine, and the second is at the Eddington Bend site—one of the locations selected for this study. Excavations at the Blackman Stream Site, produced a single parallel-flaked projectile point diagnostic of the Late Paleoindian Period (10,000-9,500 \(^{14}\text{C}\) yrs B.P.) (Sanger et al. 1992). Researchers recovered the point from a deep alluvial setting one meter below strata dating to between 7,400 \(^{14}\text{C}\) yrs B.P. and
8,400 \(^{14}\text{C}\) yrs B.P. (Sanger et al. 1992). Sanger et al. (1992) assigned it to the Late Paleoindian Period based on both tool form and relative dating. Kelley (2006) surmised that since the biface was recovered from deep fine-grained sediments, it may have been deposited when the river was near base level coinciding with river down-cutting and the fall of sea level before 10,800 \(^{14}\text{C}\) yrs B.P.

Excavations at the Eddington Bend site also produced a parallel-flaked biface diagnostic of the Late Paleoindian Period (Sanger et al. 2003). The recovery context was not as informative for this point as it was for the one at Blackman stream. Charcoal recovered from the same level produced two Archaic Period dates—5,390±70 \(^{14}\text{C}\) yrs B.P. and 6,480±70 \(^{14}\text{C}\) yrs B.P. (Mack 2016; Sanger et al. 2003). These dates were interpreted as being too young for the biface form (Sanger et al. 2003).

Although the evidence is sparse, these biface forms recovered from the Penobscot River Valley are indications of a cultural landscape that had very early beginnings and continued to evolve through time. As Kelley (2006) suggests, additional evidence of Paleoindian Period occupation may exist on landforms within the Penobscot River Valley that have yet to be examined.

**The Archaic Period: “Settling In” to an Evolving Homeland**

The Archaic Period (ca. 10,000-3,000 \(^{14}\text{C}\) yrs B.P.) follows the Paleoindian Period and is described as a period of “settling in” (Sanger 2005:18) when human mobility and settlement patterns are believed to have become aligned with the region’s wetland and riverine resources that had formed and stabilized by this time. Archaeological reconstructions of this time period are classified as Early (ca. 9000-7500 \(^{14}\text{C}\) yrs B.P.) Middle (ca. 7500-6000 \(^{14}\text{C}\) yrs B.P.), and Late Archaic (ca. 6000-3000 \(^{14}\text{C}\) yrs B.P.) with further classification of varying traditions within these chronological units. The Archaic Period in Maine has received substantial archaeological attention due in part to Native peoples’ mortuary practices featuring red ochre use and distinctive grave inclusions. This interest has resulted in diverse interpretations and archaeological
nomenclature. While some archaeologists developed culture historical classifications based on technological traditions such as the Gulf of Maine Archaic tradition (GMAt) (Robinson et al. 1992; Robinson 1996b, 2001), others developed chronologies based on comprehensive cultural traditions. These include the Laurentian Tradition, (Funk 1988; Ritchie 1938, 1965, 1971a; Tuck 1971) and the Atlantic Slope Macro Tradition (Dincauze 1972, 1975b, 1976). Archaeological classifications have also been linked to mortuary practices during this time period (e.g. Moorehead Burial tradition, Sanger 1973, 1975, 2006).

Culturally, human subsistence practices, tool forms, and settlement strategies that existed during the Archaic Period differ significantly from the Paleoindian Period. Families in the region relied heavily on local lithic sources of low-grade metamorphic rocks for manufacturing ground stone tools. Projectile points, which are often signature artifacts for cultural units in archaeology, are rare to absent during the Early (ca. 9000-7500 ¹⁴C yrs B.P.) and Middle (ca. 7500-6000 ¹⁴C yrs B.P.) Archaic Periods, particularly east of the Kennebec River in Maine.

Ground stone tool technology holds a prominent place as a diagnostic feature of the Gulf of Maine Archaic tradition (GMAt). The GMAT is an Early and Middle Archaic Period archaeological construct with a material culture signature that includes the manufacture and use of quartz tools accompanied gouges, ground stone rods, slate points, choppers, celts and adzes (Robinson 1996b, 2001, 2006). Associated with this stone tool technology is a mortuary practice that includes the use of formal cemeteries and the inclusion of large quantities of red ochre with the deceased (Robinson 1996b, 2001, 2006).

Archaeological research in the Penobscot River valley suggests the ground stone tool technology that emerged during the GMAt extends into the Late Archaic (ca. 6000-3000 ¹⁴C yrs B.P.). Sanger and Newsom (2000) propose that the Otter Creek point, a hallmark of Ritchie’s (1938, 1965, 1969, 1971b) Late Archaic Laurentian tradition, was a bifacial tool technology added to a pre-existing groundstone tool technology in the region.
Archaic Period sites occur in both coastal and interior settings within the Penobscot River Valley. However, evidence of Archaic Period occupation of coastal regions in Maine has been somewhat limited. Notable coastal sites include the Turner Farm and Nevin sites (Bourque 1995; Byers 1979; Spiess and Lewis 2001) with the oldest occupations dating to between 5700 and 4500 14C yrs B.P. (Bourque 1995; Sanger et al. 2007). Of note here is a coastal and interior distinction proposed for the Late Archaic in Maine.

The Laurentian and Small Stemmed Point traditions (Bourque 1995; Dincauze 1974, 1975b; Funk 1988; Ritchie 1938, 1965) are distinguished by differences in stone tool assemblages, site locations, and subsistence strategies. The Laurentian Tradition (ca. 6000-4500 14C yrs B.P.) is characterized as a lifestyle adapted to interior environments and wetlands (Sanger 2005) and has been interpreted as a cultural continuum spread throughout northeastern North America. It occurs regionally in the following areas: Southeast Ontario, Northern New England, Southern Quebec, Northern New York, the lower Great Lakes and the St. Lawrence drainage (Ritchie, 1938, 1965, 1971; Funk 1988). Technologically, the Laurentian tradition is distinguished by the presence of “Otter Creek Points” and a ground stone tool technology that includes gouges, ground slate points, ulus, bannerstones and plummets.

Closely contemporaneous with the Laurentian Tradition is the Small Stemmed Point Tradition (ca. 5000-3800 14C yrs B.P.) (Bourque 1995) which has been presented as a coastally adapted lifestyle occurring in parts of Southern and Western Maine and distributed along the Atlantic coast. Similar to the Laurentian tradition, groundstone tool technology exists within the tradition. However, small quartz points and the presence of swordfish-based technology distinguish it from the Laurentian tradition. There has been some evidence of small stemmed point tradition technology recovered from a lakeside site in eastern Maine suggesting that this tradition is not exclusive to coastal environments (Spiess, 2013 pers. comm.). The Small Stemmed Point tradition has general acceptance among regional archaeologists, but debates exist about its antecedents (Bourque 1995; Cox 1991).
Terminal Archaic--Susquehanna Tradition (ca. 3800-3000 \(^{14}\)C yrs B.P.)

The Susquehanna Tradition is generally interpreted as a cultural intrusion into Maine from the Mid-Atlantic states. This proposed movement of people into the area occurred ca. 3800 \(^{14}\)C yrs B.P. (Bourque 1995) and was accompanied by cultural differences linked to materiality, settlement patterns, subsistence strategies and mortuary practices. Susquehanna tradition occupations occur in both interior and coastal settings and exist within the study area. As an archaeological construct, the Susquehanna tradition is characterized by large, thin felsite bifaces as well as drills, scrapers, and gravers. Steatite bowls are included in this tradition in Southern New England states. However, they are not a prominent artifact class in Susquehanna assemblages from Maine (Sanger 2008).

In addition to a different suite of stone tool forms, people living during this period cremated their dead—a change from the previous practice of inhumations accompanied by red ochre and ground stone tools. However, there are locations where both types of mortuary practice occur including Eddington Bend (Petersen and Sanger 1987; Snow 1975), the Young site (Borstel 1982), and the Turner Farm site in Penobscot Bay (Bourque 1995). This suggests some cultural rationale for spatial continuity in cemetery selection. Also like their predecessors, peoples living during this time occupied areas along rivers and lakes, occasionally re-occupying locations settled previously.

The Susquehanna tradition is fairly well represented in the study area. Mosher and Spiess (2004) report 245 Susquehanna tradition sites state-wide and 19 sites within a few miles of Mattamiscontis, Maine just north of the study area. Susquehanna components are also present within the central portion of the study area at the Young site (Borstel 1982), the Hirundo Site (Sanger et al. 1977), the Gilman Falls site (Sanger 1996c), and on North Haven Island in Penobscot Bay (Bourque 1995). Numerous sites of this period and many earlier ones, have evidence of people using these locations during the Ceramic Period as well which I discuss in the next section.
The Ceramic Period—a Cultural Landscape of Potters and their Families

The Ceramic Period (ca. 3050-450 \(^{14}\)C yrs B.P.) is the last archaeological unit identified for pre-contact times in Maine and is the temporal context for the present study. Sites of this period are more abundant than previous periods and they occur in both coastal and interior settings. Spiess (2017) reports over 2000 shell middens along Maine’s coast most of which date to the Ceramic Period. People living during this period are portrayed as mobile hunting, fishing, and gathering groups who were proficient in using birch bark canoes and the waterways as assets for engaging with the lands, waters, and each other.

As its name suggests, this period marks the beginning of ceramic use and manufacture by Indigenous peoples. According to Sanger (2005:25) archaeological data from this time period point to a “growing distinctiveness of the region from the Iroquoian speakers to the west and the agricultural coastal Algonquians of southern New England.” There has been some speculation that pottery-making diffused from the west or south (Sanger 2005). However, this has yet to be tested.

Mortuary studies in Vermont, Maine, and the Canadian Maritimes show some similarities to the Early Woodland mound-building culture identified in the Ohio River Valley commonly referred to as the Middlesex phase of the Adena complex (Heckenberger et al. 1990; Klein 1983; Moorehead 1922; Rutherford; Turnbull 1976). However, evidence for the Adena-Middlesex phase in Maine is scarce. The Mason site, located on Alamoosook Lake near Penobscot Bay was identified as a location with an Adena-Middlesex component (Moorehead 1922; Klein 1983). The presence of these types of sites in the Maritimes is interpreted as populations moving east along the St. Lawrence River (Sanger 2005:26).

The introduction of ceramics into societies is often interpreted as a technological shift to accompany agriculture (Childe 1936). However, Northeast pottery production pre-dates agriculture by roughly 2000 years (Hart and Lovis 2007; Scarry 2008; Taché and Craig 2015). Horticultural practices in Maine appear at roughly 1000 \(^{14}\)C yrs B.P. (Bourque 2001) with
evidence of maize production occurring in the western part of the state. Some evidence of pre-
Ceramic Period horticulture may be represented in gourd remains recovered from the Sharrow Site (Petersen and Sidell 1996) and the Eddington Bend Site (Mack 2016).

The Ceramic Period is sometimes interpreted as a period of increasing social complexity (Robinson 2009, Sanger 2005). Robinson (2009) suggests large sites situated at locations where anadromous fishing would have occurred provide evidence of groups of people coming together. The Eddington Bend site is considered such a location (Petersen and Sanger 1987; Robinson 2009). Robinson (2009:30) proposes a shift in how landforms were used during the Ceramic Period whereby during the Early Ceramic Period families chose to settle more often on lower terraces adjacent to the river and subsequently, during the Middle Ceramic Period use of high terraces along the river became more common (Robinson 2009). Ceramic Period sites from the central Penobscot River seem to support such a pattern as evidenced by the presence of Early Ceramic Period sites on Pushaw Stream (Borstel 1982; Kelley 2006; Mack et al. 2002; Sanger et al. 1977) However, sites near Howland at the confluence of the Piscataquis and Penobscot Rivers indicate reoccupation of the same landforms during Early and Middle Ceramic Period times (Newsom 1999). Research on landform use on Maine’s interior during the Early and Middle Ceramic Period would aid in evaluating Robinson’s (2009) suggested model.

A major contribution to understanding Indigenous life in Maine has been the research directed toward Ceramic Period house features. Focused investigations of these features began with Sanger’s (1987) research in Passamaquoddy Bay. Since then, house features have been reported at a number of coastal sites, including the Knox site (Belcher 1988) the Todd Site (Mack 1994, Skinas 1987), the Fernald Point site (Sanger et al. 1980), the Holmes Point East site (Hrynwick 2009), and the Flye Point site (Cox 1983). Archaeological remnants of dwellings span the Ceramic Period and based on house feature investigations, Sanger (2010) proposed several characteristics common to these coastal dwellings. They were generally semi-subterranean, small (3-4 m across), oval in plan view, and saucer shaped in profile. Sanger (2005:28) interprets their
small size as conducive for nuclear or extended family dwellings. They usually had an interior hearth and crushed shell around the perimeter. Entryways identified in some house features faced away from the beach and they are generally located toward the “landward side of the site” away from middens (Sanger 2010:41). The data on pre-contact dwellings for the Ceramic Period in Maine offer a glimpse into coastal settlement strategies that is currently unavailable for the interior.

Grit-tempered, open-fired, unglazed wares with conical bases are common characteristics of the earliest ceramic forms. This early pottery also has cordage or fabric impressed interior and exterior surfaces and is typed as Vinette I throughout the region (Ritchie 1969; Snow 1980). The Vinette I nomenclature originated in Brewerton, New York (Ritchie and MacNeish 1949) and as a type style, it has been reported throughout the Northeast (Taché 2005). In Maine and the Maritimes, Vinette I correlates to Ceramic Period 1 (ca. 3050-2150 14C yrs B.P.) and has been recovered from both coastal and interior settings.

Investigations as to what inspired the use of ceramics in Maine and the Maritimes have been limited. Research by Taché and her colleagues (2008) outline several potential uses for early ceramics including nut and seed processing, grease extraction from mammal bones, and fish and shellfish processing. They also offer some potential social factors connected to the introduction of pottery into Native lifeways in the region. Among these are possible changes in social gatherings (Taché et al. 2008) and funerary practices which were accompanied by special foods or meals.

Taché and Craig (2015:178) conducted residue analyses on 133 ceramic samples from throughout the northeast and found that lipids from aquatic organisms occurred frequently in Vinette I pots. Based on their study, they suggest that early pottery in the Northeast may have been associated with fish-processing activities linked to the preparation of fish oil for social gatherings. Additional research exploring food remains on pottery or within ceramic fabrics will aid in understanding the use of early ceramics in the Northeast.
Sites dating to the Early Ceramic Period occur at several locations within the Penobscot River Valley. Research in the Howland area produced radiocarbon dates of 2180 ± 90 $^{14}$C yrs B.P., and 2590 ± 100 $^{14}$C yrs B.P. at two separate sites (Newsom 1999). These dates were obtained from charcoal associated with Vinette 1 ceramics.

The Early Ceramic Period is also well represented at sites in the vicinity of Pushaw Stream in the central Penobscot River drainage. Here, sites with Early Ceramic Period components include: the Young Site (Borstel 1982), the Hirundo Site (Sanger et al. 1977), the Beaver Site (Mack et al. in prep.) and the Bob Site (Mack et al. 2002) which produced two Early Ceramic Period radiocarbon dates (2920 ± 60 $^{14}$C yrs B.P. and 2280 ± 70 $^{14}$C yrs B.P.). Kelley (2006) reports that half of the sites near Pushaw Stream have an Early Ceramic Period component. She points out that this counters Fiedel’s contention that the Early Ceramic Period is not well represented in New England due to climatic factors (Kelley 2006).

Sites dating to the Early Ceramic Period are fewer than preceding and subsequent periods. However, it is important to note that a well-developed Ceramic Period stone tool chronology does not exist for Maine and although references to “Meadowood” or “Adena” points occur, reference to them is not consistent in the literature. Therefore, if Early Ceramic Period sites exist without pottery or reliable dates, they may go unrecognized as such.

Another complicating factor relates to pottery function. If, as Taché and Craig (2015) suggest, Early Ceramic Period pots serve a particular function related to specialty foods for gatherings, these pots may be represented differentially across the landscape. Hence, Early Ceramic Period pots in the archaeological record may skew interpretations of Indigenous land use during this time.

Coastal sites also provide evidence of occupation at this time as indicated by Early Ceramic Period material remains recovered from sites such as the Turner Farm site (Bourque 1995) a large multi-component site situated on North Haven Island in Penobscot Bay and Scott’s Midden site on Deer Isle (Cox 2009). Site files from the Maine Historic Preservation Commission
also include sites from Stonington, Castine, and Blue Hill as evidence of Early Ceramic Period occupation in Penobscot Bay. Of note, some house floors identified at the Knox site date are attributable to the Early Ceramic Period (Belcher 1989).

The Middle Ceramic Period (CP2-4; ca. 2150-950 \(^{14}\text{C}\) yrs B.P.) is well represented in the Penobscot River valley from the interior to the coast and ceramic manufacture and use appears to be most abundant at this time. The environment during this time is generally interpreted as being similar to that which exists in the Penobscot River valley today. However, global climate records indicate a cooling period at roughly 1000 years ago (Gajewski 1987; Russell et al. 1993).

Unlike the Early Ceramic Period, pottery styles change dramatically over this 1200-year period. Early in the Middle Ceramic Period pots have surfaces impressed with pseudo-scallop shell or dentate designs. Later in the Middle Ceramic Period potters switch to cordage-based techniques such as cord-wrapped stick with punctates. The most notable change in pottery during the Middle Ceramic Period is the shift to shell temper during Ceramic Period 4 (ca. 1350-950 \(^{14}\text{C}\) yrs B.P.). The shift to this type of temper at this time is not completely understood.

Eventually, between 950 and 650 \(^{14}\text{C}\) yrs B.P. the use of shell temper becomes the predominant temper type across both coastal and interior environments. Archaeological evidence also suggests that it is during this time that cordage twist becomes uniform across these interior and coastal settings with “Z” twist dominating ceramics with fabric or cordage impressions (Petersen and Sanger 1991).

Evidence of Middle Ceramic Period occupation occurs in all sites included in this study. Within the central Penobscot River, the Blackman Stream site produced a date of 1110 ± 70 \(^{14}\text{C}\) yrs B.P. on a feature with pottery (Kelley 2006) and Middle Ceramic Period occupations are also evident at the Gilman Falls site, at the Gut Island site near Indian Island, at the Bob Site, and at other unnamed sites in the central part of the river.

Penobscot Bay also appears to have been occupied extensively during the Middle Ceramic Period. Bourque’s (1971) dissertation research produced evidence of Middle Ceramic
Period occupation from three sites in East Penobscot Bay, both on and near Deer Isle—the Wiesenthal site, the Eaton site, and the Hunniman site (Bourque 1971). Radiocarbon dates and pottery from these sites fall within the Ceramic Period 3-4 time range (Bourque 1971). Closer to the mouth of the Penobscot River, the Kidder Point site and Sears Island produced ceramics diagnostic of Ceramic Period 2 (Spiess and Hedden 1983). Additionally, sites on Penobscot Bay’s outer islands such as Isle au Haut and Kimball Island have Middle Ceramic Period components (Kristmanson 1992).

The Late Ceramic Period (ca. 950-450 14C yrs B.P.) delineates another shift in ceramic technology. Additionally, increasing social complexity and social alliance networks are common interpretations for social organization at this time (Sanger 2005:31; Robinson 2009:30). Bourque and Cox (1981) suggest that the Goddard site in Blue Hill Bay provides evidence of trade and social gathering during this period (Bourque and Cox 1981). Items including a Viking coin and nonlocal lithic tools are cited as evidence of such.

The interactions among peoples living during the Late Ceramic Period likely provided a social framework from which the Wabanaki Confederacy emerged. The Wabanaki Confederacy is a social and political alliance that exists among the contemporary Native peoples of Maine. It provides a social mechanism to collectively address issues affecting Native peoples regionally. It also inspires gatherings and a strategic framework for engaging with external groups.

Similar to the Middle Ceramic Period, coastal shell middens are features of the cultural landscape of the Late Ceramic Period. As discussed above, these middens contain diverse archaeological materials not found in other spatial context (e.g. house features, bone tools). They are also time capsules for periods related to European colonization as contact on the coast was more common than in the interior of Maine.

It is also during the Late Ceramic Period that maize agriculture is believed to have entered pre-contact lifeways on the Kennebec River and west (Sanger 2005). Evidence of maize agriculture has not been identified for the Penobscot River valley. However, this does not mean
that people in the study area did not cook and eat corn which could have been obtained through travel and trade. Its presence regionally may have had some effect on peoples in the Penobscot River valley either through subsistence, trade, or technology.

A major ceramic shift to more globular vessels with substantial collars occurred during the Late Ceramic Period. Geometric designs similar to Iroquoian pots described by European colonists have been recovered from Late Ceramic Period sites in Maine (Bourque 2001). The similarity of Maine pots to those in the St. Lawrence Valley is often interpreted as increased interaction between peoples of Maine and Iroquoian groups to the west. This has yet to be confirmed.

Late Ceramic Period sites in the Penobscot River Valley occur at the Hirundo site (Sanger et al. 1977), the Bob site (Mack et al. 2002) the Blackman Stream Site (Sanger, David, Belcher, William R., and Kellogg 1992) and at the Eddington Bend site (Sanger and Petersen 1987; Mack 2016). Of the Late Ceramic Period sites in Penobscot Bay, the Goddard Site mentioned above is probably the best known and documented. Other Late Ceramic Period sites occur on Isle au Haut and Kimball Island (Sanger 1979; Belcher 1988).

**Enter Europeans—The Contact Period in the Penobscot River Valley**

European contact had devastating impacts on the Indigenous communities of Maine and the complexities of the contact period are beyond the scope of this dissertation. For a review of early European contact with Wabanaki peoples see Prins and McBride (2007).

Ethnohistoric accounts indicate that the first European contact in Maine occurred in the 1500’s when Giovanni Verrazzano explored the Maine coast on behalf of the King of France (Prins and McBride 2007). Exploration and economics influenced early efforts to interact with Indigenous groups and following initial explorations, settlers’ engagement with Indigenous communities were motivated by land acquisition, religious conversion, and the fur trade. The Penobscot River was central to these efforts. However, archaeological evidence of the contact period is poorly represented in the Penobscot River Valley.
The colonial period is represented on Indian Island. In 1970, Snow (2009) conducted excavations on the southern tip of Indian Island to explore an 18th century stockade that was destroyed by the English in 1723 (Snow 2009). Snow (2009) reports a mix of pre- and post-contact artifacts. Post-contact items recovered during this excavation included trade beads and gun flints. Snow (2009:10) also reports a series of post molds and an associated radiocarbon date of $155 \pm 100 \, ^{14} \text{C} \, \text{yrs B.P.}$ Although Snow (2009:10) questions the reliability of such a late date, it falls within the time frame of the stockade.

Excavations on the southern tip of Indian Island conducted as part of a mitigation project for a waterline occurred in 1998 and 1999 (Robinson 2009). In addition to a Middle Ceramic Period component at this location, Robinson (2009) also reported 19th century ceramics, kaolin pipe fragments, glass, and an iron mouth harp. This area of Indian Island produced evidence of an Archaic period occupation as well, suggesting a long-term connection between people and place.

Similar to what was noted by Boulanger and Hill (2015) for the Fort Hill Site in the Connecticut River Valley, Indian Island has been interpreted as a place of social realignment in times of stress or duress resulting in "composite ethnic groups" during post-contact times (Prins and McBride 2007). Given the occurrence of social realignment at times of contact in the region, it is not unreasonable to think that Native peoples behaved in similar ways prior to European contact although perhaps for different reasons. Material culture reflects this complex engagement of different peoples.

Future research on Indian Island guided by Indigenous archaeologies methodologies will be a valuable contribution to telling the Penobscot story and the impact of European contact. The introduction of a Tribal Historic Preservation Program at Penobscot Nation in the last decade has created a mechanism for supporting local Indigenous archaeologies projects. Some of this work has occurred through partnerships with the University of Maine, tribal tourism offerings, and construction project review. Through these efforts, Penobscots are experiencing greater Indigenous management and control over their cultural patrimony. Additionally, the community
now has the infrastructure to participate in archaeological spheres. This has led to increased interpretive power with regards to archaeology specifically, and a more prominent voice in broad heritage issues. It is expected that the future of Penobscot archaeologies will continue to grow in empowered ways.

**Conclusion**

This section is a re-telling of the human and natural histories of the Penobscot River valley. Generally, it is presented in a way that subscribes to archaeological conventions in the region. The Paleoindian, Archaic, Ceramic and Contact periods are presented here with special focus on these units within the Penobscot River valley. This discussion is complemented by a presentation of Indigenous oral narratives as advocacy for a multi-vocal, Indigenous archaeologies approach. Within the two narratives, the formation of the Penobscot River valley constitutes a major event in the evolution of this cultural landscape. Following the River’s establishment, it supported the human lifeways reviewed here. It is a 10,000-year story.

People change through time and space and the archaeological constructs reviewed here highlight those changes in typical culture historical fashion. Each archaeological unit discussed above contributes to our understandings of past peoples. However, the story is incomplete. Interdisciplinary approaches to reconstructing the past have proven to be valuable in aiding archaeological interpretations. Oral narratives are an important piece of an interdisciplinary approach.

In the beginning of this section I shared a legend that describes how the Penobscot River was formed. The following narrative provides an account of how land-based features came to be in Penobscot Bay. These stories combined with the archaeological, geological, and ecological narratives presented here are all part of the River’s story. The remaining chapters of this dissertation are a continuation of this story.
Gluskabe Shapes the Land

One day Gluskabe and his dog were traveling in a canoe and they came across a high mountain (Kineo or Katahdin). The dog awoke from sleeping and sniffed the air. Turning toward the mountain he told Gluskabe that the people would need meat to eat. He told Gluskabe to have his bow and arrow ready for the morning and the dog would go to the mountain and drive a moose toward Gluskabe. The dog instructed Gluskabe to shoot the Moose, open its belly with his stone knife and throw the entrails to the dog. The next morning Gluskabe awoke to the sounds of his dog barking so he rushed to prepare himself with his stone knife and bow and arrow.

Gluskabe could tell by the sound of the dog barking that he was headed toward the water. Then suddenly he saw the moose run through the woods and into the water and begin to swim toward the other land. The dog also came out of the woods and traversed the land and water reaching the other land and preventing the moose from getting out of the water. Then Gluskabe took his canoe and tools and moved in front of the moose. When the moose saw Gluskabe and his dog, he turned to go to the other shore, so Gluskabe chased him and just before the moose reached land Gluskabe killed the animal and dragged the dead moose on to the land. Remembering what his dog had told him to do, Gluskabe cut open the moose’s belly and threw the intestines to his dog who was sitting on another shore [Isleboro]. As he did so he said “Let this day put a mark on the place of my doings.” Some of the intestines fell into the water and turned to a vein of quartz beneath the water. He then proceeded to cut up the animal setting some meat aside for food. He used other parts to mark the land. The hind quarters marked his first moose hunt and became Cape Rosier and the moose’s liver is now Thrumcap Ledge (Francis 2009; Speck 1918).
CHAPTER 6

SITES AND SAMPLES

Introduction

In this study, I examine technological choices of potters living in the Penobscot River valley to humanize Maine’s Indigenous past and show how approaching an archaeological problem through an agency-based framework can improve and expand upon archaeological interpretations guided by normative approaches. By exploring potters’ choices from three distinct locations within one river valley, I assess the prevailing settlement model for Maine that distinguishes groups based on adaptations to coastal and interior environments. My expectation is that by analyzing technological attributes of ceramics using an agency framework, I can reveal information about the social context of ceramic production, how attributes such as cordage twist relate to other attributes within the spectrum of choice, and how time, choice, and identity intersect.

To that end, I selected sites and data sets that have temporal compatibility but are distinct spatially within one river system. Sites and samples selected represent an interior setting, a coastal setting, and a boundary setting near the head of tide. They are located within three physiographic divisions—the Eastern Lowlands region, the Central Interior Region and the Penobscot Bay Region as defined by McMahon (1990). These ecoregions are distinguished from each other based on differences in environmental characteristics such as soils, climate, vegetation, and topography.

The interior or “Howland” sample is derived from several small sites in central interior Maine near the confluence of two major rivers—the Penobscot River and the Piscataquis River. The Coastal sample includes ceramics from two shell middens from Penobscot Bay. One is located on an offshore island and the other is on the mainland. The third sample is in the town of Eddington, Maine near the head of tide—a unique ecological setting where the river and ocean begin to merge together (Figure 1). These data sets consist of Early, Middle, and Late Ceramic
Period (ca. 3050-450 \(^1^4\)C yrs B.P.) assemblages. The sites, their settings, and the ceramic assemblages are discussed below.

Within the following discussion, reference is made to temporal assignments of archaeological ceramics. The temporal assignments follow Petersen and Sanger’s (1991) seven-part ceramic chronology and are abbreviated using “CP” designators. For example, CP1 references “Ceramic Period 1.” Ceramic Period temporal assignments are defined in Table 1.

Cultural zones are also referenced here and represent periods of human activity at a site. Cultural zones are assigned based on stratigraphic and cultural units. They are not used to delineate discrete occupations; rather they refer to occupations spanning a temporal assignment.

The sections of this chapter are organized by sample location. With respect to each location, I present the geographic and physiographic setting of the site or sites, the history of research at each location and a summary of the archaeological data recovered from each site with an emphasis on ceramic data.

**The Howland Sites and Ceramics—the Interior Sample**

**Introduction**

The interior ceramic sample selected for this study was drawn from sites in north-central Maine on the lower Piscataquis River near its confluence with the main stem of the Penobscot River. The sites are located in the vicinity of Howland, Maine and occur in both island and riverbank settings. In the Penobscot language, the name Piscataquis is pskêhtakʷis and translates to “little branch river” (https://penobscot-dictionary.appspot.com/entry/6184246368534528/ accessed 14 Jan. 2017). Archaeological sites along this river show Indigenous families using the river and its landforms for roughly 10,000 years (Cook and Spiess 1981; Mack et al. 1997; Newsom and Sanger 1998; Newsom 1999; Petersen et al. 1986; Petersen 1991; Sanger and Newsom 2000; Spiess et al. 1984).
Current Physiographic Setting

Howland is roughly 60 km north of the head of tide. This places the Howland sites within the state’s Eastern Lowlands ecoregion—an area that covers roughly 2.2 million acres in East-Central Maine (McMahon 1990). This physiographic unit encompasses lowlands west of the St. Croix River and includes forested ecosystems and an abundance of marshes, peatlands, and swamps (McMahon 1990). Present day forests of this region include both hard-wood and soft-wood species such as red and black spruce, balsam fir, sugar maple and yellow birch. For some floral species such as dogwood, swamp honeysuckle, and sumac, the Eastern Lowlands ecoregion marks their northern limits (McMahon 1990).

The Piscataquis River and its tributaries above Howland have been identified as prime spawning and nursery habitats for Atlantic Salmon. The Atlantic Salmon authority has estimated that it provides nearly 1/3 of all Atlantic salmon production habitat in the Penobscot drainage (Newsom 1999). Riverine habitats in the region host terrestrial, aquatic, and semi-aquatic species of birds. The hardwood floodplain forests and early successional growth forests in the area are suitable for white-tailed deer. Other mammals inhabiting the area include beaver, bear, muskrat, and red fox (Newsom 1999).

The Eastern Lowlands ecoregion has a seasonal climate with average temperatures ranging from 3° F in the winter to 79° F. in the summer. Summers are often humid and precipitation occurs throughout the year with an average rainfall of 46” and an average snowfall of up to 100” in western parts of the region (McMahon 1990).

History of Research

The Piscataquis River flows west to east and has long been known as an important interior canoe route for Maine’s Indigenous peoples. According to Eckstorm (1926:65), Joseph Chadwick first surveyed the interior of Maine in 1764 on behalf of the Governor of Massachusetts, Francis Bernard. Bernard commissioned Chadwick to assess the potential for building a road from the mouth of the Penobscot River at Stockton Springs to Quebec. In
surveying the interior, Chadwick (1764 in Eckstorm 1926) referenced the Piscataquis as the “Piscataquis-ahwangan” or “Indian Route” to Moosehead Lake, a route Eckstorm (1926:80) describes as going up the Piscataquis River and Sebec Stream to a series of ponds, then to Moosehead Lake. This lake is the location of Mt. Kineo—a source of felsite used for stone tool making throughout the pre-contact period. The term “ahwangan” is likely a rough derivation of the Penobscot term “a’wanga’nis” or “awonikansis” which translates to “little portage” (Carol Dana/Gabriel Paul pers. comm. 2017).

The significance of the Piscataquis River as a route to the interior of Maine, and its potential for archaeological research, was recognized by Warren K. Moorehead (1922). Moorehead (1922) led an archaeological survey team to explore the region in 1915 beginning at the confluence of the Piscataquis and Penobscot Rivers and moving upstream. In addition to providing a canoe route to Moosehead Lake, the Piscataquis River and its northern tributaries also provided access to a large hematite deposit in central Maine, which was mined extensively in the 19th century by Katahdin Iron Works. Moorehead (1922) reports that while the rest of his crew surveyed the banks of the Piscataquis River, he and Walter B. Smith journeyed north to explore Katahdin Iron works in search of red ochre graves. They did not locate any burials in the vicinity of Katahdin Iron Works. Moorehead and Smith collected samples of both yellow and red ochre from the vicinity of Katahdin Iron works then returned to assist the rest of the crew with the archaeological exploration of the Piscataquis River (Moorehead 1922).

According to Moorehead (1922), his crew located a large village site at the confluence of Seboeis Stream and the Piscataquis River. His account places the crew in that location at the end of July, 1915 (Moorehead 1922). He also described a sawmill at the site. Smith (1923) on the other hand, makes no reference to a sawmill at the mouth of Seboeis Stream in his journals, nor does he report a site there. However, he does report a large site at the mouth of Schoodic Stream and his journals place the crew on Schoodic stream at the end of July (Smith 1923; Newsom 1999). It appears that Moorehead confused the two streams in his reporting (Newsom 1999).
Excavations at the confluence of Seboeis Stream and the Piscataquis River in the 1990’s revealed a Ceramic Period site at this location but its small size did not match Moorehead’s description. Several decades passed before archaeologists revisited the area after Moorehead’s investigation. Interest in the archaeological resources along the Piscataquis River resurfaced in the 1980’s when Cook and Spiess (1981) surveyed the Piscataquis River exploring the relationship between archaeological sites and canoe routes. The project included an assessment of local collections as well as a limited survey along the banks of the Piscataquis River. Based on this survey, they concluded that Indigenous peoples occupied the Piscataquis River from roughly 5100- 500 $^{14}$C yrs B.P (Cook and Spiess 1981).

Avocational archaeology along the Piscataquis River has contributed to its archaeological story. In 1982, an avocational archaeologist revealed the Brigham site—a deeply stratified site near the confluence of the Sebec and Piscataquis Rivers. Charcoal recovered from this location was dated to 10,300 B.P. (Petersen 1991). This prompted the Piscataquis Archaeology Project which was initiated to explore the archaeological potential of the location. Work under this project revealed the nearby Sharrow site—a deeply-stratified riverine site that preserved a cultural record spanning much of the pre-contact period (Petersen 1991). As such, it challenged not only models of human occupation of Maine’s interior, but also shifted archaeological approaches to field work to include exploration of deep stratigraphic deposits.

Archaeological researchers from the University of Maine returned to the lower Piscataquis between 1995 and 1997. Their aim was to conduct a cultural resources management study mandated by federal relicensing requirements for the Howland Dam (Mack et al.1997; Newsom and Sanger 1998; Newsom 1999). This research was accomplished under the direction of Dr. David Sanger. The University of Maine team identified 38 pre-contact sites—18 of which were determined eligible for Phase II level archaeological research. The objective of these studies was to assess the content and integrity of prehistoric archaeological sites being impacted by the Howland dam and to ascertain whether or not they were eligible for inclusion in the National
Register of Historic Places (Newsom 1999). Fourteen sites underwent Phase II research and ceramics from seven of those are included in this study. The data collected from the cultural resources management research on the lower Piscataquis was analyzed and reported on in my Master's thesis (Newsom 1999).

**Archaeological Summary**

Archaeological research within the Howland area shows that Native peoples frequently chose landforms near confluences of rivers and streams. Sanger (1979) identified this as a common settlement pattern during pre-contact times. The sites in this area occur in two localities—the Seboeis Stream locality and the Maxy Brook locality. The locality concept is defined by Phillips and Willey (1953:618) as a discrete spatial unit larger than a site that encompasses one or more sites within a geographic space. The spatial proximity of sites within a given locality is conducive to interaction among peoples settling there, should the sites be used concurrently.

Ceramics from four sites at the confluence of the Piscataquis River and Maxy Brook (Maxy Brook Locality) and three sites at the confluence of the Piscataquis River and Seboeis Stream (Seboeis Stream Locality) are included in the present study (Figure 3). These sites produced ceramics spanning the Ceramic Period. However, the Late Ceramic Period is poorly represented in the Lower Piscataquis Region (Newsom 1999).

The Howland sites and associated ceramic assemblages are discussed below. The descriptions are summarized based on Newsom and Sanger (1998) and Newsom (1999) unless otherwise noted. I conducted all of the artifact analysis on the assemblages from the Howland sites with the exception of faunal material which was analyzed by Jeffrey Sommer as part of the Phase II research in the Howland area. For purposes of this analysis, I used previously established vessel lots but re-analyzed the ceramic collection to ensure consistency in my methods.
The Seboeis Stream Locality

The Seboeis Stream locality is located at the confluence of the Piscataquis and Penobscot Rivers and measures roughly 1 km² (Figure 3). Sites in this locality are situated on a small island near the mouth of the Piscataquis River, on both banks of the river, and on the east bank of Seboeis stream which is a small tributary on the north side of the river. Nine archaeological sites underwent cultural resources management assessment. Of those, 3 represent sites with significant Ceramic Period assemblages. Each of these sites is discussed below.

The Bo-Island Site (108-36)

The Bo-Island site (108-36) (Figure 3) is the only island-based site within this locality. Evidence of pre-contact occupation occurs primarily on the southern and western portions of the island. Phase II excavations occurred in 1996 and archaeological crews excavated 25 m² of the site. Cultural materials were recovered from depths up to 140 cmbs (centimeters below surface) (Mack et al. 1997; Newsom and Sanger 1998; Newsom 1999). The site is deeply stratified with the thickest alluvial deposits occurring in the Northwest portion of the island.

The Bo Island site is multi-component with evidence of both Late Archaic and Ceramic Period occupations. The recovery of an ulu fragment and three Late Archaic period plummets during Phase I testing prompted additional study (Mack et al. 1997). Cultural material recovered from the site includes ceramics ranging in age from Ceramic Period 1 (ca. 3050-2150 ¹⁴C yrs B.P.) to Ceramic Period 4 (ca. 1350-950 ¹⁴C yrs B.P.), 84 lithic tools representing both the Ceramic and Late Archaic periods, and 930 faunal fragments which includes unidentified mammal, beaver, river otter, and turtle.

Three cultural zones were identified at the site representing the Early Ceramic Period, the Middle Ceramic Period and the Late Archaic Period. Cultural material assigned to the Late Archaic Period was concentrated in the northwest portion of the site with a few scattered items in the southwestern area of the site. The Early Ceramic Period occupation occurred only in the northwest portion of the island. This component was represented by cordage impressed interior
and exterior pottery (Vinette 1) and an associated hearth feature which was dated to 2180 ± 90
14C yrs B.P. (Newsom 1999). The Middle Ceramic Period component occurred in the northwest
and southwest portions of the site.

Seven cultural features were identified during Phase II excavations at the Bo Island site.
Five of them occurred in the northwest portion of the island and the remaining two occurred in
one excavation unit in the southwest corner of the island. Features on the island appear to fall into
two categories--hearts and shallow basin-shaped pits with stained sediment.

Four features were identified as hearths. One hearth feature was assigned to the Early
Ceramic Period based on a radiocarbon date of 2180 ± 90 14C yrs B.P. (Newsom and Sanger
1998; Newsom 1999) and its stratigraphic association with CP1 and CP2 pottery. Two hearth
features were assigned to the Middle Ceramic Period based on stratigraphic context, and one
hearth feature was not given a temporal assignment.

Three basin-shaped features also occurred at the site. One was assigned to the Late
Archaic based on an associated biface form and two were assigned to the Middle Ceramic Period
based on stratigraphic context.

Remnants of seven ceramic vessels were recovered from the Bo Island Site (108-36)
during Phase I and Phase II excavations (Mack et al. 1997; Newsom and Sanger 1998; Newsom
1999). These seven vessel lots are included in the present study. The ceramic assemblage includes
327 sherds and spans the CP1-CP4 time periods. The site produced one CP1 vessel lot with
cordage impressed interior and exterior surface treatment; two vessel lots with rocker dentate
stamped exteriors; two vessel lot with simple stamped dentate surface treatment; and two vessel
lots with cord-wrapped stick surface treatment. Most vessel lots (n=5) have grit inclusions,
although one vessel lot has shell/organic inclusions and a second vessel lot contains a mix of
organic and grit inclusions.
The Seboeis Site (108-38)

The Seboeis Site (108-38) is located on a low terrace on the east bank of Seboeis stream near its confluence with the Piscataquis River (Figure 3). The site is small and runs parallel to the stream. It measures approximately 35 m long by 8 m wide. Cultural deposits are deep here with materials recovered from depths up to 130 cmbs. The site is experiencing severe erosion in some areas. However, a large boulder on the shoreline near the east end of the site appears to be offering some limited protection against erosion (Newsom and Sanger 1998; Newsom 1999).

The stratigraphy at site 108-38 is complex and is represented by a sequence of deep alluvial sands. Colluvial deposition from the adjacent slope may have also contributed to the stratigraphic sequence. Some strata are uniform across the site whereas others are more localized. Several buried soil horizons, as evidenced by dark sediment and the presence of charcoal, exist at the site (Newsom and Sanger 1998; Newsom 1999).

The artifact assemblage from the site includes 21 stone tools and 629 flakes. Faunal material representing unidentified mammal, beaver, turtle and fish was recovered from the site. Ceramics representing the Early, Middle and Late Ceramic Periods (ca. 3050-450 14C yrs B.P.) were recovered. Archaeological materials from earlier periods were not recovered during Phase I and Phase II excavations (Mack et al. 1997; Newsom and Sanger 1998; Newsom 1999).

Three cultural zones were identified at the site. Zone 1 is a Middle Ceramic Period occupation represented by CP2 through CP4 ceramics. This zone is distributed across the site and CP2 vessel lots dominate this zone’s ceramic assemblage. Zone 2 represents the Early Ceramic Period based on the presence of fabric impressed interior/exterior ceramics (Vinette 1) and two radiocarbon dates--2590 ± 100 14C yrs B.P. and 2720 ± 100 14C yrs B.P. (Newsom and Sanger 1998; Newsom 1999). Zone 3 is interpreted as a small Late Ceramic (950-450 14C yrs B.P.) period occupation based on the remains of 1 vessel lot assigned to CP5/6, a hearth feature, and associated lithic and faunal remains. Cultural material assigned to this zone was recovered on the west end of the site near the riverbank. Zone 3 at the Seboeis site (108-38) is the only evidence of
Late Ceramic Period occupation from the Seboeis stream locality (Newsom and Sanger 1998; Newsom 1999).

Four hearth features were identified during excavations at the Seboeis site representing three cultural components (Newsom and Sanger 1998; Newsom 1999). With the exception of one feature identified in a test pit near the upstream end of the site, the features at this site generally clustered near the river bank in the center of the site. All included both ceramic and lithic material remains and three of the four included faunal remains. Species associated with hearth features at the Seboeis Site include turtle, beaver, fish and unidentified mammal. Two features were assigned to the Middle Ceramic Period based on stratigraphic context and associated material culture. One feature represents an early Ceramic Period feature as evidenced by CP1 pottery and an associated radiocarbon date of 2590 ± 100 14C yrs B.P. (Newsom and Sanger 1998; Newsom 1999) and one feature was assigned to the Late Ceramic Period based on CP5/6 ceramics and stratigraphic context (Newsom and Sanger 1998; Newsom 1999).

The ceramic sample from the Seboeis site includes 18 vessel lots comprised of 436 sherds. This assemblage represents a well-stratified sequence documenting changes in ceramics through time. However, the Late Ceramic Period is poorly represented with only one vessel lot assigned to it. Most vessel lots from the site have grit inclusions, two vessel lots have organic inclusions and one has a mix of both grit and organic materials. Surface treatments represented in this collection include rocked and simple dentate stamping, cord-wrapped stick, fabric-impressed, pseudo-scallop shell stamped and punctates.

The Eagle View Site (108-40)

The Eagle View Site (108-40) is located on a high terrace on the North bank of the Piscataquis River opposite the Bo Island site (108-36) (Figure 3). The site measures 77 m long and 20 m wide with cultural materials occurring as deep as 190 cmbs. Phase II excavations consisted of 15.75 m² and occurred within 20 m of the riverbank. Deep alluvial sediments
characterize the stratigraphy and strata are unevenly distributed across the site (Newsom and Sanger 1998; Newsom 1999).

The artifact assemblage from this site consists of thirty-six stone tools, and 1,317 lithic flakes. Ground stone tools such as a stone rod fragment and a celt/gouge preform indicate a Middle Archaic Period component. Faunal material included unidentified mammal, turtle, beaver, black bear, bird, large rodent and large carnivore. Ceramics spanning the CP2-CP4/5 (ca. 2150-650 $^{14}$C yrs B.P.) time period were recovered from the site (Newsom and Sanger 1998; Newsom 1999).

Two cultural zones were identified at the site. A Middle Ceramic Period zone is represented by CP2 through CP4/5 ceramics and occurs across the site. One side-notched biface with Meadowood-like characteristics was recovered in association with CP2/3 pottery (Newsom and Sanger 1998; Newsom 1999). Meadowood bifaces are generally interpreted as representing the Early Ceramic Period. However, no Early Ceramic Period pottery was recovered from the site. This specimen is similar to one recovered from an Early Ceramic Period context at the Knox site (Belcher 1988; 1989).

Cultural zone 2 is a Middle Archaic Period occupation represented by ground stone tools and a radiocarbon date of 7380 ± 110 $^{14}$C yrs B.P. on a hearth feature (Newsom and Sanger 1998; Newsom 1999). This zone is distinguished by a stratigraphic divide between it and the Middle Ceramic Period zone. It occurs between 120 and 170 cmbs near the south end of the site. The presence of low-grade metamorphic chipping debris associated with this zone provides additional support for a Middle Archaic Period occupation at the site as this material is commonly used in stone tool manufacture during this time period (Newsom and Sanger 1998) (Sanger 1996 Gilman Falls).

Excavations at the Eagle View site (108-40) revealed four cultural features (Newsom and Sanger 1998; Newsom 1999). One hearth feature with fire-cracked rock and a reddish-brown sediment stain was identified during Phase I testing. This feature did not produce any cultural
material and is unassigned temporally. Two hearth features were assigned to the Middle Ceramic Period based on diagnostic ceramics and stratigraphic context. One was identified during Phase I testing and included CP4/5 ceramics (Mack et al. 1997). The other hearth was identified during Phase II excavations and included more than 50 lbs of fire-cracked rock, debitage, and potsherds with smooth surfaces (Newsom and Sanger 1998; Newsom 1999).

An Archaic Period feature also occurred at the Eagle View site (108-40). This feature was a basin-shaped sediment stain with 2 pieces of fire-cracked rock. Artifacts included one scraper and debitage. Calcined faunal material was also recovered from this feature and included mammal, bird, turtle, rodent, and beaver (Newsom and Sanger 1998; Newsom 1999).

Eight ceramic vessel lots comprised of 126 sherds from the Eagle View Site (108-40) are included in this study. The assemblage is representative of the Middle Ceramic Period (CP2-4). One vessel lot recovered during Phase I testing at the site was assigned to CP4/5 (Mack et al. 1997). This vessel lot has grit inclusions and faint cord-wrapped stick impressions. CP5 pots are distinguished from CP4 ceramics by way of the dominant use of shell/organic temper as well as a decrease in cordage thickness (Petersen and Sanger 1991). Because this vessel lot does not have shell/organic inclusions and its cordage thickness is larger than the average for CP4 vessel lots in this study (1.61 mm vs. 1.33 mm, respectively), I have reassigned this vessel lot to CP4. The remaining seven vessel lots include two rocker-dentate stamped vessel lots, three simple dentate stamped vessel lots and one vessel lot with punctate impressions and one with no diagnostic design elements. Most vessel lots have grit inclusions. Two vessel lots exhibit both grit and organic inclusions.

Maxy Brook Locality

The Maxy Brook Locality is upstream of the Seboeis Stream locality and sites within it are situated on the North bank of the Piscataquis river (Figure 3). This locality covers a distance of roughly 1 km along the Piscataquis River near the confluence of the Piscataquis River and Maxy Brook. Five archaeological sites were excavated as part of a Phase II archaeological
assessment (Newsom and Sanger 1998; Newsom 1999). Four sites produced aboriginal ceramics representing the Middle Ceramic Period. These are included in the present study and are discussed below.

**Site 108-23**

Site 108-23 appears to be a short-term occupation in the most westerly portion of this locality near the Howland/Maxfield town line. Phase II excavations occurred in 1996 and consisted of 9.5 m² with a maximum depth of 130 cmbs. Cultural material was recovered from depths of up to 80 cmbs (Newsom and Sanger 1998; Newsom 1999). The site is on a high terrace adjacent to the river and measures approximately 405 m long and 10 m wide. A fining upward alluvial sequence, which consists of coarse sands underlying finer sediments, characterizes the site stratigraphy. Site 108-23 has experienced some disturbance from modern activities. A plow zone is present across the site. Brick and glass were recovered from below pre-contact material in several units during Phase II excavations (Newsom and Sanger 1998; Newsom 1999).

One Middle Ceramic Period cultural zone was identified at site 108-23. This zone is represented by two ceramic vessel lots—one with pseudo-scallop shell impressions and the other rocker dentate stamped impressions (Newsom and Sanger 1998; Newsom 1999). One chert biface fragment recovered during Phase I exhibited a flake scar reminiscent of fluting technology (Mack et al. 1997). The fragmentary nature of this specimen prohibited an assignment to a cultural zone. Site 108-23 produced an additional seven lithic tools and over three hundred lithic flakes. A very sparse faunal assemblage exists from this site. Only seven calcined bone fragments were recovered. These were all identified as medium to large mammal (Newsom and Sanger 1998; Newsom 1999).

One hearth feature was identified during Phase II excavations. It was basin shaped and semi-circular in plan view. Lithic debitage, charcoal, and fire-cracked rock were associated with this feature. This feature was not assigned to a cultural zone (Newsom and Sanger 1998; Newsom 1999).
Two ceramic vessel lots comprised of 78 sherds are present in the ceramic sample from site 108-23. Both are included in this study. These vessel lots are representative of CP2 and were assigned to this time period based on the presence of pseudo-scallop shell and rocker-dentate stamped surface treatments. Both vessel lots have grit inclusions and were recovered from the upstream end of the site.

**Site 108-24**

Site 108-24 is located on a high terrace above the Piscataquis River near its confluence with Maxy Brook (Figure 3). The site area is 140 m long and 11 m wide and is parallel to the river. Archaeological materials were recovered from depths up to 70 cmbs. Similar to 108-23, this site also has deep sediment deposits characterized by a fining upward alluvial sequence (Newsom and Sanger 1998; Newsom 1999).

Material evidence of site occupation is limited to Middle Ceramic Period cultural remains. Ceramics from the site represent Ceramic Periods 2, 3 and 4 (ca. 2150-950 $^{14}$C yrs B.P.). However, some mixing of ceramics is evident and brick was recovered between 30 and 40 cmbs suggesting disturbance at the site. Lithics recovered from site 108-24 include scrapers, stemmed and non-stemmed bifaces, a hammerstone and modified lithics such as cores and edge modified flakes. Faunal remains identified from site 108-24 include beaver, unidentified mammal, turtle, and deer (Newsom and Sanger 1998; Newsom 1999).

One Middle Ceramic Period cultural zone was identified at the site based on diagnostic ceramics. This zone occurs in the upper 80 cm of the stratigraphic sequence and it is concentrated between 20 and 60 cmbs. No other cultural zones were identified at the site (Newsom and Sanger 1998; Newsom 1999).

One feature was identified during Phase I testing at the site. It was described as a hearth feature with dark brown sediment, charcoal and bone (Mack et al. 1997; Newsom 1999). A tentative association between this feature and a rocker dentate stamped vessel lot and two non-stemmed bifaces was reported in the Phase I report (Mack et al. 1997).
Site 108-24 produced 926 sherds assigned to 12 vessel lots. Four vessel lots have rocker dentate stamped surfaces; three have smooth surfaces with no additional surface treatment; cord-wrapped stick impressions occur on two vessel lots, and pseudo-scallop, channeling, and dentate stamp surface treatments each occur on one vessel lot. Ceramics from the site span the CP2-CP4 (ca. 2150-950 \(^{14}\)C yrs B.P.) time periods. One vessel lot has a mix of organic and grit paste inclusions. The remaining vessel lots have grit inclusions.

**Site 108-26**

Site 108-26 is situated on the north side of the Piscataquis River on a high terrace running parallel to the river bank (Figure 3). The site is roughly 35 m long and 10 m wide. Cultural deposits extend up to 70 cmbs (Newsom and Sanger 1998; Newsom 1999). The stratigraphy is similar to others in this locality and is characterized by a fining upward alluvial sequence. Phase II excavations occurred in 1996 and were recommended based on an intact Middle Ceramic Period component at the site (Mack et al. 1997). Site 108-26 also produced 41 ceramic manufacturing scraps and represents one of the few locations within the interior sample where ceramic manufacturing is evident at the site. The other is the Eagle View site where only one manufacturing scrap was recovered. Historic and modern artifacts were also recovered from Site 108-26 and include a kaolin pipe bowl and historic nails (Newsom and Sanger 1998; Newsom 1999).

A single Middle Ceramic Period cultural zone was identified at site 108-26 based on six ceramic vessel lots ranging from CP2-CP3 (ca. 2150-1350 \(^{14}\)C yrs B.P.) A Middle Ceramic Period date of 2230 ± 70 \(^{14}\)C yrs B.P. was also obtained on a charcoal sample associated with rocker dentate ceramics (Newsom and Sanger 1998; Newsom 1999). This date is considered early for rocker dentate ceramics in the region. No cultural features were identified at this site.

Remnants of six ceramic vessel lots comprised of 899 sherds from site 108-26 were included in this study. The assemblage includes four rocker dentate stamped ceramics, one pseudo-scallop shell stamped vessel lot and one vessel lot with a punctate and incised surface
All vessel lots are grit temper. Manufacturing scraps are also included in this assemblage and were interpreted as being an indicator of warm season occupation (Newsom 1999).

**Site 108-27**

The final site within the Maxy Brook locality to be discussed here is site 108-27. Like several other sites in this locality, Site 108-27 is located on a high terrace on the North bank of the Piscataquis River. It is also adjacent to Maxy Brook (Figure 3). Phase II excavations occurred in 1997 and crews excavated 12 m². The site measures roughly 70 m long and 15 m wide along the river with cultural deposits occurring up to 80 cmbs (Newsom and Sanger 1998; Newsom 1999). Site stratigraphy is characterized by alluvial fine-grained sands with two buried horizons present at the site.

The Ceramic Period is well-represented at the site and earlier occupations were not evident based on excavations there. Cultural material recovered from the site includes ceramics ranging from CP1 to CP4/5. Six stone tools reminiscent of chipping activity were recovered from the site (e.g. hammerstone, felsite chunk, core). Faunal remains recovered from Site 108-27 included six fragments representing beaver and mammal (Newsom and Sanger 1998; Newsom 1999).

Initially, three cultural zones were identified at the site representing Early, Middle, and Late Ceramic Period occupations. The Early Ceramic Period zone is represented by a single CP1 vessel lot recovered from a shovel test pit (Mack et al. 1997). No other Early Ceramic Period material was recovered.

The Middle Ceramic Period zone is well-represented by six vessel lots spanning the CP2-4/5 time periods. Most vessel lots assigned to this zone are generally clustered in two units near the upstream end of the site. A radiocarbon date of 1510 ± 90 ¹⁴C yrs B.P. on a hearth feature at the site supports the presence of a Middle Ceramic Period occupation (Newsom and Sanger 1998; Newsom 1999).
A late Ceramic Period cultural zone was proposed at this site based on one vessel lot assigned to CP 5/6 during Phase I analysis (Mack et al. 1997). I reassigned this vessel lot to CP4/5 based on the presence of grit inclusions in the vessel lot and its cord-wrapped stick/circular punctate design. Shell/organic inclusions dominate CP5 and CP6 ceramics in the region. These ceramic attributes and the site context are more appropriate to CP4/5. Therefore, a Late Ceramic Period zone is not likely represented at this site.

Excavations at site 108-27 revealed four cultural features. All features at the site are associated with one stratum assigned to the Middle Ceramic Period. FCR was not abundant in these features. All were described as circular or semi-circular sediment stain with charcoal. One feature was associated with 2 vessel lots—one with cord-wrapped stick impressions and one with dentate impressions. This feature was dated to 1510 ±80 14C yrs B.P. (Newsom and Sanger 1998; Newsom 1999). The associated cord-wrapped stick vessel lot may represent an early example of this type of surface treatment. Features at this site occurred near the upstream end of the site away from Maxy Brook.

Nine ceramic vessel lots from site 108-27 are included in this study. They are comprised of 1367 sherds recovered during Phase I and Phase II archaeological research (Mack et al. 1997; Newsom and Sanger 1998; Newsom 1999). One vessel lot is assigned to the Early Ceramic Period based on cordage impressed interior and exterior surfaces. The remaining vessel lots are representative of the Middle Ceramic Period. Three vessel lots are rocker dentate stamped and three are cord-wrapped stick impressed. The remaining two vessel lots are corded/fabric impressed exterior and simple dentate stamped, respectively. All vessel lots from this site are grit tempered.

**Summary Interior Sites and Ceramic Assemblages**

The ceramic sample from the Howland, Maine sites spans the Ceramic Period (ca. 3050-450 14C yrs B.P.) with Ceramic Periods 2-4 best represented. Assemblages from seven sites within two distinct localities on the Piscataquis River are included in this study. Sixty-two vessel
lots and 4186 sherds comprise the sample. Ceramics assigned to Ceramic Period 2 dominate the assemblage representing 35% of the Howland sample. An Early Ceramic Period occupation of the area is evidenced by 6 fabric impressed interior and exterior vessel lots. The Late Ceramic Period is weakly represented by two vessel lots, both were recovered from site 108-38.

**Coastal Sites and Ceramic Samples**

**Introduction**

The ceramic sample representing the coastal setting in this study was drawn from two archaeological sites in Penobscot Bay. One sample is from the Knox site (30-21) - an offshore island site located in outer Penobscot Bay (Figure 1). The other assemblage is a private collection from site 30.96. This collection was accumulated from a shell midden on the mainland on Naskeag point near Brooklin, Maine. The two sites are roughly eight nautical miles apart and according to William Haviland (pers. comm. 2017) travel between them by boat “is close to a "straight shot" from Pell [Island] to Naskeag point” if one travels between a series of islands in the bay. Haviland travels these waters often by boat and offers the following comments on travel between the two locations:

To the south and east, there is the open water of Jericho Bay, so when the wind is blowing from those directions, a canoeist would want to take a route inside (to the west) of [a series of] islands, so as to be in the lee much of the time. Mornings would be calmer waters generally, but there are strong tidal currents at the foot of Eggemoggin Reach, which can kick up a chop, so timing would be a key consideration (Haviland pers. comm. 2017).

Given Haviland’s description of boat travel between the two sites, it is reasonable to speculate that site inhabitants had some form of social relationship, interaction, or engagement and a comparable lifestyle. Therefore, material culture from the two locations should display some shared characteristics.

Penobscot Bay has a rich archaeological heritage and is significant in Wabanaki history and culture. The Wabanaki oral narrative presented in Chapter 5 references Gluskabe’s role in creating landforms in Penobscot Bay. In recounting his visit to some of these features, James
Francis, Penobscot Nation Tribal Historian, commented that visiting the landforms referenced in the Gluskabe story revealed the true meaning of the landscape and illustrated their navigational benefits when viewing the world from the water (Francis 2009).

Penobscot Bay has many archaeological sites dotting the coastline. Most, but not all, are shell middens. Evidence of Native American occupation of Penobscot Bay can be traced to the Middle Archaic Period based on our current understanding of the region. The sites selected for inclusion in this study are Ceramic Period sites. Each is discussed below following an overview of the current physiographic setting for the region.

**Current Physiographic Setting**

The coastal sites selected for this study fall within the Penobscot Bay physiographic ecoregion. This region extends from Pemaquid Point in the west to Naskeag Point near Blue Hill Bay in the East. Much of the region consists of a transitional forest ecosystem ranging from spruce-fir forests to mixed hard and soft wood forest (McMahon, 1990). Subarctic maritime flora grows on offshore islands. Average temperature ranges from 77°F in July to 11°F in January. Bedrock outcrops are common in the region with granite along the east shore and sandstones and pelites in the west (Osberg et al. 1985; McMahon 1990). Regional precipitation averages 49” annually and the region’s growing season is roughly 140 days (McMahon 1990).

**The Knox Site (30-21), Pell Island, Maine**

The Knox site is a shell midden site located on Pell Island—a small offshore island in East Penobscot Bay, Maine. Pell Island is situated on a pluton of course-grained granite with outcrops present adjacent to the site (Belcher 1989). Potters at this location may have accessed this granite source for temper. Pell Island is only accessible by watercraft (Figure 1) and is situated within an area that includes several major and minor offshore islands. The site is best known for the house floor features preserved at the site. Three cultural components were identified at the Knox site representing the Early, Middle and Late Ceramic Periods (Belcher 1988, 1989).
According to Belcher (1988), archaeological research at the Knox Site began in the 1920’s when documented by Arlo Bates (1922) while working for the R.S. Peabody Museum. Formal archaeological research was initiated when the site became part of the University of Maine’s coastal survey program in 1979 (Belcher 1988; Sanger 1979). Circular depressions on the surface of the site were interpreted as remnants of aboriginal living structures. This prompted a major research initiative at the site in 1979 and 1986 (Belcher 1988). Data recovered during these investigations served as the basis for Belcher’s (1988) Master’s thesis. Excavations focused on the house pits identified at the site as well as midden deposits between them. Belcher (1989:178) reports 23 m² were excavated at the site.

The Knox site represents a coastal space occupied by Native families throughout much of the Ceramic Period with the period between 1600 and 1200 ¹⁴C yrs B.P. representing the most “intense occupation of the site” (Belcher 1988:3). The site measures roughly 350 m² (Belcher 1988, 1989). Archaeological research at the Knox site revealed remnants of household dwellings which underwent extensive excavation and analysis. Belcher (1988) reports that two types of dwellings existed at the Knox site—semi-subterranean and surficial structures. Based on this research he identified three Ceramic Period components at the site. They include an Early Ceramic Period component represented by interior and exterior corded ceramics; a Middle Ceramic Period component represented by dentate decorated ceramics; and a very limited Late Ceramic Period component represented by cord-wrapped stick pottery (Belcher 1988). Several radiocarbon dates support these assignments. These are discussed below.

Material culture recovered from the site includes lithics, bone tools, ceramics and faunal material. Based on faunal data, Belcher (1988, 1989) concluded that Native peoples living at the Knox site shifted their fishing strategies over time. Specifically, they went from a brush weir fishing technology in the Early Ceramic Period to deep water fishing in the Middle Ceramic Period. This change accompanies a 1 m sea level rise between the two periods and Belcher (1988, 1989) interprets the change in fishing strategy as a response to changing sea levels.
Seven cultural features were identified at the site (Belcher 1988, 1989). Three features were described as formed hearths either in or adjacent to housing units. Other features include a ceramic cluster, an unformed hearth, a pit feature, and a line of rocks. Ceramics were associated with two of the formed hearths, the ceramic cluster, and the pit feature (Belcher 1989:24-28).

Belcher’s (1988, 1989) study produced several Ceramic Period radiocarbon dates. These are summarized here based on his reporting. Charcoal recovered from hearth feature No. 1 returned a radiocarbon date of 2020 ± 90 ¹⁴C yrs B.P. A cordage impressed interior and exterior vessel lot (V.11) was associated with this feature. A second cordage impressed interior and exterior vessel lot (V.14) was recovered from hearth feature No. 4. Charcoal from this feature was dated to 2270 ± 70 ¹⁴C yrs B.P. The ceramic cluster feature was also radiocarbon dated through associated charcoal and returned a date of 2720 ± 90 ¹⁴C yrs B.P. A Middle Ceramic Period date (1610 ± 70 ¹⁴C yrs B.P.) was obtained on shell (Mya Arenaria) associated with dentate stamped pottery (V.2 and V.6) (Belcher 1988). Radiocarbon dating records for this date are no longer available at Beta Analytic, Inc. It is unclear if this date was corrected for the Marine Reservoir Effect.

The ceramic assemblage from the Knox site includes 1,173 sherds. From those, Belcher (1988) identified 28 vessel lots which formed the basis of the sample included in this study. Most were assigned to Ceramic Period 3 (n=11) which is generally characterized by dentate stamp surfaces with thick vessel lot walls and rims. Dentate tooth size increases during this period when compared to earlier dentate forms. The site also produced five Early Ceramic Period vessel lots (CP1), six vessel lots classified as CP2 or CP2/3 and three classified as CP4 or CP3/4. Three vessel lots could not be assigned to a Ceramic Period. The Late Ceramic Period is not represented at this site. Nearly all vessel lots from the Knox site have grit inclusions. One vessel lot has a mix of grit and organic inclusions.
The Arthur Wood Collection Site 30-96, Naskeag Point, Maine

The Arthur Wood Collection is a second coastal ceramic assemblage included in this study. This is a private collection currently on loan at the Abbe Museum in Bar Harbor, Maine. The collection was accumulated by Arthur Wood from site 30.96 which is a shell midden site located on Naskeag Point near Brooklin, Maine. Naskeag point is on the East side of Penobscot Bay. The site is located roughly one mile from the Goddard site—a multi-component, shell-free coastal site with a large Late Ceramic Period occupation (Bourque and Cox 1981).

Based on correspondence with Arthur Spiess (2015), it appears that the site was recorded in the Maine Historic Preservation Office site files in 1980 by Steve Cox who estimated the site to be roughly 80 m along the East side of Naskeag Point. The collection lacks detailed provenience information but is believed to be primarily from site 30.96 with a few possible pieces from nearby coastal sites. Ceramics from the site reflect Early through Late Ceramic Period occupation.

Eighty-six vessel lots comprised of 124 sherds from the Arthur Wood collection were included in this study. Vessel lots from this collection were established previously by interns and volunteers at the Abbe Museum in Bar Harbor, Maine. The ceramics from this collection include vessel lots assigned to CP1 through CP5. Vessel lots representing the Middle Ceramic Period (ca. 2150-950 $^{14}$C yrs B.P.) are most abundant (n=49). Comparatively, the Late Ceramic Period (ca. 950-450 $^{14}$C yrs B.P.) is better represented at this location than at others included in this study. Nine vessel lots were assigned to CP5 or 5/6. The Early Ceramic Period is poorly represented here with only one vessel lot diagnostic of CP1. This assemblage has vessel lots with grit, shell, and mixed inclusions. Exterior surface treatments include dentate stamping, cord-wrapped stick and fabric-impressed techniques. Although unprovenienced beyond a general level, the Arthur Wood collection represents Maine’s ceramic sequence fairly well and provides a useful comparative data set.
Head of Tide Site and Ceramics Sample - The Eddington Bend Site (74-8), Eddington, Maine

Introduction

The Eddington Bend site is a large cemetery and habitation site in Eddington, Maine situated near the head of tide. The land form is a high Late Pleistocene or Early Holocene terrace overlooking a bedrock outcrop that crosses the river (Kelley 2006; Mack and Clark 2010; Mack 2016). The site is located roughly 15 m above the water on the main stem of the Penobscot River. The bedrock outcrop near the site created rapids or falls and likely provided aboriginal peoples prime access to anadromous fish.

Evidence of pre-contact occupation of the site ranging from the Middle Archaic to the Contact Period has been recovered. In addition, a late Paleoindian Period point was recovered during excavations in 1989. Charcoal recovered from the same depth as the biface was radiocarbon dated and returned results of 5390 ± 70 14C yrs B.P., and 6480 ± 70 14C yrs B.P. (Mack 2016; Sanger et al. 2003). These dates are inconsistent with our current understanding of late Paleoindian Period occupations in the region. It is unclear what role the Eddington Bend site played in the lives of Native families during Paleoindian Period times, if any.

The Eddington Bend site is one of the largest and most complex sites in Maine. It is estimated that the site measures roughly 33000 m² (Mack 2016). Evidence of repeated use of the site for mortuary and other activities over millennia suggests that it has a unique role within the cultural landscape of the Penobscot River valley. The superpositioning of Susquehanna Period cremation burials over older red ochre inhumation burials of the Moorehead Burial Tradition is a rare occurrence in Maine archaeology. As Robinson (1992) suggests, the Eddington Bend cemetery is similar to the Turner Farm site (Bourque 1995) both in terms of its role as a multicomponent cemetery location as well as the qualitative characteristics of the artifact assemblages. Given the site’s unique status and rich record of Indigenous engagement with it, it is not surprising that the site has been the target of archaeological inquiry repeatedly since the early 1900’s (Smith 1926).
Over the years, development has had a severe impact on the integrity of the site. Electrical transmission lines, a fish ladder, an access road to a local salmon club, historic cultivation and looting have disturbed the site significantly. From 1913 to 2012 a hydroelectric dam existed on the river adjacent to the Eddington Bend site. This dam was removed in 2012 as part of the Penobscot River Restoration Project—a project implemented to restore anadromous fish runs in the Penobscot River (http://www.penobscotriver.org/content/4152/project-overview accessed Jan. 2017).

**Current Physiographic Setting**

The Eddington Bend site is located within the Central Interior ecoregion (McMahon 1990). This region extends from the base of the White Mountains in West-central Maine to lowlands of the Penobscot River valley and includes the lower drainages of the Kennebec and Penobscot rivers. It has a flat to gently rolling terrain and a climate that is similar to that of the Eastern lowlands region with seasonal changes and average temperatures of 80°F in the summer and 10°F in the winter. Precipitation occurs year-round and average rainfall in this region is 42”; average snowfall is 80” (McMahon 1990).

**History of Research**

The first professional to conduct archaeological research at the Eddington Bend site was Walter B. Smith from 1906 to 1929 (Robinson 1993). Smith, a geologist, assisted Moorehead on numerous excavations of red ochre burial sites in Maine (Moorehead 1922). Smith was alerted to the cemetery component of the site by the landowner who encountered a celt and some “red dirt” while digging a grave for a large farm animal (Robinson 1993:17). This event prompted Smith to embark on archaeological inquiry of the site over the course of several years. Smith recognized the significance of the site and the multiple episodes of human occupation that occurred there over a very long period of time (Smith 1926). He identified several loci at the site and reported both a “village” component adjacent to the bank of the river as well as a cemetery located further inland on the terrace. Smith published his work (Smith, 1926) and a copy of his report was also
included in Warren K. Moorehead’s report on the archaeology of Maine (Moorehead, 1922). These publications inspired substantial amateur collecting in the 1950’s and 60’s. Several individuals amassed large collections of artifacts including many funerary objects.

In 1970 and 1971, Snow (1975; 2009) conducted formal excavations at the site as part of an archaeology course with a combined crew of students from the University of Maine and the University at Albany (SUNY). During a site visit with Mickey Chandler (a local collector), Snow (2009) determined that the site should be tested to assess its relationship to other red ochre burial sites in the region. Snow’s excavations focused on three areas of the site which he designated as Loci A, B and C. Locus A was coordinated with Chandler’s looting pit where Snow’s crew excavated a cremation burial which was subsequently radiocarbon dated to 3430 ± 45 ¹⁴C yrs B.P. placing it within the Susquehanna Period (Snow 1975, 2009).

**Cultural Resources Management Studies**

Since Snow’s (1975) investigations, the Eddington Bend site has undergone numerous cultural resources management studies beginning roughly 15 years after Snow’s excavations. Variation in crews, project directors, and excavation strategies accompanied these efforts. As a result, this has created challenges in interpreting the site, its features, cultural components, and material remains. In 1984, Bangor Hydro-Electric Company undertook two projects that would potentially impact the site. These projects included rehabilitation of the hydro-electric dam near the site and construction of a power house on the Eddington Bend site (Sanger 1984; Mack 2016).

Federal environmental review requirements prompted Bangor Hydro-Electric Company to contract with the University of Maine to conduct archaeological testing of the Eddington Bend site to assess site significance and integrity. Between 1984 and 1989 Phase I and Phase II excavations were conducted at the site under the direction of Drs. David Sanger and James Petersen (Mack 2016; Petersen and Sanger 1987; Sanger 1984). The site was determined eligible for listing in the National Register of Historic Places and the University of Maine conducted
Phase III excavations between 1989 and 1992 (Mack 2016; Petersen and Sanger 1987). The results of the Phase III investigations were not reported on in their entirety.

Bangor-Hydro Electric Company sold its hydro-power operations to Pennsylvania Power and Light in the late 1990’s and with that went the management responsibilities for the Eddington Bend site. The collections were transferred to a private archaeological consulting company. However, Bangor-Hydro Electric Company retained responsibility for maintenance of the power transmission lines that crossed the site. In 2009, the company initiated a plan to replace three wooden utility poles (Mack and Clark 2010; Mack 2016). This upgrade included consultation with the Penobscot Nation Tribal Historic Preservation Officer (THPO) who raised concerns about disturbance to the site from repeated wooden pole replacement. The company recommended replacing the wooden structures with a single steel monopole and the Penobscot Nation THPO agreed to this alternative as a preventative measure to avoid future site disturbance. This undertaking prompted an archaeological mitigation project of a 4 m² area which was conducted and reported on by TRC of Ellsworth Maine (Mack and Clark 2010). They reported Late Archaic through Ceramic Period occupations of the site (Mack and Clark 2010). Excavations during this project produced 267 ceramic sherds and 24 manufacturing scraps. The majority of sherds (87%) were assigned to CP2 or CP2/3. This ceramic sample was not included in the present study (Mack and Clark 2010).

In 2010, responsibility for the Eddington Bend site transferred to the Penobscot River Restoration Trust, (PRRT) a non-profit coalition of partner organizations working to restore sea run fisheries to the Penobscot River. The PRRT assumed responsibility for the Eddington Bend site when it purchased the adjacent Veazie Dam for decommissioning. The Veazie Dam was removed in 2013 and a small Phase II archaeological study was conducted prior to access road upgrades for that project. Investigators concluded that archaeological resources along the road did not add to “the National Register quality of the site” (Mack 2016). No additional archaeological excavations at the site have occurred since 2013.
In 2016, TRC of Ellsworth, Maine issued a final mitigation report of the Phase III studies conducted by the University of Maine (Mack 2016). This report was limited in scope to an assessment of 20 cultural features at the site representing the various types of features and their contents. This approach was selected due to the difficulties in reconstructing the site using records from multiple project directors with different approaches to excavations, reporting, stratigraphic interpretations, and record keeping (Mack 2016). The ceramic analysis conducted for the present study was included in the final mitigation report for the features selected in the sample (Mack 2016).

Cultural Features and Radiocarbon Dates

The total number of cultural features encountered during excavations at the Eddington Bend site is undocumented. In their final mitigation report, TRC identified five types of features encountered during Phase III excavations at the Eddington Bend Site. Archaeological ceramics occurred in all feature types identified in Mack’s (2016) approach. Eight of the 20 features sampled for Phase III reporting were assigned to the Ceramic Period (Mack 2016). One Ceramic Period feature described as a deep fire pit feature was radiocarbon dated to 1800 ± 30 ¹⁴C yrs B.P. and 1930 ± 30 ¹⁴C yrs B.P., placing it within the CP2 time period. A list of radiocarbon dates from the Eddington Bend site as reported in Mack (2010) is presented in Table 6.

Archaeological Ceramics

Ceramics from the Eddington Bend site span the Ceramic Period with most vessel lots (n=245) falling within the Middle Ceramic Period (CP2-4) or Middle to Late Period (CP4/5). The sample included in this study represents ceramics from CP1 through CP6/7 and consists of 314 vessel lots comprised of 637 sherds. CP2 vessel lots are most abundant in the collection making up 45.5% of the total sample. The Early Ceramic Period (CP1) is represented by three vessel lots and the Late Ceramic Period (CP5-7) is also weakly represented by eight vessel lots.

Pre-contact and post-contact activities at the site have had detrimental effects on the preservation of aboriginal ceramics. Overall, ceramic sherds from the site are small when
compared to assemblages from coastal shell middens or riverine sites where natural events or human activities aid in the preservation of aboriginal ceramics. Sherd size and abrasion characteristic were not recorded during this analysis. However, such a study may provide insight into ceramic attrition and post-discard processes (Skibo 2013).

**Indigenous Agency and the Eddington Bend Site**

As an important Indigenous cultural space within the Penobscot River Valley, Eddington Bend has been a setting repeatedly associated with Indigenous agency. As Pawling (2016:626) points out, Eddington Bend’s location near the head of tide was significant to Penobscot peoples as a place where ecosystems converge. He notes that during the late 18th century, a boundary between Penobscot and Euro-American territory was demarcated by a boulder in the river at this location. The boulder was referred to as “Nichols Rock” (later called “Sobscook” meaning sea rock or boiling rock) and represented the entry point into Penobscot territory and the point where navigation by the birch bark canoe became necessary (Pawling 2016: 626). Hence, the location was an important component of Penobscots’ efforts to maintain control over their homeland.

In the 20th century, Penobscots were actively involved in the archaeological proceedings related to regulatory actions linked to hydro-electric projects on the Penobscot River. For example, in a letter to the Federal Energy Regulatory Commission dated November 22, 1994, Penobscot Nation leadership requested that the programmatic agreement for hydro-electric projects in the lower Penobscot River “more explicitly reflect the cultural interest that [the Penobscot Indian Nation] has in those historic tribal lands […] which are no longer part of the Reservation. This includes the Eddington Bend site.

The correspondence goes on to state that “Although some of [the Penobscot Nation’s] lands in the lower Penobscot River have been lost to non-Indians, we still maintain a strong interest in recording and preserving our history for future generations, and in safeguarding from desecration, and ensuring access to, our burial sites” (P. Bisulca to Federal Energy Regulatory Commission letter, 22 November 1994, FERC Correspondence, Penobscot Nation). Penobscot
agency relative to the Eddington Bend site and other archaeological sites along the Penobscot River is documented repeatedly in hydro-electric relicensing correspondence, agreements, and federal notices. These processes have proven to be an effective way for Penobscot people to assert themselves in archaeological decision-making.

Recently, Penobscot Nation representatives have been active participants in Penobscot River Restoration efforts. Through these efforts, they have highlighted the importance and significance of the Eddington Bend site as part of Penobscot cultural heritage by way of federal and state agency engagement and public education and outreach.

As demonstrated by the preceding discussion, the Eddington Bend site is an important place, not only within the realm of Maine archaeology, but also in the cultural heritage of Penobscot people. In addition to the ceramic assemblage it produced, the prominence of the Eddington Bend site in these contexts figured heavily in its inclusion in the present study.

**Sample Comparability**

The sites and samples selected for this study are comparable temporally. Most vessel lots fall within the Middle Ceramic Period and based on regional ceramic chronologies, we have a general understanding of how ceramics change through time particularly with respect to surface treatments. This places occupation at these locations within the same time frames. However, each of the seven chronological units (CP1-CP7) covers several centuries of change, choice, interaction, invention, and traditional practice. If we consider the rate of technological change over the most recent 500 years of human existence, we can imagine potters changing their techniques over a much shorter time scale than what archaeologists have currently outlined. Thus, the present study aids in refining our understanding of archaeological ceramics through space and time by examining choices made by potters in the ceramic production process.

**Conclusion**

In this chapter I discussed the sites and samples selected for this study. I presented the physiographic setting for each location and provided a review of the history archaeological
research conducted at each site. I also presented a summary of each ceramic assemblage. The sites and samples discussed here formed the basis of the comparative analyses designed to test existing aboriginal settlement models for the region. In the next chapter I present the results of my analysis and offer interpretations and conclusions based on this research.
CHAPTER 7
DATA ANALYSIS AND RESULTS

Introduction

As stated in the introduction to this dissertation, the aim of this study is to humanize archaeological research by showing that agency and technological style can be effective theoretical tools for human-centered approaches to archaeological questions. To that end, I identified two objectives for this research. My first objective was to highlight human agency in the pottery manufacturing process through an analysis of ceramic attributes from three distinct ecological settings in Maine. The second objective was to test and evaluate Sanger’s two-population model as the prevailing model for socio-spatial organization among Native peoples living in Maine during the Ceramic Period. To meet these objectives, I analyzed ceramic vessel lots spanning Maine’s Ceramic Period (ca. 3050–450 \(^{14}\)C yrs B.P.) using technological attributes as a basis for this analysis. This chapter presents the results of these analyses.

The data sets analyzed for this research reflect potters’ choices within the ceramic production sequence and fall into three broad categories—ceramic fabric characteristics, vessel lot morphology, and surface treatment characteristics. The discussion of the analysis below is organized by ceramic attribute. Because I am interested in understanding socio-spatial organization among Native peoples living within the Penobscot River drainage area, I compare attributes through time and across site locations. The findings presented here are supported by general statistical testing. They are intended to lead archaeological inquiry into further exploration of specific areas of ceramics research in the Northeast. They should not be taken as conclusive and my interpretations are offered as additional guides to further inquiry.

The Ceramic Sample

The ceramic sample selected for this study consists of 490 vessel lots comprised of 5030 sherds. The sample comes from three distinct geographic and ecological settings—Howland, Maine (interior location), the Eddington Bend site (boundary location), and Penobscot Bay
(coastal location). In order to maintain temporal control of the data, vessel lots were assigned to Ceramic Periods 1-7 following Petersen and Sanger (1991) (Table 1).

The chronological units are abbreviated as CP1, 2, 3 etc. In some instances, vessel lots could not be assigned to a specific chronological unit with confidence. For example, if there was uncertainty on whether a vessel lot was representative of CP2 or CP3, the vessel lot was assigned to CP2/3. These vessel lots were included in assessments comparing CP2 and CP3 collectively against other time periods such as CP4 and CP5. Vessel lots that could not be assigned to a temporal unit were listed as unassigned.

For comparative purposes, data sets were grouped into two broad chronological units—CP2-3 and CP4-5. The CP2-3 group includes all CP2, CP3 and CP2/3 vessel lots. Likewise, the CP4-5 group includes all CP4, CP5, and CP4/5 vessel lots. These fall within the Middle Ceramic Period and are generally distinguished by dramatic shifts in surface treatment from dentate-based applications to cordage-based applications. These periods are represented at all sites. Grouping the data in this way provided more robust data sets for analytical purposes. It should be noted that CP2 and CP4 were better represented within their respective groups than CP3 and CP5.

Overall, Ceramic Periods 1 (n=15) and 6-7 (n=3) are not well represented in the sample and were generally not included in comparative analyses. When pertinent (for example in discussions of cordage twist), the CP1 sample is referenced in these results. The CP6-7 sample was considered too small to include in comparative analyses between chronological units. However, these vessel lots were included in calculations and discussions related to the overall ceramic sample.

Additionally, 90 vessel lots could not be assigned to a specific chronological unit. Generally, these vessel lots lacked diagnostic characteristics such as shell/organic temper, or dentate or cordage-based surface treatments. Similar to the CP6-7 vessel lots, these were not included in comparisons between chronological units, but were included in calculations and discussions of the overall ceramic sample. Temporal distribution of the sample shows that vessel
lots characteristic of CP2-3 are the most abundant (n=297). Ceramic vessel lots assigned to CP6-7 are weakly represented (n=3).

The sample sizes from the three different locations are variable. The interior sample from the Howland sites included 62 vessel lots and 4186 sherds. The coastal sample from the Knox site and the Arthur Wood collection consisted of 114 vessel lots and 207 sherds. The sample from the Eddington Bend site is the largest sample consisting of 314 vessel lots and 637 sherds. The sherd count from the Howland sites is larger overall because vessel lots were previously established for a different study that included rim and body sherds. Vessel lots within the other samples were established primarily with rim sherds supplemented by body sherds in many but not all cases.

Data on attributes analyzed in this research included both qualitative and quantitative data. Site comparisons were made using these data to address my research questions. Statistical tests used to assess the significance of data trends are discussed in the next section.

**Tests of Statistical Significance**

In this section I discuss the statistical tests selected for this study. Variation in sample sizes, small sample sizes, and multiple data types presented some challenges in selecting statistical tests for comparative interpretations. I used several statistical tests in this analysis and set the significance threshold at .05 throughout. For comparisons of nominal data, I relied on the Chi square test for independence to determine if there was a significant relationship between site location and a particular attribute. The Chi square test compares observed data to what would be expected if no relationship existed between the data sets. This test is useful for comparing proportions of attribute states in two or more samples. For the Chi square test to be effective, the sample size has to be sufficient to produce reliable results. The “Rule of 5” is commonly applied to ensure adequate sample size (Drennan 1996). This rule dictates that at least 80% of expected values be 5 or greater. I applied this rule in this study and elected not to include Chi square test results in those instances where the “Rule of 5” did not apply (Drennan 1996).
To compare sample means between two samples, I used histograms to compare data sets from the three sites followed by two-sample t-tests. This enabled me to determine if mean values at one location were significantly different from those at another location.

With ordinal data, I used the Mann-Whitney U test (non-parametric) to compare medians of two independent samples. This test was selected because normal distributions in the data set is not a requirement for this test.

In some cases, I was interested in comparing diversity among particular ceramic attributes at each location. For this purpose, I used Simpson’s Index of Diversity—a test commonly used by ecologists to determine species richness and evenness within a particular ecosystem. This type of test was used when comparing the diversity in attributes such as lip shape. Differences in diversity of attributes can inform the social context of production. For example, a site serving as a gathering place for multiple groups and potters may result in more diversity in ceramic characteristics. The same result would not be expected in an assemblage from a dwelling context.

Simpson’s Index of Diversity is a useful analytical tool for comparing diversity in data sets. However, applications of diversity indices to compare archaeological assemblages have been plagued with challenges relating to the effects of sample size on diversity indices and uncertainties regarding the nature of the overlying populations (Kintigh 1984; McCartney and Glass 1990). In this study, I employ diversity indices to compare collections in an exploratory way and not as a conclusive test.

The statistical tests discussed here aided in the evaluation and interpretation of trends observed in ceramic attributes within the three settings. In some cases, sample sizes were too small to subject to statistical testing. However, some analytical results were noteworthy despite small sample sizes and I elected to include them in my reporting. I now turn to a discussion of the attributes selected for analysis and a presentation of the results of this examination.
Ceramic Fabric Attributes

Ceramic fabrics are defined by Rice (1987:476) as “the composition of a fired ceramic, including clay, inclusions, and pores and excluding surface treatment; often used synonymously with body, paste, or ware.” Ceramic fabrics are comprised of a clay matrix and aplastic inclusions—each of which is altered by processes of paste preparation and firing (Orton et al. 1993).

Choices related to ceramic fabrics are the first among the decisions potters make in the chaîne opératoire and they are critical for ensuring the successful manufacture of a pot. These decisions are influenced by the intended function of the vessel, be it utilitarian, symbolic, or creative. The intended function and actual use of the pot may differ (Skibo 2013). When potters transform clays, they do so within a cultural context that shapes their pottery needs. Those needs may change and influence the use of a pot over time.

Potters transform clay in several ways to include: adding water to clays; removing perceived imperfections in clays through sieving or other means; adding aplastics as functional or aesthetic elements or to aid in paste manipulation; and mixing clays from different sources. All of these choices are made within a complex dynamic of culture, environment, skills, agency, and need. Hence, examining ceramic fabrics provides a window into some significant decisions and actions of people transforming raw materials into functioning pots.

In light of this, my analysis included several attributes related to ceramic fabrics. I examined some conventional attributes for pottery analysis such as inclusion type, size, and density. I also examined some attributes that are less commonly examined such as fabric consistency, and the presence or absence of hematite within the ceramic fabric. The results of this analysis are presented below.

Inclusion Analysis

Inclusions are the aplastic elements added to or naturally occurring in the clay matrix. Inclusion characteristics are linked to ceramic function, performance, firing, and workability.
They may also serve aesthetic purposes or other cultural purposes not directly linked to pot performance. Distinguishing between aplastics occurring naturally in the clay matrix and those added by the potter is not possible without an in-depth petrographic examination of the inclusion type, distribution, orientation and grain size (Rice 1987; Santacreu 2014). This type of analysis was not undertaken here. For more information on my analytical approach, see chapter 5. For purposes of this study, I analyzed inclusion type, size, and density. Results of this analysis are presented below.

**Inclusion Type Introduction and Sample Overview**

Inclusion type refers to the types of aplastics (minerals, shell, organics, grog, etc.) within the clay matrix. Inclusion types were classified initially as grit (crushed rock), shell/organic, or a mix of grit and shell/organic inclusions. Grit inclusions were further classified with respect to mineral type (e.g., quartz, feldspar, etc.).

Most often, ceramic fabrics in this study displayed more than one type of inclusion. In these cases, primary, secondary, and tertiary inclusion types were identified based on a visual assessment of the relative abundance of each type of inclusion. While not as accurate a method as point-counting inclusions in thin sections, this approach serves as a sufficient low cost, and less destructive alternative to point-counting.

It should be noted that among hand-crafted pots, inclusions within the clay matrix may not be evenly distributed throughout the ceramic fabric, therefore when assessing the abundance of inclusion materials in vessel lots, it is necessary to inspect multiple sherds within a vessel lot. Very often ceramic analysts in the Northeastern U.S. must cope with low sherd numbers representing vessel lots. Additionally, variability in inclusion type is influenced by differential preservation of ceramic sherds. Therefore, when assessing the relative abundance of inclusion types within any given vessel lot, my classifications of primary, secondary, and tertiary inclusion types were based on examination of multiple sherds whenever possible. However, it is important to note that vessel lots represented by one sherd exist within the sample and in some instances,
my examination of inclusion types was limited to single sherds. While inclusion type was recorded for each level of relative abundance (i.e. primary, secondary, and tertiary), my focus in this discussion is on primary inclusion types—the aplastic material most abundant within the clay matrix.

Inclusion type was recorded for 490 vessel lots (Howland: n=62; Eddington Bend: n=314; Coast: n=114). Overall, the majority of vessel lots displayed grit inclusions (86.73%; n=425). Vessel lots with shell/organic inclusions are the second-most common (7.14%; n=35), followed by vessel lots with mixed inclusions (6.12%; n=30). Of the vessel lots with grit inclusions, most have a combination of the three major minerals found in granites—feldspars, quartz, and micas (46.59%; n=198).

Forty-two vessel lots with only one mineral inclusion type were also present in the sample. These consisted of 40 vessel lots with quartz inclusions and two vessel lots with feldspar inclusions.

An overall comparison of ceramic fabrics by location indicates that primary inclusion type within the Howland sample is dominated by feldspars whereas quartz occurs more commonly as primary inclusion type within the Eddington Bend and coastal samples (Figure 4). A Chi square test of independence was performed to evaluate the relationship between site location and primary inclusion type for all time periods. Results of this test indicate that the relationship between site location and primary temper type is significant $\chi^2 (4, n = 480) = 64.12, p < .05$ (Table 7). In the next section I discuss how primary inclusion type compares across temporal and spatial units.

Inter-Site Comparisons of Primary Inclusion Type by Time Period

A comparison of primary inclusion type by time period and location indicates differences within both the CP2-3 and CP4-5 samples (Figure 4) (Table 8). Primary inclusions within the CP2-3 sample consisted of three major categories—feldspars, quartz, and “other” represented by micas and shell/organic inclusions. Analysis of inclusion types showed that overall, quartz was
the predominant primary inclusion type within the CP2-3 sample. However, this predominance was not represented across all three sites. Within the Howland CP2-3 sample, feldspar was identified as the most common primary inclusion type with quartz being second most common. In contrast, quartz dominated primary inclusion types in CP2-3 vessel lots from the Eddington Bend and coastal sites, whereas feldspars were second-most common.

A Chi square test of independence was conducted on the CP2-3 sample (Table 9). Here, I compared primary inclusions focusing specifically on the presence feldspar and quartz at the three locations. Results of this test indicate that the relationship between site location and primary inclusion type is significant $\chi^2 (4, n = 290) = 20.28, p < .05$. Vessel lots with shell/organic inclusions during the CP2-3 time period were too few to include in statistical comparisons.

During the CP4-5 time period, shell/organic inclusions appear in ceramic fabrics at all locations. However, vessel lots with grit inclusions are more common than those with shell/organic inclusions in the overall CP4-5 sample. This predominance is not consistent across the three sites. As might be expected, shell/organic temper occurs more often than grit in coastal vessel lots. In contrast, the Howland and Eddington Bend samples indicate a preference for grit over shell inclusions (Figure 4).

Comparisons of primary inclusions within each of the three CP4-5 samples show feldspars, quartz, and shell/organic inclusions to be more evenly distributed among the Howland and Eddington Bend vessel lots than is the case with the coastal sample (Figure 4) (Table 8). In contrast, shell/organic temper represents the most common primary inclusion type within the coastal CP4-5 sample. Quartz is the second-most common primary inclusion type and vessel lots with feldspar as a primary inclusion are minimally represented in the coastal CP4-5 sample.

**Inclusion Type Discussion and Interpretation**

Comparisons of primary inclusion type between sites in this study suggest that potters at the Howland sites made dramatically different choices about the aplastic materials they used in their pastes than potters at Eddington Bend and the coast. Unlike the coastal and Eddington Bend
samples, vessel lots from Howland have more feldspar inclusions than other mineral types and this predominance of feldspar occurs in the CP2-3 and CP4-5 samples. Several factors may account for this. First, potters may be using feldspar-rich granites as tempering agents. Granites are common in the area. In fact, two historic granite quarries were located roughly 40 miles west of Howland in the town of Guilford, Maine, which is also on the Piscataquis River. Granites from these quarries are described by Nelson et al. (1907:148) as:

- a biotite-muscovite granite of light-gray shade and medium to coarse, even-grained texture, with feldspars up to one-half inch in diameter
- It consists, in descending order of abundance, of very slightly bluish white potash-feldspar (microcline), smoky quartz, a whitish soda-lime feldspar (oligoclase), black mica (biotite), and much less white mica (muscovite), [...] As the feldspars are of similar shade and the muscovite is present in small amount the contrasts are between the feldspar, smoky quartz, and biotite, and they are marked.

The source described above may have been accessed directly by Native peoples, or the material may have been transported by ice or fluvial activity. Cobbles closer to the source may retain more feldspar than those farther away because it is more susceptible to weathering than quartz (Alice Kelley, pers. comm., 2017).

A second potential explanation for feldspar-rich inclusions is human action. Potters may have sieved or even hand processed mineral inclusions to achieve higher quantities of feldspar for pot performance or aesthetic reasons. Cultural protocols may have also influenced inclusion choices and a preference for feldspars.

Although the rationale and factors influencing the predominance of feldspar inclusions in Howland vessel lots is unclear, this study shows that the preference for feldspar inclusions was maintained over time suggesting a cultural continuity in temper selection between CP2-3 and CP4-5. Although the sample from the latter period is small, it is informative. Added support for the preference of feldspar through time exists in the small CP1 sample from Howland. Of the six CP1 vessel lots from Howland sites, five of them have feldspars as a primary inclusion type suggesting an extended period of sustained inclusion preference.
Obviously, access to raw materials plays a role in the temper choices of aboriginal potters and the preference of feldspars over quartz as primary inclusion types within the Howland sample is connected in some way to what types of materials are available to potters. However, vessel lot function, performance, aesthetics and cultural protocols are also influential on these choices. As Rye (1976) points out, feldspars have similar thermal expansion rates to clays. As such they make a pot more thermal shock resistant or resistant to repeated heating and cooling.

Quartz, on the other hand, is less resistant to thermal shock because it has a higher thermal expansion rate than clay (Rye 1976). Hence, its use in vessel lots that are subject to repeated heating and cooling is not ideal. However, that does not mean that pots tempered with quartz were not used for cooking. Finer grades of quartz can be effective tempers for cooking vessel lots, particularly if accompanied by thin vessel lot walls (Rye 1976).

The important point here is that potters’ inclusion choices at the Howland sites were different from those at the other two sites. These differences are discussed within the context of other attribute trends in the conclusions to this chapter.

Another significant difference among the three sites relates to primary inclusion type changes through time. In the samples from Eddington Bend and the coastal sites, when shell/organic inclusions are incorporated into the suite of choices for temper, the use of quartz as primary inclusions decreases and feldspar use remains relatively stable. In contrast, when shell/organic temper is introduced into the suite of choices for potters at the Howland sites the use of feldspars decreases and the use of quartz remains fairly stable. In each case, the introduction of shell/organic temper into the potters’ suite of temper choices affected how they engaged with their primary inclusion of choice. Hence, it appears that the shift from grit temper to shell may not have been to replace a specific mineral (e.g. quartz or feldspar), it may have been a replacement for the preferred temper type independent of what type of mineral that was. The introduction of shell temper and its relationship to established primary inclusions of choice warrants further exploration.
**Inclusion Size Introduction and Sample Overview**

Inclusion size is one choice a potter makes within a suite of choices related to ceramic performance, workability, use, and appearance. It influences both mechanical strength and thermal shock resistance of the pot. In this analysis, both maximum and minimum values of inclusion size were recorded for each category of inclusion (primary, secondary, tertiary). These represent the largest and smallest inclusions observed visually within the ceramic fabric of each vessel lot. This discussion focuses on primary inclusions, specifically maximum values of primary inclusion sizes recorded for each vessel lot.

Inclusion size was recorded for 490 vessel lots (Howland: n=62; Eddington Bend: n=314; Coast: n=114). All inclusion types (grit, shell/organic, and mixed) were analyzed for size. In terms of shell/organic inclusions, measurements were recorded on shell fragments if present or voids in the fabric in cases where shell/organics had eroded or burned out. In all cases, numerical inclusion size data were converted to ordinal categories following Ingram (1989) (Table 10). Samples were compared based on median values.

Observations on inclusion size within the entire sample indicate that vessel lots with very coarse (1-2 mm) and granule-sized (2-4 mm) inclusions are most common within the sample. Collectively, they make up 93.67% (n=459) of the entire sample. I conducted a Mann-Whitney U statistical test to determine if the inclusion size differed significantly between the locations generally. This test included all time periods and showed that the Eddington Bend sample differs significantly from the Howland and coastal samples (Table 11). However, the Howland and coastal samples did not differ significantly from each other. My comparisons of inclusion size relative to sample location and time period are discussed below.

**Inter-site Comparisons of Primary Inclusion Size by Time Period**

When the data are broken down by time period, comparisons of median values of inclusion size at each of the three locations indicate some noteworthy differences (Figure 5) (Table 12). Analysis of inclusion size within the CP2-3 time period suggests a preference for
slightly larger inclusions at the Howland locations as evidenced by a larger median value. Here, median inclusion size is 2.17 mm, whereas the Eddington Bend and coastal samples had slightly smaller maximum inclusions with median values of 1.79 mm and 1.71 mm, respectively.

This preference for granule-sized inclusions within the Howland CP2-3 sample is also evident when maximum inclusion size was compared based on sample proportions. The Eddington Bend and coastal data differ from Howland with higher proportions of vessels with very coarse (1-2 mm) inclusions over those with granule-sized (2-4 mm) inclusions within the CP2-3 samples (Table 12) (Figure 5).

During the CP4-5 time period, the Eddington Bend and coastal samples show a shift to larger primary inclusions from those during the CP2-3 time period. Median values for maximum inclusions in CP4-5 vessel lots from the Eddington Bend and coastal samples were 2.17 mm and 2.39 mm, respectively. Each of these two locations shows a preference for granule-sized inclusions over very coarse inclusions based on percentage values as well.

In contrast, median values from the Howland sample suggest that potters at this location maintained a preference for granule sized inclusions between CP2-3 and CP4-5. This is evidenced by a median value for CP4-5 inclusion size of 2.16 mm—nearly identical to the CP2-3 sample. However, when percentages of vessel lots within the Howland CP4-5 sample are compared, very coarse inclusions occur more frequently than those with granule sized inclusions, indicating a possible shift to smaller temper over time at the Howland locations.

To test the significance of the differences in samples, I conducted Mann-Whitney U tests to compare median inclusion size at each of the locations for the CP2-3 and CP4-5 samples. Results indicate that during the CP2-3 time period, a significant difference exists between Howland and Eddington Bend and Howland and the coast. However, the Eddington Bend and coastal samples are not significantly different with respect to inclusion size (Table 13). I interpret these results as an indicator of Howland potters’ preference for larger inclusions during this time period. This may be influenced by, or related to potters’, choices of inclusion type which is
discussed more fully in the discussion and interpretation section below. Results of the Mann-Whitney U test on the CP4-5 inclusion size data indicate no significant difference at the .05 level in comparisons between locations (Table 14).

**Inclusion Size Discussion and Interpretation**

Comparisons of primary inclusions in this study indicate, not only differences among the three locations during specific time periods, but also differences in how potters’ choices changed through time. Similar to the data on inclusion type discussed above, the sample from the Howland location stands out as distinct from the Eddington Bend and coastal samples with regard to inclusion size.

Median values of inclusion size between CP2-3 and CP4-5 within the Howland sample remain fairly stable suggesting potters did not change their techniques dramatically between the two periods even though shell/organic temper was added to their suite of choices. When the Howland data are visually represented in a box-plots (Figure 6), the graph indicates that smaller inclusion size occurs in higher proportions to larger sizes within the CP4-5 sample. Vessel lots from Eddington Bend and the coast show an opposite trend and with a shift to larger inclusions over time. As we saw with inclusion type, temper preferences at Howland differed from the other two locations and potters’ temper size preferences may have even shifted in opposing ways.

Potters’ choices relative to inclusion size may reflect different strategies for constructing cooking pots based on differences in temper types. As mentioned previously, the results of this study indicate that potters at Eddington Bend and the coast relied more on quartz as a primary temper over feldspars. Because feldspars have a similar thermal coefficient to clays, vessels with feldspar tempers are more resistant to thermal shock and perform better as cooking vessel lots than those with quartz temper (which has a much higher thermal coefficient than clay) (Rye 1976). As a strategy to protect against thermal shock, potters who use quartz tempers may use finer grains and lower densities of quartz to compensate for the less than ideal performance characteristics of quartz temper in cooking pots.
During the CP4-5 time period, shell/organic temper became another temper option for potters. This also has a similar thermal expansion rate to clays. Perhaps, the need for smaller temper size was no longer necessary if shell/organic temper was used to replace quartz. It is conceivable that potters on the coast and at the Eddington Bend site changed their tempering strategies based on different performance characteristics in shell and quartz tempers. This might serve to explain the increase in temper size between CP2-3 and CP4-5 at these locations. In the next section I discuss the results of my inclusion density analysis which also show notable differences in the samples with respect to potters’ choices relative to ceramic fabrics.

**Inclusion Density Introduction and Sample Overview**

Inclusion density represents the percentage of aplastics present in the clay matrix. In addition to the type and size of inclusions present in the ceramic fabric, exploration of potters’ choices regarding how much aplastic material to include in the ceramic fabric mixture informs interpretations of ceramic workability, performance, and technological style.

Inclusion densities were quantified in this study based on visual comparisons with Philpotts’ (1989) density chart which estimates the percentage of inclusions within the surrounding matrix (Figure 6). It is important to note that not all ceramics analysts use Philpotts (1989) and percentage values may not be consistent with other studies. For purposes of comparative analyses and reporting, inclusion density categories were grouped as follows: 1%-2%, 3%-5%, and 10%-%30%.

To ensure my assessments of inclusion density were consistent across the samples, I recorded inclusion densities in one phase of the analysis. In other words, I recorded inclusion densities all at the same time before moving on to analyze other attributes. Inclusion densities were recorded for each vessel lot then were compared spatially across the three sample settings and temporally based on assigned Ceramic Periods.

Inclusion density was recorded for 490 vessels lots (Howland: n=62; Eddington Bend: n=314; Coast: n=114). Table 15 summarizes inclusion density data. Inclusion density for one
vessel lot from Eddington Bend was classified as higher than 30% and was not included in comparative analyses. Analysis of inclusion densities for all sites and time periods from the Penobscot River valley samples indicates that vessel lots with inclusion densities ranging between 3% and 5% were most common. However, vessel lots with higher and lower density percentages are comparably represented in the sample. Least common were vessel lots with low inclusion densities ranging between 1%-2%.

Overall, inclusion density percentages show a slight shift to lower densities between the CP2-3 and CP4-5 time periods. During CP2-3, inclusion densities within the 3%-5% range are most common comprising 40.06% of the CP2-3 sample. Conversely, the CP4-5 sample shows equal percentages of vessel lots with densities in the 1%-2% and 3-5% ranges.

When the data are compared spatially, the Howland sample indicates a preference for denser inclusions when compared to the other two locations (Figure 7). To assess the relationship between location and inclusion density, I conducted a Chi square test of independence on the overall data set. Results of this test indicate that the relationship between location and inclusion density is significant $\chi^2 (4, n = 489) = 24.61, p < .05$ (Table 16).

Inclusion densities with respect to specific sites and temporal units indicate some differences between sites as well. These are discussed below.

**Inter-Site Comparisons of Inclusion Density by Time Period**

During Ceramic Period 2-3 ceramic fabrics within the Howland sample exhibit higher inclusion densities than those from the Eddington Bend and coastal samples. Specifically, most of the Howland CP2-3 vessel lots have inclusion densities ranging from 10%-30%; whereas, inclusion densities within both the Eddington Bend and the coastal samples show a preference for densities within the 3%-5% range (Table 15) (Figure 7). Comparatively, these differences in inclusion density at the three locations during the CP2-3 time period are noteworthy, particularly in light of differences in inclusion type and size among the three locations discussed above.
To test the significance of the differences between the three locations, I conducted a Chi-square test of independence to evaluate the relationship between site location and inclusion density during CP2-3. Results of this test indicate that the relationship between site location and inclusion density is not significant $\chi^2(4, n = 297) = 8.38, p < .05$ (Table 17).

During CP4-5, Howland potters appeared to maintain their preference for high inclusion densities as was observed in the CP2-3 sample. Alternatively, high inclusion densities represent the lowest percentage of vessel lots within the CP4-5 samples from Eddington Bend and the coast (Figure 7). The CP4-5 data set did not meet sample size requirements for the Chi-square test. In the next section I offer some interpretations of the results of my inclusion density analysis.

**Inclusion Density Discussion and Interpretation**

Comparisons of inclusion density in ceramic samples from the three locations revealed some noteworthy differences and the Howland sample stands out with what appears to be a preference for dense inclusions. Choosing how much temper to include in ceramic pastes is important in pottery manufacture and could influence workability, drying, mechanical strength, and thermal shock resistance. For example, a potter might choose to make densely tempered pastes to aid in the drying process because they may take less time to dry than sparsely-tempered clays (Arnold 1985:61). In some cases, high temper densities may be selected to increase a pot’s mechanical strength (Chilton 1999:150).

In this study, potters’ preference for dense inclusions at the Howland locations not only differed from the other two locations, but this choice appears to have been consistent over time. In contrast, a preference for more sparse inclusions is suggested by the data from the Eddington Bend and coastal samples.

The mix of tempers, pastes, and morphology is complex with regard to ceramic performance, as is the rationale for selecting a specific ceramic recipe. In the case of the Penobscot River sites, differences in choices relating to inclusion density, type, and size seem to suggest that potters relying on quartz as primary tempering material made other technological
choices to complement the use of quartz-rich tempers. At Eddington Bend and the coastal sites, where quartz inclusions were the predominant choice, temper size and density tend to be lower than at Howland where the primary temper of choice is feldspar. These choices, taken collectively, would have improved vessel lot performance within the realm of cooking.

This is not to say that function and vessel lot performance are solitary drivers for technological choices. It is offered here as a potential scenario worthy of further testing. What is most relevant to the questions being explored through this study are the differences in ceramic paste recipes between the Howland sites and the other two locations, and how those differences are maintained through time. In the next section, I discuss the results of my analysis of fabric consistency which show some unique characteristics within the Eddington Bend sample.

**Fabric Consistency Introduction and Sample Overview**

For purposes of this study, fabric consistency categories classify how friable or compact the ceramic fabric is based on an ordinal scale. During my analysis, it became apparent that vessel lots within the sample had a wide range of fabric consistencies. Analysis of these various states is sometimes approached with tests of hardness (Rice 1987:354-357) such as the Mohs hardness test or thin sections to examine porosity. These methods can damage the ceramic sample. As an alternative to these types of methods, I developed an ordinal scale to classify fabric consistency based on visual inspection. The scale is as follows: 1 = very friable; 2 = friable; 3 = moderate; 4 = compact; 5 = very compact. Select examples of these categories can be seen in Figures 8 and 9.

Although this method lacks precision, it allows the analyst to gauge fabric consistency through visual inspection. It also produces a set of ordinal data that can be used for comparative purposes. This type of analysis is subject to individual bias and it is best used as a supplemental data set in combination with other variables of ceramic fabrics.

There are a multitude of factors affecting fabric consistency such as permeability, inclusion type and size, clay properties, firing, use, and taphonomic processes. The purpose of this analysis was to examine fabrics in a general way and perhaps more in line with how a potter
experiences ceramic pastes; then assess how fabric consistencies compare through time and space.

Fabric consistencies were recorded for all vessel lots in the study (n=490). Results of this analysis indicate that most vessel lots (48.16%; n=236) within the sample of Penobscot River sites have moderate (level 3) fabric consistencies. Friable and very friable fabrics are least represented overall (16.93%; n=83). As is the case with other fabric characteristics, notable differences in fabric consistencies are evident among the three locations.

Overall the Howland and coastal samples share similar fabric consistency distributions with higher proportions of vessel lots classified in the very friable to moderate ranges. Conversely, the Eddington Bend sample trends toward more compact fabrics with a small percentage (7.64%/n=24) of vessel lots falling within the very friable to friable range. A Chi-square test of independence was conducted on the overall data sets. Results indicate that the relationship between site location and fabric consistency is significant \( \chi^2 (4, n = 469) = 55.37, p < .05 \) (Table 18) when overall samples are compared.

**Inter-Site Comparisons of Fabric Consistency by Time Period**

Analysis of fabric consistencies in CP2-3 vessel lots from the three locations indicates that Eddington Bend fabrics differ from the other two locations (Figure 10). While all locations show that vessel lots with moderate fabric consistencies are most common at each site, the Eddington Bend sample indicates that potters were making more vessel lots with compact fabrics than potters at the other two locations. At Eddington Bend, over one-third of the vessel lots fall within the compact to very compact (4-5) ranges. Conversely, compact to very compact fabrics occur in low percentages at Howland and the coast. Vessel lots falling into the friable to very friable categories are not well represented at the Eddington Bend site. This is not the case for the Howland and coastal sites where vessel lots with friable to very friable fabrics are more common.

To evaluate the relationship between fabric consistency and site location, I conducted a Chi-square test of independence on this data set. Results indicate that the relationship between
site location and fabric consistency during CP2-3 is significant $\chi^2 (4, n = 297) = 39.92, p < .05$ (Table 19).

Fabric consistencies in vessel lots from the three locations change between CP2-3 and CP4-5. Fabrics appear to become more compact at all locations as evidenced by increased percentages of vessel lots in the compact to very compact ranges (Figure 11). The Eddington Bend sample stands out in that most vessel lots fall within the compact to very compact range during CP4-5.

Although the sample size is small (n=13), vessel lots within the Howland CP4-5 sample show an even distribution between levels 1-2 and 3 (very friable to friable and moderate). This suggests a continuing preference for fabrics on the lower end of the scale between CP2-3 and CP4-5. On the other hand, coastal vessel lots appear to become more compact over time as suggested by a higher percentage of vessel lots falling within the compact to very compact range (levels 4-5) during CP4-5 (Table 20) (Figure 11).

**Fabric Consistency Discussion and Interpretation**

Analysis of fabric consistencies at all locations show a shift toward more compact vessel lots between CP2-3 and CP4-5. This may be a bi-product of the introduction of shell/organic temper during the latter period.

What is more notable, is the apparent stability in fabric consistencies through time within the Howland sample as evidenced by the CP2-3 and CP4-5 samples. This suggests that technological choices among potters at this location were distinct from the other locations, but long-lasting—a trend similar to what occurred with respect to other fabric attributes discussed above.

Another difference between the locations is evident. The Eddington Bend and coastal sites appear to be more distinct from each other in terms of fabric consistency than in other categories of fabric characteristics. Although speculative at this point, different firing contexts among the three locations may be one explanation for more compact ceramic fabrics at Eddington
Bend. Ceramic pastes undergo shrinkage during the drying and firing stages which results in increased density and decreased porosity within a ceramic paste. Shrinkage increases at higher temperatures. If Eddington Bend served as a gathering place during Ceramic Period times as has been suggested, it is possible that the firing of ceramics at this location occurred in larger and hotter fires.

Excavations at Eddington bend revealed multiple types of large fire-related features that included ceramic material (Mack 2016). For example, Feature 324 is described as a deep fire pit feature measuring >100 cm x 100 cm x 140 cm. This feature included Middle Ceramic Period pottery and manufacturing scraps as well as stone tools and fire-cracked rock. Two radiocarbon dates of 1,800 ± 30 14C yrs B.P. and 1,930 ± 30 14C yrs B.P were obtained on wood charcoal from this feature. Additionally, Feature 324 produced 286 pounds of fire-cracked rock.

Fire-related features from the other two locations are much smaller. If large fire-related features were used to fire pots at Eddington Bend, the result might be more compact fabrics than those fired in smaller features at other locations.

Of course, there are many factors that contribute to fabric consistency. Taphonomic processes such as freeze/thaw cycles and depositional settings play a role in altering archaeological ceramics. A more empirical analysis of ceramics from the three locations to explore firing temperatures on ceramics may show that the different fabrics are directly related to firing context, and by extension, the social context of production. In the next section I address the final ceramic fabric attribute discussed in this dissertation—the presence of hematite within ceramic fabrics.

**Hematite Presence Introduction and Sample Overview**

During analysis, hematite was identified in ceramic fabrics from all three locations in varying amounts. The presence of hematite in ceramic fabrics could reflect choice of clay or inclusion sources, or its presence could be the product of intentional addition to the ceramic paste.
by the potter. Hematite presence within the sample was originally identified through visual inspection and was confirmed with SEM testing.

Hematite is a culturally significant mineral that has been used by Native people in the area for millennia. It is best known for its role in mortuary contexts during the Archaic Period. Evidence exists of hematite presence in later burial contexts as well although in smaller quantities.

Given that hematite has been shown to be culturally important to Native peoples in the region, I determined it to be a ceramic fabric attribute worthy of exploration. The aim in this analysis was to determine if the presence of hematite in ceramic fabrics could be shown to be culturally significant. The results of this examination are presented here.

Hematite presence within the ceramic fabric was classified into three categories. “Level 1” classification indicates that hematite was present and visible throughout the ceramic fabric. Hematite presence classified as “Level 2” indicates that one or two flecks of hematite were visible in the sherd during analysis, but it did not occur consistently throughout the fabric. If hematite was not visible within the ceramic fabric of a particular vessel lot, it was classified as “Level 3.”

Within the entire sample, more vessel lots exhibited some level of hematite within the ceramic fabric than did not (58.16%; n=285). Hematite was not visible in 41.83% (n=205) of the vessel lots. A Chi-square test of independence was performed to evaluate the relationship between site location and hematite presence for the entire sample (Table 21). Results of this test indicate that the relationship between hematite levels and site location is significant $\chi^2 (4, n = 490) = 25.68, p < .05$. In the following sections, I compare the occurrence of hematite within ceramic fabrics temporally and spatially.

**Inter-Site Comparisons of Hematite Presence by Time Period**

During CP2-3, the occurrence of hematite within the ceramic fabrics at the three locations appears to be fairly uniform (Figure 12). CP2-3 ceramics at all locations had hematite levels
representative of all levels. During this time period, the coastal sample stands out as having a slightly higher percentage of vessel lots in which hematite was not observed (56.09%; n=23). This was not the case for the Eddington Bend and Howland samples which exhibited similar percentages of vessel lots falling within the three hematite categories during the CP2-3 period (Table 22) (Figure 12).

Analysis of hematite levels in vessel lots from the CP4-5 time period indicate some obvious spatial and temporal differences. Ceramic samples from the Eddington Bend and Howland sites showed a marked decrease in the percentage of ceramic vessel lots in which hematite was present throughout the fabric (level 1). In fact, none of the CP4-5 vessel lots from Howland had hematite visible throughout the fabric.

In contrast, the levels of hematite in vessel lots in the coastal sample remained relatively stable and little change occurred with respect to hematite presence in ceramic fabrics between CP2-3 and CP4-5. During both time periods, vessel lots from the coast displayed higher percentages of vessels in which hematite was not observed. In general, the coastal sample exhibited remarkable consistency between the two time periods. This suggests continuity in choices influencing hematite presence in ceramic fabrics over time. In the next section I interpret the results of my analysis of hematite presence in the ceramic samples in this study.

**Hematite Discussion and Interpretation**

This examination of hematite in ceramic fabrics revealed some interesting temporal and spatial differences. Coastal vessel lots stand out as distinct in that hematite presence remains relatively consistent through time and also hematite was not observed in vessel lots as frequently here as it was at the other two locations. An increase in the percentage of vessel lots in which hematite was not observed was evident at all three locations, albeit small in the coastal sample. Some of this trend may be accounted for by shifts from grit inclusions to shell/organic inclusions during the CP4-5 time period. Shell/organic inclusions would not contain hematite as might be the case for grit tempers. When hematite presence is compared within the context of inclusion
type (i.e. grit or shell/organic), analysis showed that in a sample of 425 grit-tempered vessel lots, 57.54% (n=245) had some level of hematite in the ceramic fabric. In contrast, a slightly lower percentage (45.31%; n=16) of vessel lots with hematite occurred in a sample of 35 shell/organic tempered ceramics. Given the fact that hematite occurred in both the grit-tempered samples and the shell-organic tempered samples, it appears that factors unrelated to temper type influenced the presence of hematite in shell/organic tempered vessel lots.

The presence of hematite in ceramic fabrics in Maine is complex. Not only do clay and temper sources and human choice factor into its presence, the process of firing a pot may alter the mineralogy of clay (Ouahabi et al. 2015). Mineralogical analyses have indicated that hematite does not occur within the Presumpscot formation (Kelley, 1989). If potters in the Penobscot River valley relied on the Presumpscot formation as a clay source for pot-making, one would not expect to see hematite in the ceramics. However, the use of other clay sources, the addition of grit tempers, the effects of fire on the clay, and intentional addition by humans are all considerations when contemplating why hematite exists in ceramic fabrics.

Probably most relevant to the goals of this research is the observation that the levels of hematite in ceramics at Howland and Eddington Bend are similar. This similarity is sustained over time and includes temporal changes that are consistent across the two samples. In other words, pots seem to change together through time at these locations with respect to this attribute. This is not the case for the coastal sample, which exhibits different levels of hematite from those at the other two locations and relatively little change in hematite levels over time.

The observations surrounding hematite in ceramic fabrics in this study not only warrants a more sophisticated analysis, but they also suggest that hematite presence in ceramic fabrics in the region may carry anthropological meaning. That meaning may be based on potters’ decisions to add hematite to ceramic pastes or it may be linked to their choices in raw materials.
Summary of Ceramic Fabric Analysis

The ceramic fabric analysis conducted as part of this study is perhaps the most informative of the attribute categories examined. Distinct differences are evident in the ceramic fabrics from the three locations. In some instances, such as the presence of hematite in the ceramic fabrics, the Howland and Eddington Bend samples share more commonalities with each other than with the coastal sample. However, the Howland sample seems to stand out with respect to the type, density, and size of ceramic inclusions.

The introduction of shell/organic material into the suite of temper options during CP4-5 and its apparent influence on the use of other temper types is telling. At all locations, it appears that shell/organic temper was used in place of primary temper choice regardless of what type of mineral was being used previously. The data presented here suggest that potters who made the Eddington Bend and coastal vessel lots had similar ceramic recipes, and these differed from the recipes used to make the pots at sites within the Howland location.

Analysis of ceramic fabrics within this study indicates an apparent shift to larger temper sizes at the Eddington Bend and coastal locations when shell/organic temper is introduced. This shift may be related to a reduction in the need for smaller temper size that was necessary during previous periods of higher quartz use. This change was not evident in the Howland sample.

Finally, ceramic fabrics at the Eddington Bend site appear to be more compact than fabrics at the other two locations. A predominance of compact fabrics at Eddington Bend is a trend that spans temporal divisions. This may relate to hotter firing regimes at this location resulting from larger fires linked to gathering activities. Alternatively, the presence of compact fabrics at the Eddington Bend site may be related to pot function.

In the next section I discuss vessel lot morphology. This attribute category appears to be less sensitive to spatial, temporal, and perhaps, social differences.
Vessel Morphology Attributes

This section presents the results of my analyses of morphological attributes of ceramic vessel lots within the Penobscot River samples. Since rims constituted the primary unit of analysis within this study, I focused exclusively on rim morphology. Seven attributes were analyzed and recorded, four of which are discussed here.

Morphological characteristics of ceramic vessel lots are imbued with functional information and may also be significant chronologically or socially/ethnically (Rice 1987:215). Similar to the examination of ceramic fabrics discussed above, this analysis of vessel lot morphology aims to identify and compare potters’ choices. The following attributes are discussed here: rim thickness, rim eversion, lip shape and vessel lot orifice size.

Rim Thickness Introduction and Sample Overview

The thickness of the walls of a pot plays an important role in vessel performance. Braun (1983:118) identifies three ways in which vessel wall thickness affects performance—thermal conductivity, flexural strength, and thermal shock resistance. In general, thinner vessel walls conduct heat better and are more resistant to thermal shock. Thicker walls tend to be mechanically stronger (Braun 1983; Rice 1987). Of course, the complex interplay between various ceramic components such as temper, firing, and morphology affect these performance properties as well (Braun 1983).

Within hand-crafted pots, variations in rim and wall thickness can occur within one vessel and body sherds also vary depending upon which part of the pot the sherd represents. Hence, maximum thickness values were taken in two locations on each vessel lot to ensure consistency for comparative purposes. By standardizing measurements in two locations on the vessel lots, values are better suited for comparative analyses. The data recorded in this study are assumed to provide a general indicator of vessel lot wall thickness. The results of these analyses are presented in Table 23 and discussed below.
Overall rim thickness values measured at the lip on vessel lots from the Penobscot River samples range from 1.42 mm to 13.43 mm and the overall mean and median values are 5.31 mm and 4.93 mm, respectively. Rim thickness values taken at 1 cm below the lip range from 2.99 mm to 11.41 mm and have a mean value of 6.78 mm and a median value of 6.78 mm. These values are comparable to Middle Ceramic Period rim thickness values for the region. In the next section I discuss how rim thickness compares over time and space.

**Inter-Site Comparisons of Rim Thickness by Time Period**

Comparative analysis of rims from the three locations indicates that rim thickness is notably similar across the three locations and within each time period. Based on average rim thicknesses, Howland stands out during the CP2-3 time period as having slightly thicker rims with an average thickness of 6.08 mm at the lip. The Eddington Bend and coastal samples exhibited slightly lower average lip thicknesses measuring 5.01 mm and 5.20 mm, respectively. A similar pattern occurred in thickness values taken 1 cm below the lip.

I conducted a Welch’s t test to evaluate the difference in means between each of the samples attributable to the CP2-3 time period. This test was selected because the data sets did not have similar variances and were unequal in sample size. The results show that mean rim thicknesses at the three locations do not differ significantly in most cases. Of the comparisons made, results indicate that the only significant difference in rim thickness exists during the CP2-3 period in lip measurements from the Howland and Eddington Bend locations; t(26)=2.66, p=.013. Rim thickness values among the samples are not otherwise distinguishable (Table 23).

Comparisons of mean and median rim thickness values between CP2-3 and CP4-5 indicate that rims get slightly thicker over time at both the coastal and Eddington Bend locations. During CP4-5 the coastal sample exhibits slightly thicker rims as evidenced by measurements taken at the lip. The Howland CP4-5 sample was too small to consider in comparative analyses.
Rim Thickness Discussion and Interpretation

Average rim thickness among the three locations is similar in most cases. With the exception of the differences between Howland and Eddington Bend vessel lots during the CP2-3 period, the samples do not differ significantly. However, rim thickness values at Eddington bend are consistently lower than those from the other two locations, suggesting a preference at this site for vessels with slightly thinner rims.

In considering the sites collectively it can be seen that over time, mean rim thickness values increase between CP2-3 and CP4-5. This same trend of increasing wall thickness over time was reported by Mack (2002) at the Bob Site—a similar-aged site in the Penobscot River valley near Old Town, Maine. This may be a reflection of overall increase in pot size through time.

Luedtke (1986:128) surmised that a vessel lot wall thickness cline may exist regionally whereby vessel lot walls get thinner from southern New England to Maine. If that is the case, it may be that the similarity in rim thickness among the Penobscot River valley sites is the product of a regional technological style or a “micro-tradition” (Luedtke 1986) specific to the Penobscot River valley. As such, one would not expect dramatic differences in rim thickness among the three sites.

Rim and vessel wall thickness are under-explored attributes in regional ceramic studies. This study suggests that these attributes are worthy of closer scrutiny. Inter-state studies and consistent methods in recording rim and wall thickness attributes are necessary to understand the socio-spatial significance of rim and wall thickness in the region. In the following section, I discuss my analysis of rim eversion, another morphological attribute selected for study.

Rim Eversion Introduction and Sample Overview

Rim eversion refers to the curve of the rim in profile from the neck to the lip. Rims in this study were classified as follows: direct rims (no curve), excurrave rims (outward curve), and incurvate rims (inward curve) (Figure 13). Potters’ choices regarding rim eversion may reflect the
intended function of the pot. For example, excursive rims may be selected for vessels used for pouring liquids, whereas rims that are incurvate may serve to prevent spillage (Rice 1987).

Within the overall study sample, excursive rims (52.84%; n=167) were more common than direct or incurvate rims (Table 24). Conversely, incurvate rims were minimally represented and comprised only 7.27% of the entire sample. However, samples from each of the locations differed slightly in the percentages of rim eversion across the three types (direct, incurvate, excursive). Within the overall Howland and Eddington Bend samples, the excursive rim occurred more frequently than the other forms of rim eversion.

In contrast, the coastal sample had a higher percentage of direct rims (51.89%; n=41) compared to other types of rim eversions present in the sample. In the following section, I discuss rim eversion choices with respect to temporal assignment and site location.

**Inter-Site Comparisons of Rim Eversion by Time Period**

Temporal and spatial comparisons of rim eversion in this study show some commonalities at the three locations. Comparisons of rim eversion from each of the CP2-3 samples showed that pots with excursive rims were most common at each of the sites. Direct rims were second most common. Incurve rims were present in small percentages within the Eddington Bend and the coastal sample, and not present at all within the Howland CP2-3 sample. Aside from the lack of incurvate rims within the Howland sample, the three sites are similar with respect to rim eversion during the CP2-3 time period.

To evaluate the relationship between rim eversion and site location during the CP2-3 time period, I conducted a Chi-square test of independence on the data for excursive and direct rims. The incurvate rim data were excluded because of the small data set. Results indicate that no significant relationship exists between site location and rim eversion during CP2-3 $\chi^2 (2, n = 201) = 5.32, p < .05$.

During CP4-5, a shift is apparent within the coastal sample and direct rims become more common at this location than was the case for CP2-3. Within the Eddington Bend sample,
excurvate rims occurred at a slightly higher percentage than direct rims. Incurvate rims were present within the Eddington Bend and coastal samples during CP4-5 but similar to the CP2-3 time period, occurred less frequently than direct or excurvate rims.

The Howland CP4-5 sample is small and rim eversion was recorded for four rims. Three of the vessel lots have excurvate rims and one has a direct rim—suggesting a similar preference for excurvate rims as was seen in the CP2-3 sample. Incurvate rims are not present in the Howland sample—also similar to the CP2-3 sample.

**Rim Eversion Discussion and Interpretation**

The predominance of excurvate rims during the CP2-3 time period suggests that pots with this rim type may have been more commonly used within the Penobscot River valley than other forms. The prevalence of excurvate rims also suggests that Native people occupying the three locations used pots for similar purposes. Sound functional interpretations of vessel lots require a holistic approach to vessel lot analysis. Rim sherds in and of themselves should not be relied on solely to interpret vessel lot function. However, some general comments can be made regarding the prevalence of direct and excurvate rims within the study sample.

Pots with excurvate rims facilitate access to contents and pouring contents (Hally 1986; Rice 1987). Incurvate rims are more suited to storage or keeping contents within the pot (Rice 1987). Of the 48 vessel lots in the sample with visible cooking residues, all had either direct or excurvate rims. Keeping in mind the fragmentary nature of ceramics in this study, it is notable that none of the vessel lots with incurvate rims had visible cooking residues on them. These features suggest pottery at these locations was used more so within the realm of cooking and serving food and liquids, than as storage containers.

Assuming that Native peoples in the region had highly mobile lifeways, a lower reliance on storage containers makes some sense. If people on the coast were semi-sedentary as Sanger (1988) has proposed, storage containers may have been used more frequently in this setting. In any case, the presence of incurvate rims at Eddington Bend and the coastal sites suggests that
ceramic-related activities at these locations warranted rims of such types that were perhaps used for storage or other functions. Further research into this aspect of vessel morphology is necessary to ascertain the role of incurvate rim vessels in pre-contact Native lifeways in Maine.

**Lip Shape Introduction and Sample Overview**

Lip shape refers to the shape of the lip in profile and for purposes of this study, lip shape was classified into five categories: flat, round, pointed, beveled, and combination rims that displayed more than one lip shape (e.g. flat/round) (Figure 13). CP2-3 vessel lots represent the largest sample (n=243). Fifty-six vessel lots were included in the CP4-5 lip shape sample.

Overall, flat lip shapes occurred most frequently in the Penobscot River sample (42.49%; n=167). Vessel lots with pointed lips were least common overall (8.90%; n=35). The Eddington Bend and coastal samples each contained lip shapes representative of all five categories. The Howland sample included lip shapes in all categories except for beveled lips. Percentages of flat and round lip shapes increase slightly between CP2-3 and CP4-5.

In this analysis, lip shape provided a small window into the diversity of ceramics at each of the sites. Since I was interested in exploring the social context of production, examining diversity in select attributes within each sample could provide insight into whether potters’ techniques were standardized or variable. For example, if people with slightly different pottery techniques gathered at Eddington Bend, we might expect the pottery to reflect a higher level of diversity than what would occur in a household context at the Knox site.

I selected lip shape to explore diversity because of the variety shapes within the samples and because it is an attribute that offers opportunities for personal or social expression. The Simpson’s Diversity Index used here examines diversity using a “0-1” scale whereby “0” indicates no diversity in the sample and “1” indicates maximum diversity. In the following sections I discuss the results the lip shape analysis and how lip shape diversity is represented within the samples.
**Inter-Site Comparisons of Lip Shape by Time Period**

Analysis of lip shape samples from the three locations shows that flat lip shapes occurred most frequently at all locations during CP2-(Figure 11). The Howland and Eddington Bend samples had slightly lower percentages of flat lips during CP2-3 than the coastal sample.

Within the Howland sample, more than 1/3 of the CP2-3 vessel lots displayed combination lip shapes (e.g. flat/round, round/pointed, etc.). These types of lips occurred in much smaller percentages (<15%) within the CP2-3 samples from the Eddington Bend and coastal sites. Beveled lips occur most frequently in the Eddington Bend CP2-3 sample whereas this type of lip shape was less common within the Howland and coastal samples.

During the CP2-3 time period, lip shapes at the coast appear less diverse than those within the other two samples. The Simpson’s Index of Diversity for coastal lip shapes was .59, whereas lip shape diversity at the Howland and Eddington Bend locations was .70 and .74, respectively (Table 27). This suggests, that not only was the coastal lip shape sample less diverse, but also that the Howland and Eddington Bend samples were similar to each other in this respect.

The CP4-5 lip shape data set from the Howland sample includes only 4 vessel lots. These data were not included in the comparative assessment. In terms of the other two samples, over half of the vessel lots from the coastal sample had flat lip shapes—a preference evident in the CP2-3 sample as well. In contrast, the Eddington Bend sample had a slightly higher percentage of vessel lots with round lips than those with flat lips. Beveled lips did not occur in the Eddington Bend CP4-5 sample. Both pointed and beveled lips were sparsely represented in the CP4-5 sample.

During the CP4-5 time period, diversity of lip shapes at the coast and Eddington Bend is similar. The Simpson’s Index of Diversity for the coastal sample was .67, whereas lip shape diversity at the Eddington Bend site was .69. This indicates that lip shape diversity within the two locations became more aligned between CP2-3 and CP4-5.
Lip Shape Discussion and Interpretation

This analysis has shown that potters from the three Penobscot River valley locations chose flat and round vessel lips over other forms during the Middle Ceramic Period and these preferences appear to be fairly consistent through time. However, lip shapes within the overall sample varied, indicating a lack of standardization in pottery making at the three locations.

The relatively high diversity in lip shape within the Howland and Eddington Bend samples is noteworthy. If groups were using the Eddington Bend location as a gathering place (Robinson 2009), one would expect to see a diverse set of lip shapes on vessel lots from that location. Interestingly, the Howland ceramic sample also displayed a similar level of diversity in lip shape. This also makes sense. If, as I have proposed elsewhere (Newsom 1999), the Howland sites represent multiple families using the Piscataquis River as an access route to the north and west, then diversity in ceramic form would be reasonable.

In contrast, the coastal sample displayed less diversity during the CP2-3 time period than the other two locations. If Native people practiced a semi-sedentary lifestyle at the coastal sites during the Middle Ceramic Period, we might expect to see less diversity in ceramic attributes than in locations where people engage with the landscape more fluidly.

Recognizing that single attributes are not sufficient for drawing conclusions, the vessel lot lip shape data presented here are informative. Diversity in lip shape (and other attributes) was identified by Chilton (1996) as a feature of Algonquian pots within Connecticut River Valley. She attributed this diversity to a ceramic production context reflecting high mobility, small groups, and family-based manufacturing contexts. I suggest the lip shape data presented here supports a similar scenario for potters at Eddington Bend and the Howland sites. Additional research into ceramic attribute diversity within coastal settings may shed light on whether the lower diversity in lip shape at the coastal sites in this study is meaningful with respect to the social context of ceramic production. In the next section I continue my discussion of rim attributes with a presentation of my observations on vessel lot orifice diameter.
Orifice Diameter Introduction and Sample Overview

The orifice diameter is a measure of the vessel opening. The size of a vessel orifice has important implications for use. For example, a large orifice permits easier access to the pot’s contents and may be more suitable for serving foods or stirring contents (Braun 1983; Rice 1987). Small openings on a pot may serve to prevent evaporation or heat loss, or they may be better suited for storage (Hally 1986; Rice 1987).

Orifice diameter and vessel lot capacity may correlate in some cases. However, variation in ceramic shape can influence the capacity of a particular vessel lot. For example, a vessel lot can have a small orifice but a large body. Chilton (1996) recorded orifice diameter and body curvature measurements to infer vessel lot size. In the present study, vessel lots were often comprised solely of rim sherd. Body sherd were not available in many cases. Therefore, orifice diameter comparisons in this study were not used to infer vessel size. However, gross comparisons of vessel lot orifice diameters are presented.

Orifice diameters were recorded on 96 vessel lots. Table 26 presents summary data on the sample. Measurements were recorded in centimeters using an orifice diameter chart. Vessel lots with less than 5% of the rim were not included in this analysis. Overall, orifice diameters within the study range from 5 cm to 32 cm. On average, orifice diameters within the Penobscot River sample are relatively small. The mean value of the overall sample is 14.38 cm. The similarity in orifice diameter measurements across the three locations is noteworthy. Mean orifice diameters from the Howland, Eddington Bend, and coastal samples are 15.45 cm, 14.06 cm and 14.37 cm respectively, suggesting slightly larger orifice diameters on vessel lots within the Howland sample. A similar observation was made within the CP2-3 sample discussed below. The CP4-5 orifice diameter sample consists primarily of coastal vessel lots. Therefore, comparative analysis of orifice diameters between sites was not conducted for this time period.
Inter-Site Comparisons of Orifice Diameter by Time Period

Orifice diameters were measured on 52 vessel lots from the CP2-3 time period. The overall average diameter within the CP2-3 sample is 15.50 cm with a median of 15 cm. The average orifice diameter within the Howland sample is the largest at 16 cm. Average orifice diameters from the Eddington Bend and coastal samples are similar (Eddington Bend 15.50 cm; Coast 14.88 cm).

Orifice Diameter Discussion and Interpretation

Similar to other aspects of rim morphology, orifice diameters among the three Penobscot River valley locations are comparable. Although this data set does not lend itself to inferring vessel lot capacity, it is a useful data set for comparative purposes. Unfortunately, orifice diameters are not often reported in ceramic descriptions from Maine. However, when compared to with Chilton’s (1996) data on Algonquian pots from the Guida Farm site in the Connecticut River valley, the average orifice diameters are comparable in size. This suggests that orifice diameter may be a useful attribute for making regional comparisons among peoples with mobile lifestyles.

Summary of Vessel Morphology Analysis

Morphological characteristics of Middle Ceramic Period pottery in the region have not been well-studied. In this examination of rim morphology, several observations are noteworthy. First, there were few distinguishing characteristics among the three locations with respect to morphology. However, the Howland sample stands out slightly in terms of rim thickness. This sample also exhibits slightly larger orifice diameters for the CP2-3 time period than at the other locations and was identified as the only sample that did not include incurvate rims.

Taken collectively, these differences are not insignificant and may reflect a set of interconnected technological choices in ceramic manufacture and use in the Howland area. Also of note is the apparent shift in rim eversion preference from excursvate to direct rims at the coastal sites between CP2-3 and CP4-5.
In light of the subtle differences observed in this analysis, morphological characteristics in regional ceramics should not be conflated through general categorizations. If the Howland differences are not simply a by-product of sampling, it could point to a different engagement with ceramic material than what is occurring elsewhere. For example, it is possible that the morphological differences at Howland are linked to a particular ceramic function or cultural protocols in that location.

**Surface Attributes**

Ceramic surface attributes represent one of the last manufacturing choices a potter makes before firing a pot and may represent one of the most visible remnants of a potter’s creative spirit. In this analysis, I focused on elements of surface attributes that reflect technological choices. These included the following: primary surface treatment, cordage type, cordage twist, and cordage thickness. The results of these analyses are discussed below.

**Surface Treatment Introduction**

In this study, surface treatments were analyzed and recorded in the order in which the potter produced them. For example, surface treatments such as scraping or smoothing were listed as primary surface treatments when they could be identified on the exterior or interior of the pot. Often subsequent surface treatments such as dentate stamping or cordage impressions were applied after the initial step. It is not always possible to identify the primary surface treatment because it may be obscured by subsequent applications. In some cases, the surface of the vessel lot may not lend itself to identifying whether the surface was smoothed or scraped prior to what might be viewed as “decorative” attributes such as dentate stamping.

Surface treatments identified in this analysis represent those created by the potter before the clay is fully dried. Post-firing surface treatments such as painting, smudging, or applying a sealant were not evident on vessel lots within the sample. Definitions of surface treatments observed within the study sample generally follow Rice (1987) and are summarized here. Scraped surfaces occur when a potter uses a tool to thin vessel lot walls or finish a vessel surface (Rice
1987:137). Smoothing creates a uniform surface and involves using the hands, leather or other soft tool.

During this analysis, a surface treatment was classified as scraped if striations were observed on the vessel lot surface. Smooth surface treatments were classified as such when no striations were evident.

Surface treatments have functional characteristics that influence vessel lot performance (Skibo 2013). For example, textured surfaces improve a pot’s thermal shock resistance because variation on the surface of the vessel impedes micro-cracking that might occur during firing or while in use as a cooking vessel. It also helps to create a more permeable surface which reduces spalling (Schiffer et al. 1994). Textured surfaces may aid in handling a pot as well. With respect to aboriginal ceramics in Maine, dentate stamping or fabric impressions on vessel surfaces potentially had a functional role as well as an aesthetic one.

In this analysis, I focused on those vessel lots on which primary surface treatment techniques could be discerned as either smoothing or scraping. Vessel lots in which smoothing and scraping techniques could not be identified are not included in this discussion. It should be noted that it is highly likely that dentate, channeling, and cordage were used as primary surface finishing techniques. It was not always clear if smoothing or scraping took place prior to other applications. Since I am interested in potters’ technological choices, I elected to focus this discussion on smoothing and scraping techniques as choices in the surface finishing sequence. In the following sections, I present the results of my analysis of surface treatments on Penobscot River vessel lots.

**Exterior Surface Treatment Introduction and Sample Overview**

Within the entire sample, smoothing on exterior surfaces occurred more commonly at the three sample locations than did scraping. Application of these two different techniques appears to be more evenly distributed at the coast than at the other locations. Here, a little over half of the sample exhibited smooth surface treatments. A slightly lower percentage of vessel lots exhibited
scraped surface treatments. In contrast, the Howland and Eddington Bend samples show a clear preference for smoothing with the majority of the vessel lots displaying this technique (Table 27).

Within the overall data set on exterior surface treatment, the coastal vessel lots stand out as different from the other two locations. A Chi-square test of independence was performed on the overall exterior surface treatment data sets. Results indicate that a significant relationship exists between site location and exterior surface treatment \( \chi^2 (2, n = 383) = 10.84, p < .05 \) (Table 28). In the following sections, I discuss these techniques in terms of their spatial and temporal distributions.

**Inter-Site Comparisons of Primary Exterior Surface Treatment by Time Period**

The preference for smoothing vs. scraping exterior surfaces is evident at all sites during the CP2-3 time period. Of note is the high proportion of smoothed exterior surfaces to scraped surfaces within the Howland and coastal samples. The Eddington Bend site exhibits less dramatic differences in applications of smoothing techniques versus scraping techniques. However, the consistent preference for use of the smoothing technique over the scraping technique during this time period is noteworthy and, as is discussed below, does not appear to be a sustained practice over time in the coastal setting.

During the CP4-5 time period, smooth exterior surfaces continue to be prevalent within the Howland and Eddington Bend samples. In contrast, coastal vessel lots during the CP4-5 time period show a preference for scraped surfaces. This is not consistent with exterior surface treatments within the CP2-3 coastal sample, suggesting a change in technique over time at this location. As is discussed below, the coastal sample tends to stand out as being different from the other two locations with respect to interior surface treatments as well.

**Interior Surface Treatment Introduction and Sample Overview**

Similar to the overall exterior surface treatment sample discussed previously, interior surfaces within the entire sample indicate a general preference for smoothing techniques (Table 30). However, this preference was not consistent across all sites. Within the coastal sample,
scraped surfaces were the most common technique identified in this analysis. Scraped interior surface comprised the majority (62% n=51) of the overall coastal sample.

The opposite is the case for the other two locations. The Eddington Bend and Howland samples had slightly higher percentages of vessel lots with smooth interior surface treatments than those with scraped interior surfaces. However, significantly high percentages of smoothed surface treatments over scraped is not evident in the interior surface treatment sample as was observed in the exterior surface treatment sample. I conducted a Chi square test of independence on interior surface treatment data to determine if there was a significant relationship between interior surface treatment choice and site location. This test showed that the relationship is significant \( \chi^2 (2, n = 361) = 8.82, p < .05 \) (Table 29). In the following sections, I discuss choices regarding interior surface treatments within the context of temporal assignment and site location.

**Inter-Site Comparisons of Interior Surface Treatment by Time Period**

Analysis of interior surfaces on CP2-3 vessel lots from each of the locations suggests that a significant preference for one surface treatment over the other did not exist at any of the three locations. The difference in percentages of vessel lots with scraped surfaces versus smoothed surfaces are not dramatic. However, the Howland and Eddington Bend sites show a slight preference for smoothed interior surfaces, whereas the coastal sample had a higher percentage of vessel lots with scraped interior surfaces.

In the CP4-5 sample, interior surface treatments are notably different from the CP2-3 sample. During the CP4-5 time period, both scraped and smoothed interior surfaces occurred at all sites. The coastal sample had the highest percentage of vessels with scraped interiors, and within the Eddington Bend sample, only 28.57% (n=6) of the vessel lots had scraped interiors. The Howland sample maintained nearly identical percentages of scraped and smoothed interior surfaces as what was present in the CP2-3 sample. The preference for scraped surfaces at the coastal locations is noteworthy and may represent a technological style idiosyncratic to potters in this location.
Surface Treatment Discussion and Interpretation

Scraping and smoothing are two techniques that potters choose from when taking steps to finish the surface of the pot. In some cases, these choices may be related to function, in other cases not. Surface treatments within the sample discussed here suggest that coastal potters may have had different preferences and techniques for surface treatments for their pots than potters at the other two locations. Notable is the high proportion of smooth exterior surfaces on coastal vessel lots during CP2-3. This appears to be an anomaly when viewed within the context of interior surfaces at this time, as well as coastal surface treatments during CP4-5—all of which indicate a preference for scraped surfaces. It is unclear why the CP2-3 sample from the coast is so dramatically different with respect to exterior surfaces. What is clear is that the coastal sample appears to stand out from the other two locations with respect to primary surface treatment suggesting that potters at this location relied on different finishing techniques than those potters at Eddington Bend and Howland. In the following section I continue my discussion of surface attributes, focusing on the results of my analysis of cordage-based attributes.

Cordage-Based Attributes

Cordage-based attributes represent the use of perishable fibers as elements within the surface treatment stage of vessel lot production. Specifically, potters impressed vessel lot surfaces with cordage using various techniques such as cord-wrapped stick or paddle, cord-wrapped cordage, twined fabric impressions, or woven fabric impressions. The use of cordage as a surface treatment is temporally sensitive in Maine and occurs during the Early Ceramic Period (CP1) and again later between CP4 and the contact period. As mentioned in previous chapters, analyses of the spin and twist of cordage observed in surface impressions on aboriginal ceramics from Maine have shown distinctions in cordage spin and twist preferences on ceramics from coastal and interior settings. This suggests that cordage production is sensitive to group or population distinctions. Given that, I examined multiple attributes of cordage used on vessel lots within the study sample. In addition to identifying basic types of cordage (fabric impressed, cord-wrapped
I also recorded the direction of spin and final twist, measured the thickness of the cordage, and noted the presence or absence of knots.

The results of the cordage analysis are presented below. Several analytical notes are worth mentioning here. Fabric impressions were evident in all samples. However, it was not always possible to distinguish woven fabrics from twined fabrics. Therefore, data on these types of cordage impressions were classified under the general category of “textile.”

Additionally, maximum cordage thickness measurements were recorded on individual elements visible on clay casts unless residues were apparent on the sherds. Then cordage thickness was recorded directly from the sherd. Thickness reflects the width of the cord perpendicular to its long axis (Drooker 1992).

In addition to cordage thickness, cordage spin and twist direction was recorded on vessel lots whenever discernable. Basic cordage twist choices are limited to one of two options with respect to spin and twist—either “S” spin, “Z” twist or “Z” spin “S” twist (Hurley 1979). These classifications represent whether the cordage maker uses a “right over left” or “left over right” technique when twisting strands of fibers together. The two techniques are distinguished by the angle of the cordage, or in the case of pottery, its impression in the clay. Typically, fibers are “spun” initially to create strands that can then be twisted together. The twist of the strands is generally conducted in an opposite direction of the spin. This helps to prevent the cordage from unravelling.

Occasionally, only spin or twist direction was visible on a sherd during analysis. In these cases, I classified the cordage according to what the spin or twist direction would have likely been. For example, on cordage where only a “Z” spin is visible, I assumed the twist to be “S.” In the following sections I present the results of this analysis. I also discuss the relationship between cordage twist and other ceramic attributes.
Cordage Type Introduction and Sample Overview

Cordage impressions were identified on 84 vessel lots. The majority (n=64) of these vessel lots were assigned to the CP4-5 time period; 15 vessel lots were assigned to CP1; two were assigned to the CP5/6 time period; one was a CP6 vessel lot; and two were not assigned to a chronological unit. This discussion on cordage type focuses primarily on the 64 vessel lots within the CP4-5 time period. Within this sample, most cordage applications were identified as cord-wrapped stick (n=38), 3 vessel lots displayed woven or twined fabric impressions, and knotted cordage was present on six vessel lots. Five vessel lots had combinations of elements (e.g. cord-wrapped stick and knot). Cordage type on the remaining 12 vessel lots could not be identified.

Inter-Site Comparisons Cordage Type during CP4-5

Within the CP4-5 cordage sample, cord-wrapped stick was the most common cordage type identified at all three locations (n=38). In a few instances (n=3) cord-wrapped stick impressions occurred in combination with other types of techniques such as knotting or weaving. These only occurred in the Eddington Bend and coastal samples. Combinations of cordage types did not occur within the Howland sample. Knotted cordage was evident in all three samples. Woven or twined fabrics occurred infrequently overall and were limited to the Howland (n=1) and coastal (n=2) samples. Cord-wrapped cord was only present on two vessel lots within the Eddington Bend sample.

Techniques other than cord-wrapped stick occurred in so few numbers it is difficult to formulate conclusions on whether a certain cordage technique is idiosyncratic to a particular location. Additional cordage-type data from ceramics throughout the region would be useful in determining if the spatial patterns identified here are significant. In the next section, I present my findings relative to cordage thickness.

Cordage Thickness Introduction and Sample Overview

As mentioned previously, cordage thickness is a measure of an individual cord (Hurley 1979). Because cordage is believed to be culturally sensitive in the region, measurements of
thickness provides a cordage-based data set that can be used to supplement cordage twist data (Table 31). Based on measurements from the entire sample, cordage thickness values range from .47 mm to 2.4 mm. Notable is a slightly larger mean thickness value ($\bar{x}=1.55$ mm) on cordage used on CP1 vessel lots than on cordage used on CP4-5 vessel lots ($\bar{x}=1.31$ mm). Based on this comparative study, temporal distinctions in cordage thickness may be more common than spatial distinctions as is illustrated by the findings presented in the next section.

**Inter-Site Comparisons of Cordage Thickness during CP4-5**

When compared, cordage thickness from the three locations does not differ dramatically. Average cordage thickness on CP4-5 vessel lots from Eddington bend and Howland are nearly identical (EBend: $\bar{x}=1.26$ mm; Howland: $\bar{x}=1.23$ mm). The coastal sample had a slightly higher mean value ($\bar{x}=1.38$ mm). These data suggest that techniques and materials used to form cordage may not have varied widely within the Penobscot River valley. This is not the case for cordage spin and twist, which I discuss in the next section.

**Cordage Spin and Twist Introduction and Sample Overview**

Cordage spin and twist was recorded on 75 vessel lots. Overall, “Z” spin, “S” twist cordage represents the most common twist pattern in the Howland (70.58% n=12) and Eddington Bend (55.55%; n=15) samples. In contrast, the overall coastal sample is dominated “S” spin, “Z” twist cordage (71.85% n=23).

In the following sections I discuss cordage twist by time period. The discussion focuses on analysis of 15 CP1 vessel lots and 38 CP4 vessel lots and eight CP5 vessel lots. In this discussion on cordage twist, I elected to distinguish between specific time periods because of regional patterns identified by Petersen (1996). Specifically, Petersen (1996) identified “discontinuities” in coastal and interior cordage twist patterns during Ceramic Periods 1 and 4—namely, a coastal preference for “Z” twist cordage and an interior preference for “S” twist cordage. During CP5, the coastal and interior distinction is replaced by a predominance of “Z” twist cordage in both settings. Therefore, to ascertain if these trends occur within the Penobscot
River data set, I examined cordage twist within specific chronological units as identified in the Petersen and Sanger (1991) chronology. The data sets are small for each of these individual time periods. The results of these analyses are presented below.

**CP1 Cordage Spin and Twist**

Cordage twist direction was identified on 15 CP1 vessel lots, all of which had grit inclusions. Analysis of CP1 vessel lots showed that the Eddington Bend and Howland samples were exclusively “Z” spin, “S” twist. This pattern is common for interior settings in Maine during the CP 1 time period.

Unlike the Howland and Eddington Bend vessel lots, the coastal sample had equal numbers of both types of techniques (i.e. “S” Twist n=3; “Z” Twist n=3). Given the regional patterns proposed by Petersen (1996), an equal distribution between “Z” and “S” twist cordage would not be expected.

**CP4 Cordage Spin and Twist**

The CP4 cordage twist analysis included 38 vessel lots. Similar to the CP1 time period, cordage twist samples from Eddington Bend and the Howland sites differed from coastal cordage twist patterns. CP4 vessel lots from the Howland sample exhibited “Z” spin, “S” twist cordage on 62.50% (n=5) of the vessel lots. The Eddington Bend CP4 sample also showed a preference for “Z” spin, “S” twist cordage (61.66% n=11).

Conversely, cordage twist within the CP4 coastal sample was dominated by the “Z” twist technique (75%; n=9). Petersen and Sanger (1991) note that “Z” twist cordage “nearly always” accompanies shell temper. Of the 32 shell/organic tempered vessel lots on which cordage twist direction was recorded, “S” twist cordage occurred on eight vessel lots suggesting the correlation between shell/organic temper and “Z” twist cordage may not be as strong as once believed. Additionally, the combination of “S” twist cordage and shell/organic temper is present in all three samples, albeit in small numbers.
CP5 Cordage Spin and Twist

Cordage twist patterns on 8 CP5 vessel lots are presented here as informational only due to the small sample size. Seven of the eight vessel lots assigned to this time period exhibit “S” spin, “Z” twist cordage—five of which occurred in the coastal sample. One vessel lot at Howland and another at Eddington bend have “S” spin, “Z” twist cordage. One coastal vessel lot has “Z” spin, “S” twist cordage. Most (n=6) of the CP5 vessel lots were shell/organic tempered. Generally, these data support coastal and interior patterns in cordage twist previously identified for the region. In the next section, I explore the relationship between “Z” and “S” twist preference and other ceramic attributes.

Relationship Between Cordage Twist and Other Attributes

Cordage twist has been identified as a potentially significant indicator of social distinctions regionally, therefore I explored ceramic attributes within the context of “S” and “Z” twist choices. My primary aim was to determine if other technological choices commonly accompanied “S” and “Z” cordage spin and twist direction. I conducted this comparative analysis using data from ceramics with cord-wrapped stick surface treatments. This type of surface treatment commonly occurs between CP4-6. The cord-wrapped stick sample consisted of 24 vessel lots with “Z” twist cordage and 17 vessel lots with “S” twist cordage. Table 32 presents a summary of these comparative data sets.

In many ways, cord-wrapped stick ceramic vessel lots viewed within the context of cordage twist are indistinguishable. For example, average orifice diameter, cordage thickness, and inclusion size are nearly identical in vessel lots with “Z” and “S” twist cordage. However, notable differences were observed in several attribute categories including average rim thickness, rim eversion, primary inclusion type, and fabric consistency. The details of these differences are discussed below.
The differences in attributes associated with “Z” and “S” twist cordage represent each of the three categories of attributes analyzed in this study—morphology, fabric characteristics, and surface attributes. They serve as an organizational framework to the following discussion.

Morphologically some differences are evident between “S” and “Z” twist vessel lots. With respect to rim thickness, vessel lots with “S” twist cordage had higher mean thickness values on the lip (\(\bar{x} = 7.21 \text{ mm}\)) and 1 cm below the lip (\(\bar{x} = 8.93 \text{ mm}\)) when compared to vessel lots with “Z” twist cordage (lip: \(\bar{x} = 5.99 \text{ mm}\) and 1 cm below: \(\bar{x} = 7.73 \text{ mm}\)).

Rim eversion also differs between the two twist types in the cord-wrapped stick sample. Excurvate rims are weakly represented (n=3) on vessel lots with “S’ twist cordage and the sample is dominated by direct rims (n=9). Within the “Z” twist sample, direct and excurvate rims occur in nearly equal amounts differing only by one vessel lot (Direct: n=6; Excurvate: n=7).

Perhaps one of the most noteworthy differences between the “S” twist and the “Z” twist samples exists within ceramic fabrics. Fabric consistency values in the “S” twist sample have a higher percentage of vessel lots with very friable to friable fabrics (47.05%; n=8) than the “Z” twist sample. Friable fabrics are present on only three vessel lots (12.50%) of the “Z” twist sample.

Another difference in fabrics between the “S” and “Z” twist sample exists in primary inclusion type. The correlation between shell temper and “Z” twist cordage has been noted by Petersen and Sanger (1991). In comparing inclusions within the two cord-wrapped stick samples, shell/organic inclusions are more common in the “Z” twist sample (54.16%; n=13) than in the “S” twist sample (23.52%; n=4). Additionally, quartz inclusions occur in similar percentages within both samples (“S” Sample=35.29%; “Z” Sample=41.66%). In contrast, there is a stark difference in the presence of feldspars in the two samples. In the “S” twist sample, feldspars are the primary inclusion type in 41% (n=7) of the vessel lots, whereas none of the vessel lots within the “Z” twist sample have feldspars as primary inclusion types. These data suggest that recipes for ceramic pastes may be a worthwhile avenue for analyses complementary to cordage twist studies.
Cordage Attributes Discussion and Interpretation

The cordage analysis presented here is informative. Generally, the data support previously identified coastal and interior cordage twist patterns. What is interesting is how the Eddington Bend site is more aligned with the interior sample in this regard than with the coastal sample. This is not the case for all attribute categories. If we were to classify the Eddington Bend potters based on cordage twist, we might consider them to be part of an “interior group.” However, when a multitude of potters’ choices are examined some attributes within the Eddington Bend sample are more comparable to coastal choices than to Howland choices.

The relationship between cordage twist preference and other attributes categories is an important one and the preliminary data presented here offer some guidance into which attribute choices may be worth exploring further. Based on the exploratory analysis presented here, it appears that rim data and ceramic pastes are potential attribute categories that may be sensitive to social distinctions in the region.

Summary of Surface Attributes

Surface attributes examined in this study included several different techniques and features. Analysis of some surface attributes suggest that the coastal sample is distinguished from the other two samples (e.g. scraped surfaces vs. smooth surfaces). In other instances, the coastal sample does not stand out.

The cordage twist patterns identified in this study support coastal and interior twist preferences identified for Maine. An exception may be in the relationship between shell temper and “Z” twist cordage. Additional investigations into the correlation between temper choices and cordage twist may demonstrate spatial patterns or functional reasons for correlations between the two variables.

In the next section I continue to examine potters’ technological choices through the analysis of ceramic manufacturing scraps. These often-ignored remnants of the manufacturing
process are imbued with technological choices. The analysis conducted here shows some stark differences in attribute characteristics between two of the three locations selected for this study.

**Manufacturing Scraps Introduction and Sample Overview**

Manufacturing scraps are remnant pieces of fired clay produced by potters during the manufacturing process. These fired clay scraps provide good evidence that pottery making activities occurred at a particular site and they are representative of the formation and firing stages of the ceramic manufacturing process. Success at these stages requires certain climate conditions be met. As I have stated elsewhere (Newsom 1999), manufacturing scraps are likely good indicators of site seasonality in Maine because weather and climate factor into pottery-making processes (see Arnold 1985:71-77). For example, winter snow cover and frozen clay deposits would impede access to raw materials for pottery production. Cold temperatures and rainy weather also inhibit one’s ability to dry and fire pottery effectively. Climate conditions in Maine between November and March would have been less than ideal to nearly impossible for potters to be successful in their craft unless some accommodation was made to manufacture pots inside. Therefore, it is likely that the construction of pots was predominantly a warm-season activity in the area. However, it is important to note that it would not have been impossible to make pots during the winter season, particularly if raw materials were stored. Additionally, steps in the manufacturing process such as crushing temper, preparing cordage, or sieving clay could have occurred in any season.

In addition to their usefulness as seasonality indicators, manufacturing scraps also reflect potters’ choices along the ceramic production sequence. Manufacturing scrap size and fabric characteristics may be idiosyncratic to a particular potter or group. Also, the question of why manufacturing scraps are fired is an interesting one. It is possible that scraps get swept up and put into the fire as a general cleaning practice, or perhaps pieces of pots are offered to the fire as part of thanks-giving practice. In any case, firing of manufacturing scraps is a choice that warrants exploration.
Inter-Site Comparisons of Manufacturing Scraps

Manufacturing scraps included in this analysis come from two locations—the Eddington Bend site and site 108-26 within the Howland area. Two additional manufacturing scraps were present within the study sample but were not included in this analysis—one at site 108-40 in the Howland sample and the other at the Knox site in the coastal sample. The “manufacturing scrap” from the Knox site was listed as such in the catalog. However, it was unfired and included shell inclusions which is uncharacteristic for pottery at this location. It was unclear whether this was an actual manufacturing scrap or simply a clay clump within the shell from the midden. Since it was not comparable to other manufacturing scraps in the analysis, it was not included.

The Howland site produced 41 scraps and Eddington Bend produced 45 scraps. Attributes recorded on this data set were similar to ceramic vessel lots and included: length and width, inclusion type, inclusion density, paste consistency and the occurrence of hematite within the fabric. The results of this analysis are presented below.

The manufacturing scraps from the Eddington Bend and Howland locations are quite similar in several ways. For instance, paste consistencies of manufacturing scraps from both locations fall within the 3-4 (moderate to compact) ranges. Also, hematite presence in the fabrics of both samples are similar with few scraps having hematite levels of 1 (present). Most (n=81) have fabrics in which hematite is present but not prominent (level 2) or not visible (level 3). Finally, the average length and width of the scraps from both locations are similar with the Howland sample producing slightly larger mean values (Length: \( \bar{x} = 18.65 \); Width \( \bar{x} = 13.13 \)) than the Eddington Bend sample (Length: \( \bar{x} = 16.37 \); Width: \( \bar{x} = 12.45 \)).

Differences in the two samples are evident with respect to the inclusions in them. Manufacturing scraps from the Eddington Bend sample show much more variation in primary inclusion type. Quartz, feldspars, micas and shell/organic inclusions are all evident as primary inclusions. In contrast, primary inclusions within the Howland sample are limited to micas (n=40) and one manufacturing scrap with quartz as a primary inclusion.
Inclusion densities are also quite different within the two samples. The Eddington Bend sample has inclusion densities ranging from 1% to 20%, whereas inclusion densities in scraps from the Howland sample are predominantly low with most (n=36) having only 1% densities.

**Manufacturing Scraps Discussion and Interpretation**

The differences observed in the two samples are likely representative of a difference in the number of potters contributing to the sample. The Eddington Bend sample was recovered from multiple units located at different places across the site. Whereas manufacturing scraps from the Howland site (108-26) were recovered together from two adjacent 1 m units and likely represent a single ceramic manufacturing episode in which one or a few individual potters participated.

As an exercise in comparing potters’ choices, analysis of manufacturing scraps appears to be useful in discerning the social context of production. In this case, the variation in inclusion type among the Eddington Bend scraps supports the notion of multiple ceramic recipes guiding ceramic manufacture at this location. This contrasts with the similarity in ceramic recipes in the Howland sample.

With respect to seasonality, if manufacturing scraps are accepted as evidence for non-winter occupation then their presence in the Howland area suggests that people occupied this area in non-winter months. This challenges Snow’s (1980) model of Native people occupying coastal areas in the summer and interior areas in the winter. Additional studies exploring manufacturing scraps and their association with other seasonality indicators such as faunal and floral data would be worthwhile for evaluating the validity of manufacturing scraps as seasonality indicators.

**Chapter Summary**

This chapter presented the results of my analysis of three ceramic samples from the Penobscot River Valley. Here, I have provided overall and comparative data on select morphological, ceramic fabric, surface attributes as well as manufacturing scraps. I have also
offered some preliminary data on the relationship between cordage twist preferences and other technological choices as observed within the Penobscot River valley sample.

Based on these analyses, each location is distinguished from the others in different ways. With respect to ceramic fabrics, the Howland sample stands out for the predominant use of feldspar inclusions—a preference that appears to transcend the CP2-3 and CP4-5 time periods. Complementary to the use of feldspar as primary inclusion at the Howland location is an apparent preference for larger inclusions and higher inclusion densities when compared to the other locations. These characteristics also appear to remain constant through time—an important finding that I address in my conclusions.

A distinction in the Eddington Bend sample worth mentioning here relates to ceramic fabric consistency. Ceramic fabrics at the Eddington Bend site tend to be more compact than those in the other locations and this trait is consistent through time. One possible explanation for this is distinctions in ceramic firing contexts. Eddington Bend pots may have been fired in larger and hotter fires than what occurred at the other two locations. This suggests a different ceramic production context and perhaps one reflecting social gatherings at this location. Additional support for this is evident in the high diversity of lip shapes present in the sample.

The Eddington Bend site location is a boundary area between coastal and interior settings. As such, I had no expectations about whether ceramics at this location would be more similar to either the Howland or coastal sites or whether they would be distinct in and of themselves with respect to technological choice. Based on the data set analyzed here, the Eddington Bend site ceramics appears to share more commonalities with the coastal sample with respect to ceramic fabrics and alternatively, are more similar to the Howland ceramics in terms of surface characteristics.

The coastal and Howland potters seem to share very few common characteristics in their ceramic choices. This observation lends support to social distinctions in coastal and interior populations. Coastal ceramics exhibited several distinct features worth noting. Coastal rim
eversion and exterior surface treatments changed through time. These changes may relate to a shift in how pots were used in this location over time or these changes may reflect demographic changes within the coastal setting.

Perhaps one of the most significant findings from this comparative analysis is how potters in the Penobscot River valley responded to shell as a new temper material. While shell temper was used at all three sites, these data suggest that shell temper was used in lieu of primary inclusion choices regardless of what that primary inclusion type was. The addition of shell temper to the suite of choices does not appear to be accompanied by a wholesale change in ceramic manufacturing techniques. The implication of this is addressed in my concluding chapter.

Throughout this chapter I have offered some interpretations of potters’ choices observed during this analysis. Although challenged in some ways by small, as well as variable, sample sizes, the results of this analysis are significant for understanding the role of agency and technological choice in aboriginal ceramics in the Northeast. In the next chapter I draw from these interpretations to address the research questions posed in my introduction. I also offer guidance for future scholarship both in terms of traditional archaeological inquiry as well as within the realm of Indigenous community engagement.
CHAPTER 8

CONCLUSIONS

In the introduction to this dissertation I presented the problem of how archaeological practice dehumanizes past peoples by neglecting the role of human agency and choice within the human/material culture dynamic. I argued that an over-reliance on normative approaches such as typologies, culture histories, and artifact-centered research designs disengages people from their technologies and erases them from archaeological interpretations of the past. Through these practices archaeologists relegate people to the periphery of archaeological inquiry and by extension, disempower them. To re-empower past peoples, we must acknowledge their agency as central to their engagement with material culture. This dissertation is an effort to that end. Here, I examined the processes and products of agentive actions within the realm of archaeological ceramics and models of socio-spatial organization in pre-contact Maine.

Inspired by a quote from Dr. Wayne Dyer, (2004) I suggested that when we change the way we look at the past, the past changes. When applied to archaeological practice, the implications of this statement are profound because we can transform not only our approaches to archaeological inquiry, but also our interpretations and presentations of the past as well.

Changing the way we look at the past is as much self-reflective as it is tactical. This dissertation incorporates both strategies. It required some self-reflection on my part by acknowledging that the way I had approached archaeological ceramics analysis in the past was rooted in a particular theoretical tradition based on normative approaches and interpretations. Tactically, I used agency, technological style, and Indigenous archaeologies theory as tools for conducting archaeological research in a humanistic way. I employed these tactics to re-empower Indigenous peoples (both past and present) by placing people at the center of my inquiry. Chapter 2 of this dissertation presents the inspiration for these tactics.

I selected a case study approach to situate this altered way of looking at the past and crafted this dissertation around two primary objectives 1) to humanize archaeological research by
applying agency and technological style theories to an archaeological question, and 2) to evaluate the model that two distinct populations occupied coastal and interior environments in Maine during periods prior to European contact. The remainder of this chapter discusses this research in light of these objectives. I begin by reflecting on my findings within the context of the two-population question. Following this discussion, I advance recommendations for future scholarship. Finally, I conclude this dissertation with a discussion of how the applications of agency, technological style, and Indigenous archaeologies have humanized this research.

Reflections on the Case Study: Putting the Model to the Test

Introduction

The case study component of this research centered on Sanger’s (1982, 1996a, 1996b) two-population model of socio-spatial organization as an archaeological question to explore. I compared ceramics from three ecological settings to determine if potters’ choices reflected social differences based on the ecological setting within which they occurred. Here, the question of whether or not differences in coastal and interior peoples could be identified through analysis of their ceramic technology was guided by three topics that serve as the conceptual framework for the case study inquiry: the social context of ceramic production, the correlation between cordage twist and other technological choices, and technological choice through time and collective social change. The effort was not simply an exercise to identify similarities and differences in ceramics. By approaching the two-population question guided by these topics, I framed the inquiry around why they might be similar or different based on potential ways in which distinctions in social identity might reveal themselves.

The outcomes of this case study are summarized here by way of these topics. I conclude the case study discussion with a presentation on how this study fits within regional models for Ceramic/Woodland Period socio-spatial organization. I now turn to a summary of the case study, beginning with a discussion of what my research findings revealed regarding the social context of ceramic production.
The Social Context of Ceramic Production

Choices along the ceramic manufacturing sequence are imbued with social meaning. The context of social production influences that meaning and has important implications for understanding why potters choose certain ceramic characteristics over others. The results of this research revealed evidence for variation in the social contexts of ceramic production between the locations selected for study. Namely, potters’ choices at the Eddington Bend site support the interpretation of this space as a place where people gathered; the Howland ceramic sample supports a production context indicative of a peripatetic lifestyle; and some ceramic manufacturing choices at the coastal locations support interpretations of a somewhat stable context of ceramic production. Details of these findings are presented in Chapter 7 and summarized here.

If Eddington Bend was a space used for coming together, then the pottery choices should reflect diversity in purpose and style. Several traits among the ceramics support this interpretation and it is particularly evident when viewed comparatively with the other two locations.

First, ceramic fabrics from this location are more compact than those from the Howland and coastal locations. This characteristic spanned the CP2-3/CP4-5 time period. Since ceramic fabrics in this realm are influenced by firing environments, I interpret this as a reflection of a larger and hotter ceramic firing environment than what occurred at the other sites in the study. Large fire-related features identified at Eddington Bend support this interpretation. Ceramics at this location were probably also fired in smaller fires. However, the occurrence of firing events in large, hot fires would be more common at this location than at others. Additionally, the firing of pots at Eddington Bend is presumed to have been a collective activity performed by potters from multiple families. In this type of production context, fires may have served as a shared resource among families for use in ceramic production and other purposes.

A second ceramic characteristic suggestive of pots being produced in a gathering-type scenario is the relatively high diversity of lip shapes at this location during the CP2-3 time period.
Diversity in lip shape indicates variation in pot function. It is conceivable that Native families gathered at this location needed pottery for multiple purposes such as serving, cooking, gaming, smudging, trading, and food gathering and processing. Undoubtedly, these needs existed at other locations. However, the intensity and scope of these needs at Eddington Bend appears to have been higher here than at the other locations. As a result, the variability in ceramic need is visible archaeologically.

Lip shape is a visible area of the pot in which potters can exercise and convey personal or collective social expression. In a ceramic production context characterized by multiple families, archaeological materials should reflect diversified stylistic forms. Additionally, diversification at a gathering location may be intensified when potters use creative or personal expression to distinguish their work from others, apply new techniques learned from others, collaborate on pottery production or transport materials from their homeland. Diversity in ceramics as is evidenced in the Eddington Bend sample would be expected as families come together to engage with each other in celebration, ceremony, trade, knowledge sharing, networking, politics, games, relationship-building etc.

Conversely, the ceramics from the Howland sample suggests a different ceramic production scenario as revealed through examination of technological choices. This sample generally supports a ceramic production context characterized by small, mobile, family-based potters creating pots for small scale domestic use. The ceramic sample from these sites have relatively thicker vessel lot walls, higher inclusion densities, and larger inclusions. These characteristics would give them more mechanical strength, which in turn, would be more suitable for transport. If the Piscataquis River was a travel artery to other regions, and the Howland sites served as short-term stops while traveling, ceramic vessel lots designed to withstand movement and travel would be necessary.

The diversity in lip shape within the Howland sample supports this model. While it is similar to the lip shape diversity at the Eddington Bend site, I interpret the similarity as a product
of two different manufacturing contexts producing similar archaeological results. Given that the sample is from multiple small sites along a main waterway, the diversity in lip shape is likely a result of small, family-based potters manufacturing pots at different locations on different occasions, based on specific needs. As a result, potters’ choices would vary from site to site. In contrast, the ceramics from the coastal sample suggest a different ceramic manufacturing context and one that supports an interpretation of a semi-sedentary lifestyle. Notably, the low diversity of lip shape when compared to the other two locations is suggestive of a manufacturing context that has more internal consistency or standardization in lip shape choice than at the other locations.

Additionally, pots with high inclusion densities are less common in this sample than in the Howland sample. It might be expected that families with less mobile or semi-sedentary lifestyles would not have as great a need for pots tailored for frequent transport. This is particularly evident during CP4-5 time period, when few ceramics from the coastal sample had high inclusion densities suggesting that the need for pots with mechanical strength, or those suitable for transport, diminished through time. This indicates an increasing stability in the social context of ceramic production at the coastal locations over time.

The findings discussed in the preceding paragraphs point to very different social contexts of production at the three locations. Although they were comparable temporally and interconnected by the Penobscot River spatially, the ceramic samples included in this study were from physical and social spaces that served people differently. As such, people’s pottery needs were different. What is clear is that people were making different pottery-related choices at the three locations and my interpretations of the social context of production at the three locations is informed by choices influenced by human agency and choice within these various social and physical contexts.

Differences in the contexts of production are not in and of themselves conclusive evidence of different identities among potters. There is nothing to suggest that coastal families
did not travel north to the Howland area and make pots differently in that context than they did on the coast because the needs there were different. It is within the conceptual framework of the three topics of exploration outlined previously that we can begin to draw some conclusions about how people in the Penobscot River valley viewed and practiced notions of “us and them.”

**Relationship Between Cordage Twist and Other Ceramic Attributes**

As discussed in the background to the case study, cordage twist is interpreted as a potential indicator of social identity in Maine. If this is the case, then patterns in other ceramic attributes should accompany the choices in twist preference if they are representative of social identity. Because cordage twist is one of a multitude of choices potters make along the production sequence, I examined the ceramic samples to determine if other technological choices commonly accompanied either of the two cordage twist preferences.

Distinctions in cordage twist between interior and coastal samples were evident in this study and relatively consistent with previously identified patterns for the region. Similarities in cordage twist between the Howland sample and the Eddington Bend sample were observed suggesting that potters at Eddington Bend were more closely aligned with the interior potters than coastal potters in this regard.

When ceramics with “S” or “Z” twist cordage were examined to determine if other attribute trends accompanied twist preference, the results indicated that certain ceramic fabric characteristics and rim characteristics differed when compared within the context of twist preference. Ceramics with “S” twist cordage generally had thicker rims with direct eversion. The potential relationship between rim characteristics and twist preference may be significant as part of a technological style. Rims can serve as visible features of creative expression. As such, they may act as vehicles for social messaging (Wobst 1977) or be a space where individual or group idiosyncrasies are encapsulated.

Ceramic fabrics also stood out as an area where some alignment with cordage twist preference was observed. Primary inclusion type and paste consistency differed in vessel lots with
“S” and “Z” twist cordage. This suggests that choices, knowledge, and social protocols regarding ceramic recipes and cordage twist are derived from similar social contexts.

It has been proposed by that distinctions in “Z” and “S” twist cordage are the result of different learning networks (Minar and Crown 2001; Minar 2013; Petersen 1996). This is likely the case, but I advocate here for a more in-depth contemplation around those factors that influence cordage twist preferences in the first place. For example, what if distinctions in cordage twist are the result of gender protocols, social taboos, or diverse methods that influence twist preference?

As part of my own self-awareness and education on this issue, I practiced cordage-making and twining. I came to understand that there are multiple methods that could be employed to achieve the same result. In the early stages of my practice, my cordage lacked uniformity in twist preference. Eventually, I established my own “habitus” for the action and my cordage became more predictable in form. I had no pre-conceived notions about the direction of twist. Nor did I have guidance or social constraints on twist direction.

Based on this experience, and given that a coastal and interior distinction is evident in the Penobscot River samples, I suggest here that the distinctions in coastal and interior twist patterns present on ceramics in Maine may be intentional and guided by social protocols or practices resulting in patterned twist direction. As Minar (2001) points out conservatism in cordage twist goes hand-in-hand with social pressures to conform and without some cultural influence on the technique, conservatism in cordage twist will not occur.

By exploring cordage twist within the context of other technological choices we can begin to identify other attributes that are tied to identity. Results of this comparative assessment have highlighted the potential areas where cordage twist preference and other technological choices intersect.
Choice, Change, and Cultural Affiliation

Examining ceramic attributes with respect to change through time is perhaps the most revealing of the three topics I explored using these data sets. As mentioned in Chapter 1 people and their material culture change. All too often change in material culture is interpreted as different people. If there was one group of people moving seasonally between the coast and interior, we might expect to see similarities in the way their ceramic manufacturing choices changed over time—in essence their pottery choices would “change together” (Rosenmeier 2011). Conversely, if there were distinct groups of people living in coastal and interior settings, their pottery would be distinguished by if, when, and how they change their manufacturing techniques. In this study, it appears the latter is the case. Potters’ choices changed through time at all locations, but they changed differently.

In all locations, people incorporated shell/organic inclusions into the suite of temper choices during the CP4-5 time period and they used this temper in place of their preferred temper of choice. Also evident is a shift from dentate-based surface techniques to cordage-based surface techniques. However, it is important to point out that the timing of these changes within the Penobscot River valley was not validated in this study. Radiocarbon dates associated with the selected samples all occurred in contexts with grit-tempered ceramics. Within the Howland sample, one radiocarbon date of 1510 ± 90 14C yrs B.P. was obtained from a context where both dentate and cord-wrapped stick ceramics co-occurred suggesting that the change from dentate to cord-wrapped stick designs occurred roughly 1500 years ago in the Howland region.

My temporal assignments for ceramic vessel lots studied here were guided by a pre-established chronology that needs to be validated and refined for application to Penobscot River valley ceramics. While the Petersen and Sanger chronology worked well as an organizing tool for this study, its use here carries some assumptions about ceramic change through time. My strategy for comparing assemblages that span multiple chronological units mitigates some potential biases resulting from this assumption, but not all.
That being said, examining changes in potters’ technological choices through time and comparing those changes by location was a worthwhile exercise in addressing the two-population question and suggests that beyond the macro changes related to shell/organic temper and surface designs, potters throughout the Penobscot River valley did not appear to “change together” with respect to their ceramic manufacturing choices. In fact, technological choices within the interior sample remained remarkably stable through time. Ceramic attributes such as temper density, size, fabric consistency, and primary surface treatment exhibited little change between CP2-3 and CP4-5 time periods.

In contrast, consistency in technological choice through time was not evident in the coastal sample. Between CP2-3 and CP4-5 change in manufacturing choices occurred in several attribute categories including rim eversion, primary surface treatment, temper size, fabric consistency, and lip shape diversity. This suggests substantial changes in ceramic recipes and techniques over time in the coastal setting. These changes can be explained by a possible shift in techniques, learning networks, or contexts of production resulting from movement of people or ideas; ceramic change can also be explained by shifts in ceramic function and the need for different pot performance characteristics. Increased populations and higher degrees of social interaction may also result in technological change over time. This is particularly relevant to increased diversity in ceramic traits as is indicated by coastal lip shapes.

What is pertinent to the questions explored in this dissertation is the issue of interior and coastal group distinction. If Native peoples are moving seasonally from the coast to interior, changes in ceramic manufacturing techniques through time should move with them. The data examined here do not show that, thereby lending support to social distinctions in interior and coastal peoples during the Middle Ceramic Period in the Penobscot River valley. However, I offer this with a caveat.

Several commonalities in archaeological ceramics within the Penobscot River sample suggest that potters within the river valley shared a common ceramic heritage. Pots from the three
locations were not so distinct that one would recognize them as being made by culturally disassociated potters. In fact, the samples are generally indistinguishable with respect to orifice diameter, rim thickness, and cordage thickness. Additionally, the shift from grit to shell temper and changes from dentate to cordage surface treatments are also evidence of commonalities in ceramic traditions. This suggests that within the Penobscot River valley, potters’ choices may convey identity at multiple scales and that identity is manifested differently depending on an individual’s contextual situation. Thus, families living within the Penobscot River valley likely operated within a complex mosaic of cultural traits and practices that created multiple scales of blended and distinct identities.

**Socio-Spatial Models Revisited**

In Chapter 4 of this dissertation, I contextualized the study regionally and intellectually beginning with Speck’s (1915) family hunting territory model and concluding with contemporary models of socio-spatial organization in the Northeast. Through this process, it became apparent that models of socio-spatial organization developed for the Ceramic/Woodland Period in the northeast are moving beyond reconstructions that delimit social space in the region. Issues of ecology, adaptation, and subsistence factor heavily in some interpretations, whereas some models have arisen from material culture studies. Several common features of Indigenous lifestyles in the region have emerged from these studies. These include concepts of flexibility, fluidity, and mutability of Indigenous lifestyles.

It appears from this study of potters in the Penobscot River valley that these lifestyle features existed here as well. As we have seen, certain technological choices are shared by potters throughout the Penobscot River valley suggesting the existence of social interaction, communication, and social relationships throughout the region. The “deeper dive” into ceramic choices and techniques undertaken here highlights distinctions that would otherwise be masked by normative approaches to ceramics studies. But it also revealed how ceramic attributes were not exclusive to any one location. Local expressions of ceramic manufacturing traits within
overarching trends indicate that spheres of learning and ceramic production may have differed but they were likely not isolated. It is not surprising that for some attributes, the Eddington Bend ceramic sample closely resembles the coastal sample and for other attributes it resembles the interior sample. This is likely because it served as a point of intersection for potters with distinct technological styles, within a broad and inter-related ceramic macro-tradition. Further ceramic studies and other regional research will undoubtedly refine these models. Some recommendations to that end are presented in the next section.

**Future Scholarship**

In this discussion, I define the term “scholarship” broadly to include what might be viewed as conventional recommendations for future research as well as scholarship that is a community-based form of research and knowledge sharing. With respect to the former, I offer recommendations for future avenues of archaeological inquiry. The latter is discussed in terms of a planned extension of this study to a community-based program of knowledge sharing. The two need not be dichotomous. Ideally, they should be complementary. In the following sections I offer some recommendations for future archaeological study based on the research conducted here. I also present plans for community-based scholarship that perpetuate archaeological knowledge in a localized and meaningful way.

**Recommendations for Future Archaeological Study**

Aboriginal ceramics research in Maine is an immature area of archaeological inquiry and the need is great for a comprehensive research agenda that focuses on the dynamic relationship between Native peoples and their ceramic culture. While the present study advanced our understanding of families living in the Penobscot River valley during the Ceramic Period, it should be seen as the impetus for future research that humanizes Indigenous families that made the Penobscot River Valley their home over the last 3,000 years. To that end, I offer the following guidance for building upon the research presented here.
With respect to comparative ceramic studies, I recommend that site type be factored into sample selection when designing studies that compare ceramic assemblages. This research compared ceramics that were recovered from sites within a single river valley and provided Native peoples different ecological and social opportunities and constraints. Given that I was interested in learning about riverine-based families, this made sense. Additionally, the ways in which previous land use models for the region had been interpreted and presented justified this approach. However, each site represented different ways in which people engaged with physical space and with each other. Eddington Bend is an unusually large site that likely served as a seasonal gathering location which may have carried ecologically based symbolism as a head-of-tide location. In contrast, sites in the Howland sample were from a series of small waterside sites, most of which were probably occupied by people in transit, and finally, although a portion of the coastal sample lacks detailed provenience information, past research at the Knox site on the coast revealed small, semi-subterranean housing features indicative of domestic living space. The type and breadth of activities at these sites likely differed. Therefore, form, function, and social role of ceramics would have differed as well. Comparisons of ceramic assemblages from sites representing similar social spaces would have mitigated some of the ambiguity around ceramic choice influenced by intended pottery function versus choice influenced by other factors such as identity, social messaging, learning networks, or social boundaries. In retrospect, comparisons of sites where activities and social behavior is more closely aligned would be recommended in future research similar to that presented here.

Moreover, in terms of comparative ceramics research, I would call for more inter-state studies that explore technological choices across contemporary political boundaries. While reviewing ceramics research outside of Maine’s borders it became apparent that Native potters made similar technological choices across wide geographic spaces. Far too often, archaeologists constrain their intellectual contributions by limiting themselves with pre-conceptions about culture areas. Exploration of regional trends and distinctions in technological choices would be a
major change in how we look at Northeast ceramics and in turn, would change our understanding of the social dynamics among peoples living in the region during the Ceramic/Woodland Period. Demographic shifts, interaction, relocation, and movement of peoples, ceramics, and manufacturing techniques are all poorly understood in the Northeast and addressing these topics in more collaborative ways would advance regional archaeology significantly.

On a more local level, I offer several topics for advanced study; a re-examination and refinement of the Petersen and Sanger ceramic chronology for Maine and the Maritimes is critical if we are to continue to apply it to ceramic studies. This chronology was presented as a heuristic model, yet testing of its efficacy has only occurred in the Maritimes region. Research designed to test the chronology in localized settings such as within river valleys or in the littoral zone would strengthen it as a tool for organizing ceramic data through time and space.

Next, topics related to the introduction and use of shell temper warrant further exploration for ceramic studies in the Northeast. Primarily, the role of shell temper and its relationship to other technological choices is poorly understood in Maine. Research designed to identify correlations between the introduction of shell temper and change in other technological choices would advance our understanding of the change significantly. Additionally, research into the timing and spatial distribution of the introduction of shell temper would be useful in sorting out how other technological choices relate to such a major shift and its meaning.

The analysis of manufacturing scraps in this study proved to be quite useful as a way of “seeing” the ceramic manufacturing process differently and identifying distinctions in potters’ practices. Manufacturing scraps are often neglected pieces of the ceramic story. Comparative studies of manufacturing scraps have the potential to identify isolated choices along the production sequence. This, in turn, could enhance our understanding of the people and processes involved in ceramic production.

Finally, this study was limited in some respects by funding availability and in some instances, more advanced analytical techniques would have improved the research. Petrographic
studies directed toward examination of hematite in ceramic fabrics would provide a better assessment of how and why hematite occurs in ceramic fabrics. Was its presence meaningful to past peoples or was it a bi-product of material selection or firing?

Research designed to source ceramic clays as well as additional SEM analysis on ceramic clays and fabrics could be informative in this regard. Additionally, petrographic research into source locations for feldspar tempers used in the Howland sample could aid in determining if the Howland potters’ preference for feldspars was influenced by resource access issues or if these minerals were deliberately selected for through sieving or some other means. A research study designed around this topic could serve to validate potters’ choices regarding feldspar’s ceramic performance and to what extent its primacy in Howland ceramics was a deliberate action.

By and large, studies of aboriginal ceramics and the Ceramic Period generally are sorely under-represented in Maine archaeology. Any movement in this archaeological direction would go far in addressing issues of identity, cultural affiliation, social boundaries, and the relationship between contemporary Wabanaki peoples and their ancestors.

nətopi-nisóhsepəna--We Return Together

In addition to the more conventional avenues of archaeological inquiry recommended here, I am offering a plan and commitment to furthering this research through community-based scholarship. In the early stages of my PhD I convened a group of community members from the Penobscot Nation to discuss with them my dissertation research plans. My goal in convening this group was to identify ways in which my research could serve community needs. These initial conversations were insightful and at that time, the group expressed support and enthusiasm for mobilizing the knowledge acquired through this research in ways that would foster the development of ceramic manufacturing skills among community members. Following those early conversations, my engagement with the Penobscot community became much more informal in that conversations about my dissertation research and the benefits to community occurred in variable contexts as I went about my days as a community member and tribal employee. This
dissertation research was very often “on again, off again” frequently truncated by other important community-based work, family commitments, and my own public service activities.

Admittedly, the community engagement process I had envisioned for this research, materialized in a less formal way than I had planned. This was not because people within the academic and community spheres were not supportive of bringing the two together, but because satisfying the academic requirements consumed my attention. The worlds of academia and community are difficult to synchronize. I think part of that difficulty comes from the segregation of our learning systems from other spheres of our lives. The integration of formal knowledge sharing and learning into our daily lives takes many forms in higher education—service learning, internships, community-based instruction, senior colleges, research partnerships, etc. These semi-integrated forms of knowledge exchange move the two worlds closer together and can be effective mechanisms for creating more diffuse boundaries between communities and the academy.

To that end, what has evolved out of this research is a knowledge sharing plan for the Penobscot community that is fluid and flexible and one in which we return to our ceramic heritage together. Based on conversations with the Director of the Penobscot Culture and Historic Preservation Department, as well as informal conversations with community members, it is clear that the desire for ceramic manufacturing instruction and learning about Penobscot’s ceramic heritage exists today as it did when I first began this academic journey. As an Indigenous archaeologist, I am committed to a future in which members of the Penobscot community are aware and knowledgeable of our pottery-based heritage and can celebrate that heritage through contemporary creative expression. By returning to the past together in this way, we validate the agency and skills of our ancestors while invoking our own powers of agency to transform our collective future—hence we will “change together.”

Perhaps the most important skill Indigenous peoples have to confront colonizing practices is the ability to mobilize knowledge that counteracts those practices. The community-
based piece of this research is designed as a means to those ends by providing an avenue by which Indigenous peoples can strengthen their relationship with their ancestral past, which in turn, contributes to a humanizing archaeological practice. In essence, this is a continuation of the *chaîne opératoire* which began when ancestors of contemporary Penobscots crafted the materials used in this analysis. By way of knowledge sharing, the ceramics are re-entered into the human/material culture engagement process through Indigenous action and choice. This, in turn, empowers contemporary Indigenous peoples within the realm of their material heritage.

**Indigenous Archaeologies, Humanizing Past Peoples, and Respecting Potters’ Choices**

Throughout this dissertation, I have incorporated ways to ensure that Indigenous peoples remain at the center of this research. I designed the study by placing people at the center of my inquiry, I also included Indigenous language references, oral narratives, and humanizing language. An Indigenous archaeologies approach inspired this research design which was couched in an effort to humanize and empower past peoples by acknowledging their agency within the realm of ceramic manufacture and use. I view this as a strategic decolonizing action advanced by my own agency as an Indigenous scholar. In this vein, this dissertation is presented as a critique of archaeological practices that normalize human behavior through culture-historical methodologies, typologies, and artifact centered approaches. Far too often regional archaeologists have made assumptions about the quality of aboriginal ceramics without fully understanding the technical aspects of and inspiration for manufacturing choices. Passing judgement on potters’ abilities based on one’s perception of what is and isn’t a “well-made” pot reflects inadequacies, not in the potter’s skill, but in the archaeologists’ comprehension of the craft and the human/pottery dynamic. Not only is this bad science, it also assumes one has the power and authority to pass such judgement, then memorialize it through publication. This dissertation challenges those practices by changing how we look at past peoples and their choices; this, in turn, changes what and who we see, and creates inspiration for future ceramic studies that
acknowledge Indigenous peoples as rational, skillful, and deliberate actors making their own way in this world one choice at a time.
## APPENDIX A
### TABLES

### Table 1: Aboriginal Ceramic Chronology for Maine and the Maritimes

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<thead>
<tr>
<th>Ceramic Period (CP) Temporal Assignment (14C yrs B.P.)</th>
<th>Diagnostic Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramic Period 1: ca. 3,050 - 2,150</td>
<td>Fabric-pressed interior/exterior surfaces; grit temper; conoidal bases and simple rims; commonly referred to as “Vinette 1.” (Figure 14)</td>
</tr>
<tr>
<td>Ceramic Period 2: ca. 2,150 - 1,650</td>
<td>Exterior decoration features dentate, pseudo-scallop shell, or linear designs; stamped and/or rocked design techniques; incision; non-standardized punctates; grit temper; appearance of castellated rims (Figure 15)</td>
</tr>
<tr>
<td>Ceramic Period 3: ca. 1,650 - 1,350</td>
<td>Exterior decoration features dentate designs with an increase in dentate tooth size; linear and circular punctates; disappearance of pseudo-scallop shell; grit temper; thicker vessel lot walls; thickened rims or low collars. (Figure 16)</td>
</tr>
<tr>
<td>Ceramic Period 4: ca. 1,350 – 950</td>
<td>Exterior decoration features cord-wrapped stick and cylindrical punctate designs often restricted to the upper portion of the vessel lot; conoidal vessel lots; simple to slightly excursive rim forms; first appearance of shell/organic temper. (Figure 17)</td>
</tr>
<tr>
<td>Ceramic Period 5: ca. 950 – 650</td>
<td>Exterior decoration features simple vertical cord-wrapped stick and circular punctate designs; decrease in cordage and punctate diameter; straight to excursive simple rims; dominant use of shell/organic temper.</td>
</tr>
<tr>
<td>Ceramic Period 6: ca. 650 – 450</td>
<td>Exterior decoration features cord-wrapped stick and linear punctates; appearance of fabric paddling; decrease in vessel lot wall thickness; globular vessel lots; collared rims with chevron or geometric motifs; undecorated bodies; shell/organic or grit temper.</td>
</tr>
<tr>
<td>Ceramic Period 7: ca. 450 – 250</td>
<td>Exterior decoration features incision and fabric paddling techniques; very thin vessel lot walls; collared rims; predominant use of grit temper.</td>
</tr>
</tbody>
</table>

Source: Petersen and Sanger (1991)
Table 2: Ceramic Fabrics Characteristics

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclusions</td>
<td>Aplastic elements added to or naturally occurring in the clay matrix (Chilton 1996). Inclusion characteristics are linked to ceramic function, performance, firing, and workability.</td>
</tr>
<tr>
<td>Inclusion Type</td>
<td>Material types of aplastic inclusions within the clay matrix either naturally occurring or added by the potter as temper (e.g. quartz, feldspar, mica etc.). Inclusions are characterized as primary, secondary, and tertiary based on their relative abundance within the clay matrix.</td>
</tr>
<tr>
<td>Inclusion Size</td>
<td>Classifies aplastics within the clay matrix into size categories ranging from very fine grains to granules following Ingram (1989). Minimum and maximum inclusion sizes were recorded for multiple inclusion types.</td>
</tr>
<tr>
<td>Inclusion Density</td>
<td>Represents the percentage of aplastics present in the clay matrix based on visual comparisons with Philpotts (1989) density chart.</td>
</tr>
<tr>
<td>Paste Consistency</td>
<td>Paste is defined as “clay or mixture of clay and added materials” (Rice 1987) used as the basis for forming a pot. Paste consistency refers to the friability of the ceramic fabric. An ordinal value ranging from 1 (friable) to 5 (very compact) is applied to sherds by way of visual inspection.</td>
</tr>
<tr>
<td>Hematite Presence</td>
<td>Classification of hematite presence into visible, visible but not prominent, or not visible within the ceramic paste. A “visible” classification indicates that hematite is present throughout the clay matrix; hematite that is “visible but not prominent” indicates that hematite was observed within the clay matrix but on a limited basis (i.e. a few grains); a “not visible” classification indicates that hematite was not observed in the clay matrix.</td>
</tr>
</tbody>
</table>
### Table 3: Vessel Morphology Characteristics

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rim and Lip</td>
<td>A rim is defined as the area between the lip and neck of the vessel. A lip is defined as the edge or margin of the vessel mouth (Rice 1987).</td>
</tr>
<tr>
<td>Rim Eversion</td>
<td>Applies to the profile of the vessel wall between the neck and the orifice of the vessel. Rims flaring outward are classified as excurvate; rims curving inward are classified as incurvate; rims with no evident curvature inward or outward are classified as direct.</td>
</tr>
<tr>
<td>Rim Thickness</td>
<td>Quantitative values measured at the lip and at 1 cm below the lip. In cases where the lip is not distinct from the rest of the rim (e.g. pointed lips), measurements are taken 3 mm below the top of the rim. Maximum values are recorded.</td>
</tr>
<tr>
<td>Lip Shape</td>
<td>Lip shape refers to the shape of the lip in profile. Lip shapes include pointed, flat, beveled in/out, round, or a combination of more than one shape.</td>
</tr>
<tr>
<td>Lip Modification</td>
<td>Lip modification refers to an extension of the edge or margin of the lip. Extrusive lip forms protrude outside the vessel, intrusive lip forms extend into the interior of the vessel.</td>
</tr>
<tr>
<td>Collars</td>
<td>Collars are raised bands or thickened areas of the rim positioned around the perimeter of the exterior of the vessel between the neck and the rim. Collars are recorded on a presence/absence basis.</td>
</tr>
<tr>
<td>Castellations</td>
<td>Castellations are a series of vertically raised areas along the top of the vessel rim creating a wavy or undulating rim. Castellations are recorded on a presence/absence basis.</td>
</tr>
<tr>
<td>Vessel Orifice Size</td>
<td>The opening of a ceramic vessel. Orifice size is recorded using a rim chart measuring the diameter of the vessel at the rim.</td>
</tr>
<tr>
<td>Body Thickness</td>
<td>When available, body sherds are measured at the thickest part of the sherd.</td>
</tr>
</tbody>
</table>
Table 4: Vessel Surface Characteristics

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Treatments</td>
<td>Processes employed by potters to form and finish the exterior and interior surfaces of a pot. Surface treatments are identified sequentially and include techniques used on the surface to form the vessels such as scraping and smoothing, as well as subsequent techniques that may represent functional or decorative elements of the vessel (e.g., dentate, punctate). Primary, secondary, and tertiary surface treatments are recorded when applicable.</td>
</tr>
<tr>
<td>Surface Treatment Techniques</td>
<td>Methods used by a potter to apply a surface treatment to a pot. Examples include, rolling, stamping, rocking, impressing, and dragging.</td>
</tr>
<tr>
<td>Tool Size and Shape</td>
<td>Shape and measurement of the tools used to apply surface treatments to a pot. Dentate tool width, dentate tooth size, dentate tooth shape, punctate size, punctate shape and cordage thickness are recorded to the nearest 0.01 mm.</td>
</tr>
<tr>
<td>Cordage Characteristics: Ply/Spin/Twist/Thickness</td>
<td>Cordage “denotes rope, string, or yam” and includes “spun, twisted, and braided structures” (Drooker 1992: 244). Ply refers to the number of fabric structures twisted together to form a cord; spin refers to the initial direction of rolled fibers used to create a single cord. Cordage twist is “the process or result of combining two or more elements by turning them about each other (Drooker 1992:248). Cordage thickness measures the maximum values of the width of a cordage.</td>
</tr>
<tr>
<td>Residues</td>
<td>Remnants of substances cooked in the pot which are adhered to the interior or exterior surface of the pot. Residues are recorded on a presence/absence basis.</td>
</tr>
</tbody>
</table>

Table 5: Maine Culture Historical Chronology

<table>
<thead>
<tr>
<th>Archaeological Unit</th>
<th>14C yrs B.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paleoindian Period</strong></td>
<td></td>
</tr>
<tr>
<td>Early Paleoindian Period</td>
<td>11,000-10,000</td>
</tr>
<tr>
<td>Late Paleoindian Period</td>
<td>10,000-9,000</td>
</tr>
<tr>
<td><strong>Archaic Period</strong></td>
<td></td>
</tr>
<tr>
<td>Early Archaic Period</td>
<td>9000-7500</td>
</tr>
<tr>
<td>Middle Archaic Period</td>
<td>7500-6000</td>
</tr>
<tr>
<td>Late Archaic Period</td>
<td>6000-3000</td>
</tr>
<tr>
<td><strong>Ceramic Period</strong></td>
<td></td>
</tr>
<tr>
<td>Early Ceramic Period (CP 1)</td>
<td>3000-2150</td>
</tr>
<tr>
<td>Middle Ceramic Period (CP 2, 3, 4)</td>
<td>2150-1350</td>
</tr>
<tr>
<td>Late Ceramic Period (CP 5, 6, 7)</td>
<td>1350-400</td>
</tr>
<tr>
<td>Contact Period</td>
<td>450-200</td>
</tr>
</tbody>
</table>
### Table 6: Radiocarbon Dates from the Eddington Bend Site

<table>
<thead>
<tr>
<th>Period/Tradition</th>
<th>Excavation Date/Context</th>
<th>Radiocarbon years B.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Archaic</td>
<td>1989 - surface in association with a Late Paleoindian point</td>
<td>6,480±70 (IsoTrace - TO-1841)</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>1989 - surface in association with a Late Paleoindian point</td>
<td>5,390±70 (IsoTrace - TO-1840)</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>1986 - Deep Trench Feature 18/286</td>
<td>3,940±100 (Beta - 20541) 3,180±90 (Beta - 20540)</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>2009 - Hearth Feature #6-09</td>
<td>3830±70 (Beta - 281162)</td>
</tr>
<tr>
<td>Late Archaic Moorehead Phase</td>
<td>1992 - Deep Fire Pit Feature 386</td>
<td>3,770±30 (Beta - 413726) 3,790±30 (Beta - 413727)</td>
</tr>
<tr>
<td>Late Archaic Moorehead Phase</td>
<td>1970 - Cremation Pit</td>
<td>3,430±145*</td>
</tr>
<tr>
<td>Early Middle Ceramic Period</td>
<td>1986 - Hearth Feature 36</td>
<td>1,800±75 (Beta - 20542)</td>
</tr>
<tr>
<td>Early Middle Ceramic Period</td>
<td>1992 - Deep Fire Pit Feature 324</td>
<td>1,800±30 (Beta - 413728) 1,930±30 (Beta - 413729)</td>
</tr>
</tbody>
</table>

Reproduced from Mack 2016
Table 7: Chi Square Table for Primary Inclusion Type

<table>
<thead>
<tr>
<th></th>
<th>Observed Values: Primary Inclusion Type</th>
<th>Expected Values: Primary Inclusion Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Howland n=61</td>
<td>EBend n=306</td>
</tr>
<tr>
<td>Feldspar</td>
<td>33</td>
<td>94</td>
</tr>
<tr>
<td>Quartz</td>
<td>21</td>
<td>199</td>
</tr>
<tr>
<td>Shell/Org.</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>61</td>
<td>306</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observed (O)</th>
<th>Expected (E)</th>
<th>O-E</th>
<th>(O-E)^2</th>
<th>(O-E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>17.79</td>
<td>15.21</td>
<td>231.29</td>
<td>13.00</td>
</tr>
<tr>
<td>21</td>
<td>37.36</td>
<td>-16.36</td>
<td>267.73</td>
<td>7.17</td>
</tr>
<tr>
<td>7</td>
<td>5.85</td>
<td>1.15</td>
<td>1.33</td>
<td>0.23</td>
</tr>
<tr>
<td>94</td>
<td>89.25</td>
<td>4.75</td>
<td>22.56</td>
<td>0.25</td>
</tr>
<tr>
<td>199</td>
<td>187.43</td>
<td>11.58</td>
<td>133.98</td>
<td>0.71</td>
</tr>
<tr>
<td>13</td>
<td>29.33</td>
<td>-16.33</td>
<td>266.51</td>
<td>9.09</td>
</tr>
<tr>
<td>13</td>
<td>32.96</td>
<td>-19.96</td>
<td>398.34</td>
<td>12.09</td>
</tr>
<tr>
<td>74</td>
<td>69.21</td>
<td>4.79</td>
<td>22.92</td>
<td>0.33</td>
</tr>
<tr>
<td>26</td>
<td>10.83</td>
<td>15.17</td>
<td>230.15</td>
<td>21.25</td>
</tr>
</tbody>
</table>

Chi Square Value: 64.12

df= (r-1)(c-1) = 4

Critical Value @ .05 = 9.48

64.12 > 9.48  
∴ can reject the null hypothesis that no relationship exists between variables
### Table 8: Primary Inclusion Type Summary Data

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Feldspar n/%</th>
<th>Quartz n/%</th>
<th>Shell/Organic n/%</th>
<th>Other n/%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howland</td>
<td>CP2-3 (n=38)</td>
<td>23/60.52%</td>
<td>14/36.84%</td>
<td>n/a</td>
<td>1/2.63%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=13)</td>
<td>5/38.46%</td>
<td></td>
<td>4/30.76%</td>
<td>n/a</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>CP2-3 (n=213)</td>
<td>67/30.73%</td>
<td>146/66.79%</td>
<td>n/a</td>
<td>5/2.29%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=26)</td>
<td>6/23.07%</td>
<td>10/38.46%</td>
<td>9/34.61%</td>
<td>1/3.84%</td>
</tr>
<tr>
<td>Coast</td>
<td>CP2-3 (n=41)</td>
<td>6/14.63%</td>
<td>34/82.92%</td>
<td>1/2.44%</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=33)</td>
<td>3/9.09%</td>
<td>11/33.33%</td>
<td>19/57.57%</td>
<td>n/a</td>
</tr>
</tbody>
</table>

### Table 9: Chi Square Table for Primary Inclusion Type CP2-3

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Observations</th>
<th>Expected</th>
<th>O-E</th>
<th>(O-E)^2</th>
<th>(O-E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP2-3 (n=38)</td>
<td>23</td>
<td>12.28</td>
<td>10.72</td>
<td>114.86</td>
<td>9.35</td>
</tr>
<tr>
<td>CP4-5 (n=13)</td>
<td>14</td>
<td>24.82</td>
<td>-10.82</td>
<td>117.11</td>
<td>4.72</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP2-3 (n=213)</td>
<td>67</td>
<td>70.46</td>
<td>-3.46</td>
<td>12.00</td>
<td>0.17</td>
</tr>
<tr>
<td>CP4-5 (n=26)</td>
<td>146</td>
<td>142.40</td>
<td>3.60</td>
<td>12.98</td>
<td>0.09</td>
</tr>
<tr>
<td>Coast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP2-3 (n=41)</td>
<td>6</td>
<td>5.14</td>
<td>0.14</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>CP4-5 (n=33)</td>
<td>34</td>
<td>26.78</td>
<td>7.22</td>
<td>52.60</td>
<td>3.97</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0.97</td>
<td>0.03</td>
<td>0.03</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Chi Square Value** 20.26

**df** = (r-1)(c-1) = 4

**Critical Value @ .05** 9.48

20.26 > 9.48  ∴ can reject the null hypothesis that there is no relationship between variables

*Includes Micas and Shell/Organic
Table 10: Inclusion Size Chart after Ingram (1989)

<table>
<thead>
<tr>
<th>Inclusion Size Classification</th>
<th>Size Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Fine</td>
<td>.06-.13 mm</td>
</tr>
<tr>
<td>Fine</td>
<td>.13-.25 mm</td>
</tr>
<tr>
<td>Medium</td>
<td>.25-.50 mm</td>
</tr>
<tr>
<td>Coarse</td>
<td>.50-1.0 mm</td>
</tr>
<tr>
<td>Very Coarse</td>
<td>1.0-2.0 mm</td>
</tr>
<tr>
<td>Granule</td>
<td>2.0-4.0 mm</td>
</tr>
<tr>
<td>Pebble</td>
<td>&gt;4.0 mm</td>
</tr>
</tbody>
</table>

Table 11: Mann-Whitney U Test of Significance - Primary Inclusion Size Overall

<table>
<thead>
<tr>
<th>Sites Compared Overall</th>
<th>U-Value</th>
<th>Z-Score</th>
<th>P-Value</th>
<th>Significant @ p &lt; .05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howland (n=38)/EBend (n=218)</td>
<td>6894.5</td>
<td>-3.60102</td>
<td>.00032</td>
<td>Yes</td>
</tr>
<tr>
<td>Howland (n=38)/Coast (n=41)</td>
<td>3157.5</td>
<td>-1.16451</td>
<td>.24604</td>
<td>No</td>
</tr>
<tr>
<td>EBend (n=218)/Coast (n=41)</td>
<td>14721</td>
<td>-2.76522</td>
<td>.0056</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Calculations from Mann-Whitney U Calculator at http://www.socscistatistics.com/

Table 12: Primary Inclusion Size Summary Data

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Median (mm)</th>
<th>Coarse (.5-1 mm) n/%</th>
<th>Very Coarse (1-2 mm) n/%</th>
<th>Granule (2-4 mm) n/%</th>
<th>Pebble &gt; 4 mm n/%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howland</td>
<td>CP2-3 (n=38)</td>
<td>2.17</td>
<td>0</td>
<td>15/39.47%</td>
<td>21/55.26%</td>
<td>2/5.26%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=13)</td>
<td>2.16</td>
<td>0</td>
<td>7/53.84%</td>
<td>5/38.46%</td>
<td>1/7.69%</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>CP2-3 (n=218)</td>
<td>1.79</td>
<td>15/6.88%</td>
<td>115/57.75%</td>
<td>88/40.36%</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=26)</td>
<td>2.17</td>
<td>0</td>
<td>10/38.46%</td>
<td>15/57.69%</td>
<td>1/3.84%</td>
</tr>
<tr>
<td>Coast</td>
<td>CP2-3 (n=41)</td>
<td>1.71</td>
<td>1/2.43%</td>
<td>23/56.09%</td>
<td>16/39.02%</td>
<td>1/2.43%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=33)</td>
<td>2.39</td>
<td>0</td>
<td>13/39.39%</td>
<td>19/57.57%</td>
<td>1/3.03%</td>
</tr>
</tbody>
</table>

Table 13: Mann-Whitney U Test of Significance - Primary Inclusion Size CP2-3

<table>
<thead>
<tr>
<th>Sites Compared CP 2-3</th>
<th>U-Value</th>
<th>Z-Score</th>
<th>P-Value</th>
<th>Significant @ p &lt; .05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howland (n=38)/EBend (n=218)</td>
<td>2958.5</td>
<td>-2.81</td>
<td>.00496</td>
<td>Yes</td>
</tr>
<tr>
<td>Howland (n=38)/Coast (n=41)</td>
<td>549</td>
<td>-2.10</td>
<td>.03572</td>
<td>Yes</td>
</tr>
<tr>
<td>EBend (n=218)/Coast (n=41)</td>
<td>4246</td>
<td>-0.26</td>
<td>.79486</td>
<td>No</td>
</tr>
</tbody>
</table>

Calculations from Mann-Whitney U Calculator at http://www.socscistatistics.com/
### Table 14: Mann-Whitney U Test of Significance - Primary Inclusion Size CP4-5

<table>
<thead>
<tr>
<th>Sites Compared</th>
<th>U-Value</th>
<th>Z-Score</th>
<th>P-Value</th>
<th>Significant @ ( p &lt; .05 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howland (n=13)/EBend (n=26)</td>
<td>151</td>
<td>.52</td>
<td>.60306</td>
<td>No</td>
</tr>
<tr>
<td>Howland (n=13)/Coast (n=33)</td>
<td>164.5</td>
<td>1.20</td>
<td>.22628</td>
<td>No</td>
</tr>
<tr>
<td>EBend (n=26)/Coast (n=33)</td>
<td>381.5</td>
<td>.72</td>
<td>.47152</td>
<td>No</td>
</tr>
</tbody>
</table>


### Table 15: Inclusion Density Summary Data

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Inclusion Density Classifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1% -2% (n/%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3% -5% (n/%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10% -30% (n/%)</td>
</tr>
<tr>
<td>Howland</td>
<td>CP2-3 (n=38)</td>
<td>5/13.15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13/34.21%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20/52.63%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=13)</td>
<td>3/23.07%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2/15.38%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8/61.53%</td>
</tr>
<tr>
<td>Eldington Bend</td>
<td>CP2-3 (n=218)</td>
<td>63/28.89%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88/40.36%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>67/30.73%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=26)</td>
<td>9/34.61%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10/38.46%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7/26.92%</td>
</tr>
<tr>
<td>Coast</td>
<td>CP2-3 (n=41)</td>
<td>11/26.82%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18/43.90%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12/29.26%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=33)</td>
<td>14/42.42%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14/42.42%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5/15.15%</td>
</tr>
</tbody>
</table>

### Table 16: Chi Square Table Inclusion Density Overall

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Inclusion Density Classifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1% -2% (n)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3% -5% (n)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10% -30% (n)</td>
</tr>
<tr>
<td>Howland</td>
<td>CP2-3 (n=62)</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=314)</td>
<td>17.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.87</td>
</tr>
<tr>
<td>EBend n=314</td>
<td></td>
<td>24.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>122.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44.76</td>
</tr>
<tr>
<td>Coast n=114</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>CP2-3 (n=62)</td>
<td>19.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>99.85</td>
</tr>
<tr>
<td></td>
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<td>36.37</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=314)</td>
<td>17.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.87</td>
</tr>
<tr>
<td>Observed (O)</td>
<td>Expected (E)</td>
<td>O-E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(O-E)^2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(O-E)^2/E</td>
</tr>
<tr>
<td>10</td>
<td>17.88</td>
<td>-7.88</td>
</tr>
<tr>
<td></td>
<td>62.05</td>
<td>3.47</td>
</tr>
<tr>
<td>16</td>
<td>24.34</td>
<td>-8.34</td>
</tr>
<tr>
<td></td>
<td>69.61</td>
<td>2.86</td>
</tr>
<tr>
<td>36</td>
<td>19.78</td>
<td>16.22</td>
</tr>
<tr>
<td></td>
<td>263.12</td>
<td>13.30</td>
</tr>
<tr>
<td>90</td>
<td>90.25</td>
<td>-0.25</td>
</tr>
<tr>
<td></td>
<td>0.06</td>
<td>0.00</td>
</tr>
<tr>
<td>132</td>
<td>122.90</td>
<td>9.10</td>
</tr>
<tr>
<td></td>
<td>82.89</td>
<td>0.67</td>
</tr>
<tr>
<td>91</td>
<td>99.85</td>
<td>-8.85</td>
</tr>
<tr>
<td></td>
<td>78.37</td>
<td>0.78</td>
</tr>
<tr>
<td>41</td>
<td>32.87</td>
<td>8.13</td>
</tr>
<tr>
<td></td>
<td>66.08</td>
<td>2.01</td>
</tr>
<tr>
<td>44</td>
<td>44.76</td>
<td>-0.76</td>
</tr>
<tr>
<td></td>
<td>0.58</td>
<td>0.01</td>
</tr>
<tr>
<td>29</td>
<td>36.37</td>
<td>-7.37</td>
</tr>
<tr>
<td></td>
<td>54.29</td>
<td>1.49</td>
</tr>
</tbody>
</table>

| Chi-square Value| 24.61    |
| df=(r-1)(c-1)   | 4       |
| Critical Value @ .05 | 9.48 |

24.61>9.48: can reject the null hypothesis that there is no relationship between variables.
Table 17: Chi Square Table Inclusion Density CP2-3

<table>
<thead>
<tr>
<th>Observed Values (O)</th>
<th>Howland n=38</th>
<th>EBend n=218</th>
<th>Coast n=41</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inc. Dens 1-2</td>
<td>5</td>
<td>63</td>
<td>11</td>
</tr>
<tr>
<td>Inc. Dens 3-5</td>
<td>13</td>
<td>88</td>
<td>18</td>
</tr>
<tr>
<td>Inc. Dens 10-20</td>
<td>20</td>
<td>67</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>38</td>
<td>218</td>
<td>41</td>
</tr>
</tbody>
</table>

Expected Values (E)

| Inc. Dens 1-2       | 10.11        | 57.99       | 10.91      |
| Inc. Dens 3-5       | 15.23        | 87.35       | 16.43      |
| Inc. Dens 10-20     | 12.67        | 72.67       | 13.67      |

<table>
<thead>
<tr>
<th>Observed (O)</th>
<th>Expected (E)</th>
<th>O-E</th>
<th>(O-E)^2</th>
<th>(O-E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>10.11</td>
<td>-5.11</td>
<td>26.09</td>
<td>2.58</td>
</tr>
<tr>
<td>13</td>
<td>15.23</td>
<td>-2.23</td>
<td>4.95</td>
<td>0.33</td>
</tr>
<tr>
<td>20</td>
<td>12.67</td>
<td>7.33</td>
<td>53.78</td>
<td>4.25</td>
</tr>
<tr>
<td>67</td>
<td>57.99</td>
<td>5.01</td>
<td>25.13</td>
<td>0.43</td>
</tr>
<tr>
<td>88</td>
<td>87.35</td>
<td>0.65</td>
<td>0.43</td>
<td>0.00</td>
</tr>
<tr>
<td>67</td>
<td>72.67</td>
<td>-5.67</td>
<td>32.11</td>
<td>0.44</td>
</tr>
<tr>
<td>11</td>
<td>10.91</td>
<td>0.09</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>18</td>
<td>16.43</td>
<td>1.57</td>
<td>2.47</td>
<td>0.15</td>
</tr>
<tr>
<td>12</td>
<td>13.67</td>
<td>-1.67</td>
<td>2.78</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Chi Square Value 8.39  

df= (r-1)(c-1) 4  
Critical Value @ .05 9.48

8.39<9.48  ∴ cannot reject the null hypothesis that there is no relationship between variables.
Table 18 Chi Square Table for Fabric Consistency for All Time Periods

<table>
<thead>
<tr>
<th>Consistency</th>
<th>Observed Values (O)</th>
<th>EBend n=293</th>
<th>Coast n=114</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>24</td>
<td>24</td>
<td>35</td>
<td>83</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>156</td>
<td>50</td>
<td>236</td>
</tr>
<tr>
<td>4-5</td>
<td>8</td>
<td>113</td>
<td>29</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>62</td>
<td>293</td>
<td>114</td>
<td>469</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consistency</th>
<th>Expected Values (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>10.97</td>
</tr>
<tr>
<td>3</td>
<td>31.20</td>
</tr>
<tr>
<td>4-5</td>
<td>19.83</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consistency</th>
<th>Observed (O)</th>
<th>Expected (E)</th>
<th>O-E</th>
<th>(O-E)^2</th>
<th>(O-E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>24</td>
<td>10.97</td>
<td>13.03</td>
<td>169.72</td>
<td>15.47</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>31.20</td>
<td>-1.20</td>
<td>1.44</td>
<td>0.05</td>
</tr>
<tr>
<td>4-5</td>
<td>8</td>
<td>19.83</td>
<td>-11.83</td>
<td>139.94</td>
<td>7.06</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>51.85</td>
<td>-27.85</td>
<td>775.78</td>
<td>14.96</td>
</tr>
<tr>
<td></td>
<td>156</td>
<td>147.44</td>
<td>8.56</td>
<td>73.32</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>113</td>
<td>93.71</td>
<td>19.29</td>
<td>372.10</td>
<td>3.97</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>20.17</td>
<td>14.83</td>
<td>219.79</td>
<td>10.89</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>57.36</td>
<td>-7.36</td>
<td>54.24</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>36.46</td>
<td>-7.46</td>
<td>55.66</td>
<td>1.53</td>
</tr>
</tbody>
</table>

| Chi Square Value | 55.37 |
| df= (r-1)(c-1)   | 4     |
| Critical Value @ .05 | 9.48 |

55.37>9.48 \therefore can reject the null hypothesis that there is no relationship between variables.
### Table 19: Chi Square Table for Fabric Consistency CP2-3

<table>
<thead>
<tr>
<th>Paste Con</th>
<th>Howland n=13</th>
<th>Ebend n=26</th>
<th>Coast n=33</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>5</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>4-5</td>
<td>3</td>
<td>16</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paste Con</th>
<th>Observed Values</th>
<th>Expected Values</th>
<th>(O-E)^2</th>
<th>(O-E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>5</td>
<td>2.71</td>
<td>2.29</td>
<td>5.25</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>4.69</td>
<td>0.31</td>
<td>0.09</td>
</tr>
<tr>
<td>4-5</td>
<td>3</td>
<td>5.60</td>
<td>-2.60</td>
<td>6.75</td>
</tr>
<tr>
<td>1-2</td>
<td>2</td>
<td>5.42</td>
<td>-3.42</td>
<td>11.67</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>9.39</td>
<td>-1.39</td>
<td>1.93</td>
</tr>
<tr>
<td>4-5</td>
<td>16</td>
<td>11.19</td>
<td>4.81</td>
<td>23.09</td>
</tr>
<tr>
<td>1-2</td>
<td>8</td>
<td>6.88</td>
<td>1.13</td>
<td>1.27</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>11.92</td>
<td>1.08</td>
<td>1.17</td>
</tr>
<tr>
<td>4-5</td>
<td>12</td>
<td>14.21</td>
<td>-2.21</td>
<td>4.88</td>
</tr>
</tbody>
</table>

| Chi Square Value | 8.21 |
| df= (r-1)(c-1)   | 4    |
| Critical Value @ .05 | 9.48 |

### Table 20: Ceramic Fabric Consistency Summary Data

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Ceramic Fabric Consistency Classifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Level 1-2 Very Friable to Friable (n/%)</td>
</tr>
<tr>
<td>Howland</td>
<td>Overall</td>
<td>24/38.70%</td>
</tr>
<tr>
<td></td>
<td>CP2-3 (n=38)</td>
<td>14/36.84%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=13)</td>
<td>5/38.46%</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>Overall</td>
<td>24/7/64%</td>
</tr>
<tr>
<td></td>
<td>CP2-3 (n=218)</td>
<td>16/7.33%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=26)</td>
<td>2/7.69%</td>
</tr>
<tr>
<td>Coast</td>
<td>Overall</td>
<td>35/30.70%</td>
</tr>
<tr>
<td></td>
<td>CP2-3 (n=41)</td>
<td>13/31.70%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=33)</td>
<td>8/24.24%</td>
</tr>
</tbody>
</table>
Table 21: Chi Square Table for Hematite Presence Overall

<table>
<thead>
<tr>
<th></th>
<th>Howland n=62</th>
<th>E Bend n=314</th>
<th>Coast n=114</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hema 1</td>
<td>14</td>
<td>86</td>
<td>16</td>
</tr>
<tr>
<td>Hema 2</td>
<td>28</td>
<td>113</td>
<td>28</td>
</tr>
<tr>
<td>Hema 3</td>
<td>20</td>
<td>115</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>62</td>
<td>314</td>
<td>114</td>
</tr>
</tbody>
</table>

Expected Values (E)

|                |             |              |              |              |
|----------------|-------------|--------------|--------------|
| Hema 1         | 14.68       | 74.33        | 26.99        |
| Hema 2         | 21.38       | 108.30       | 39.32        |
| Hema 3         | 25.94       | 131.37       | 47.69        |

Observed (O)  | Expected (E) | O-E | (O-E)^2 | (O-E)^2/E |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>14.68</td>
<td>-0.68</td>
<td>0.46</td>
<td>0.03</td>
</tr>
<tr>
<td>28</td>
<td>21.38</td>
<td>6.62</td>
<td>43.78</td>
<td>2.05</td>
</tr>
<tr>
<td>20</td>
<td>25.94</td>
<td>-5.94</td>
<td>35.27</td>
<td>1.36</td>
</tr>
<tr>
<td>86</td>
<td>74.33</td>
<td>11.67</td>
<td>136.08</td>
<td>1.83</td>
</tr>
<tr>
<td>113</td>
<td>108.30</td>
<td>4.70</td>
<td>22.11</td>
<td>0.20</td>
</tr>
<tr>
<td>115</td>
<td>131.37</td>
<td>-16.37</td>
<td>267.89</td>
<td>2.04</td>
</tr>
<tr>
<td>16</td>
<td>26.99</td>
<td>-10.99</td>
<td>120.73</td>
<td>4.47</td>
</tr>
<tr>
<td>28</td>
<td>39.32</td>
<td>-11.32</td>
<td>128.11</td>
<td>3.26</td>
</tr>
<tr>
<td>70</td>
<td>47.69</td>
<td>22.31</td>
<td>497.56</td>
<td>10.43</td>
</tr>
</tbody>
</table>

Chi Square Value: 25.68

df = (r-1)(c-1) = 4

Critical Value @ .05: 9.48

25.68 > 9.48: * * can reject the null hypothesis that there is no relationship between variables

Table 22: Hematite Presence Summary Data

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Hematite Presence Classifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Level 1 (n/%)</td>
</tr>
<tr>
<td>Howland</td>
<td>Overall (n=62)</td>
<td>14/22.58%</td>
</tr>
<tr>
<td></td>
<td>CP2-3 (n=38)</td>
<td>10/26.31%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=13)</td>
<td>0/0%</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>Overall (n=314)</td>
<td>86/27.38%</td>
</tr>
<tr>
<td></td>
<td>CP2-3 (n=218)</td>
<td>57/26.14%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=26)</td>
<td>3/11.53%</td>
</tr>
<tr>
<td>Coast</td>
<td>Overall (n=114)</td>
<td>16/14.03%</td>
</tr>
<tr>
<td></td>
<td>CP2-3 (n=41)</td>
<td>8/19.51%</td>
</tr>
<tr>
<td></td>
<td>CP4-5 (n=33)</td>
<td>6/18.18%</td>
</tr>
</tbody>
</table>

Key: Level 1 – visible throughout fabric; Level 2 – present but not prominent; Level 3 – not visible
<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Rim Thickness Summary</th>
<th>Rim Thickness Summary</th>
<th>Rim Thickness Summary</th>
<th>Rim Thickness Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rim Thickness 1</td>
<td>Rim Thickness 2</td>
<td>Rim Thickness 1</td>
<td>Rim Thickness 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mean</td>
<td>median</td>
<td>sd</td>
<td>n</td>
</tr>
<tr>
<td>Howland</td>
<td>Overall</td>
<td>6.43</td>
<td>5.75</td>
<td>1.93</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>Overall</td>
<td>4.90</td>
<td>4.41</td>
<td>2.10</td>
<td>237</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>5.01</td>
<td>4.49</td>
<td>2.19</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>5.88</td>
<td>5.88</td>
<td>2.20</td>
<td>20</td>
</tr>
<tr>
<td>Coast</td>
<td>Overall</td>
<td>6.20</td>
<td>6.24</td>
<td>1.81</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>5.20</td>
<td>5.10</td>
<td>1.75</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>6.85</td>
<td>6.81</td>
<td>1.41</td>
<td>25</td>
</tr>
</tbody>
</table>

Key: Rim thickness 1 measured at lip; Rim thickness 2 measured 1cm below lip

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Rim Eversion Summary</th>
<th>Rim Eversion Summary</th>
<th>Rim Eversion Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Direct (n/%)</td>
<td>Incurvate (n/%)</td>
<td>Excurvate (n/%)</td>
</tr>
<tr>
<td>Howland</td>
<td>Overall</td>
<td>7/26.92%</td>
<td>0/0%</td>
<td>19/73.07%</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>3/15.78%</td>
<td>0/0%</td>
<td>16/84.21%</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>1/25%</td>
<td>0/0%</td>
<td>3/75%</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>Overall</td>
<td>78/36.96%</td>
<td>20/9.47%</td>
<td>113/53.55%</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>55/35.76%</td>
<td>15/9.74%</td>
<td>84/54.54%</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>8/42.10%</td>
<td>2/10.52%</td>
<td>9/47.36%</td>
</tr>
<tr>
<td>Coast</td>
<td>Overall</td>
<td>41/51.89%</td>
<td>3/3.97%</td>
<td>35/44.30%</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>7/25%</td>
<td>1/3.57%</td>
<td>20/71.42%</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>15/68.18%</td>
<td>1/4.54%</td>
<td>6/27.27%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Lip Shape</th>
<th>Lip Shape</th>
<th>Lip Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Flat (n%)</td>
<td>Round (n%)</td>
<td>Pointed (n%)</td>
</tr>
<tr>
<td>Howland</td>
<td>Overall</td>
<td>12/46.15%</td>
<td>3/11.53%</td>
<td>2/7.69%</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>8/42.10%</td>
<td>2/10.52%</td>
<td>2/10.52%</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>3/75.00%</td>
<td>1/25.00%</td>
<td>0/0%</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>Overall</td>
<td>107/38.48%</td>
<td>66/23.74%</td>
<td>31/11.15%</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>79/40.51%</td>
<td>40/20.51%</td>
<td>21/10.76%</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>9/36.00%</td>
<td>10/40.00%</td>
<td>1/4.00%</td>
</tr>
<tr>
<td>Coast</td>
<td>Overall</td>
<td>48/53.93%</td>
<td>20/22.47%</td>
<td>2/2.24%</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>18/62.06%</td>
<td>4/13.79%</td>
<td>1/3.44%</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>14/51.85%</td>
<td>4/14.81%</td>
<td>0/0%</td>
</tr>
</tbody>
</table>
### Table 26: Orifice Diameter Summary Data

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Orifice Diameter Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mean</td>
</tr>
<tr>
<td>Howland</td>
<td>Overall</td>
<td>15.45 cm</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>16.00 cm</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>No Data Available (n=0)</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>Overall</td>
<td>14.06 cm</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>15.50 cm</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>Limited Data Available (n=2)</td>
</tr>
<tr>
<td>Coast</td>
<td>Overall</td>
<td>14.37 cm</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>14.88 cm</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>14.52 cm</td>
</tr>
</tbody>
</table>

### Table 27: Exterior Surface Treatment Summary Data

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Exterior Surface Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Scraped (n/%)</td>
</tr>
<tr>
<td>Howland</td>
<td>Overall</td>
<td>9/17.64%</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>3/8.82%</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>4/33.33%</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>Overall</td>
<td>70/29.29%</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>50/30.30%</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>2/8.69%</td>
</tr>
<tr>
<td>Coast</td>
<td>Overall</td>
<td>40/43.01%</td>
</tr>
<tr>
<td></td>
<td>CP2-3</td>
<td>5/16.66%</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>19/61.29%</td>
</tr>
</tbody>
</table>

### Table 28: Chi Square Table Exterior Surface Treatment Overall

#### Observed Values: Exterior Surface Treatment

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Howland n=51</th>
<th>EBend n=239</th>
<th>Coast n=93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scraped</td>
<td>9</td>
<td>70</td>
<td>40</td>
</tr>
<tr>
<td>Smooth</td>
<td>42</td>
<td>169</td>
<td>53</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>239</td>
<td>93</td>
</tr>
</tbody>
</table>

#### Expected Values: Exterior Surface Treatment

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Howland n=51</th>
<th>EBend n=239</th>
<th>Coast n=93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scraped</td>
<td>15.85</td>
<td>74.26</td>
<td>28.90</td>
</tr>
<tr>
<td>Smooth</td>
<td>35.15</td>
<td>164.74</td>
<td>64.10</td>
</tr>
<tr>
<td>Total</td>
<td>51.00</td>
<td>239.00</td>
<td>93.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observed (O)</th>
<th>Expected (E)</th>
<th>O-E</th>
<th>(O-E)^2</th>
<th>(O-E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>15.85</td>
<td>-6.85</td>
<td>46.87</td>
<td>2.96</td>
</tr>
<tr>
<td>42</td>
<td>35.15</td>
<td>6.85</td>
<td>46.87</td>
<td>1.33</td>
</tr>
<tr>
<td>70</td>
<td>74.26</td>
<td>-4.26</td>
<td>18.13</td>
<td>0.24</td>
</tr>
<tr>
<td>169</td>
<td>164.74</td>
<td>4.26</td>
<td>18.13</td>
<td>0.11</td>
</tr>
<tr>
<td>40</td>
<td>28.90</td>
<td>11.10</td>
<td>123.31</td>
<td>4.27</td>
</tr>
<tr>
<td>53</td>
<td>64.10</td>
<td>-11.10</td>
<td>123.31</td>
<td>1.92</td>
</tr>
</tbody>
</table>

Chi Square Value: 10.84

df= (2-1)(3-1)= 2

Critical Value @ .05: 5.99

10.84> 5.99; ∴ can reject the null hypothesis that there is no relationship between variables.
Table 29: Chi Square Table Interior Surface Treatment Overall

<table>
<thead>
<tr>
<th>Observed Values</th>
<th>Howland n=54</th>
<th>EBend n=225</th>
<th>Coast n=82</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrapped</td>
<td>27</td>
<td>97</td>
<td>51</td>
</tr>
<tr>
<td>Smooth</td>
<td>27</td>
<td>128</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>225</td>
<td>82</td>
</tr>
</tbody>
</table>

Expected Values

<table>
<thead>
<tr>
<th></th>
<th>Scrapped</th>
<th>Smooth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26.18</td>
<td>109.07</td>
</tr>
<tr>
<td></td>
<td>27.82</td>
<td>115.93</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observed (O)</th>
<th>Expected (E)</th>
<th>O-E</th>
<th>(O-E)^2</th>
<th>(O-E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>26.18</td>
<td>-0.82</td>
<td>0.68</td>
<td>0.03</td>
</tr>
<tr>
<td>27</td>
<td>27.82</td>
<td>-0.82</td>
<td>0.68</td>
<td>0.02</td>
</tr>
<tr>
<td>97</td>
<td>109.07</td>
<td>-12.07</td>
<td>145.73</td>
<td>1.34</td>
</tr>
<tr>
<td>128</td>
<td>115.93</td>
<td>12.07</td>
<td>145.73</td>
<td>1.26</td>
</tr>
<tr>
<td>51</td>
<td>39.75</td>
<td>11.25</td>
<td>126.55</td>
<td>3.18</td>
</tr>
<tr>
<td>31</td>
<td>42.25</td>
<td>-11.25</td>
<td>126.55</td>
<td>3.00</td>
</tr>
</tbody>
</table>

Chi Square Value 8.82

df= (2-1)(3-1) = 2

Critical Value @ .05 5.99

8.82 > 5.99 * can reject the null hypothesis that there is no relationship between variables

Table 30: Interior Surface Treatment Summary Data

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Scrapped (n/%)</th>
<th>Smooth (n/%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Overall</td>
<td>Howland</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27/48.21%</td>
<td>29/51.78%</td>
</tr>
</tbody>
</table>

Table 31: Cordage Thickness Summary Data

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Time Period</th>
<th>Cordage Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>median</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Howland</td>
<td>Overall</td>
<td>1.28 mm</td>
</tr>
<tr>
<td></td>
<td>CP1</td>
<td>1.40 mm</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>1.24 mm</td>
</tr>
<tr>
<td>Eddington Bend</td>
<td>Overall</td>
<td>1.31 mm</td>
</tr>
<tr>
<td></td>
<td>CP1</td>
<td>Limited Data Available (n=3)</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>1.27 mm</td>
</tr>
<tr>
<td>Coast</td>
<td>Overall</td>
<td>1.41 mm</td>
</tr>
<tr>
<td></td>
<td>CP1</td>
<td>1.55 mm</td>
</tr>
<tr>
<td></td>
<td>CP4-5</td>
<td>1.42 mm</td>
</tr>
</tbody>
</table>
### Table 32: Cordage Twist and Associated Attributes

<table>
<thead>
<tr>
<th>Attribute or Characteristic</th>
<th>Cord-Wrapped Stick “S” Twist or “Z” Spun</th>
<th>Cord-Wrapped Stick “Z” Twist or “S” Spun</th>
<th>CP1 “S” Twist or “Z” Spun</th>
<th>CP1 “Z” Twist or “S” Spun</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Count</strong></td>
<td>n=17</td>
<td>n=24</td>
<td>n=12</td>
<td>n=3</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>H=4; EB=8; C=5</td>
<td>H=4; EB=5; C=15</td>
<td>H=6; EB=3; C=3</td>
<td>C=3</td>
</tr>
<tr>
<td><strong>Primary Exterior Surface Treatment</strong></td>
<td>Smooth (n=13) Scraped (n=4)</td>
<td>Smooth (n=13) Scraped (n=10)</td>
<td>Smooth (n=2) Smoothed over Cordage (n=5)</td>
<td>Smooth (n=1) Cordage (n=2)</td>
</tr>
<tr>
<td><strong>Primary Interior Surface Treatment</strong></td>
<td>Smooth (n=5) Scraped (n=8)</td>
<td>Smooth (n=7) Scraped (n=11)</td>
<td>Cordage (n=5) Smoothed over Cordage (n=5)</td>
<td>Cordage (n=1) Smoothed over Cordage (n=1)</td>
</tr>
<tr>
<td><strong>Punctate</strong></td>
<td>n=5</td>
<td>n=6</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Punctate Shape</strong></td>
<td>Lin (n=1) Rnd (n=1) Combo (n=1) Irr (n=2)</td>
<td>Rnd (n=5) Irr (n=1)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Average Rim Thickness 1</strong></td>
<td>7.21 mm; (n=12)</td>
<td>5.99 mm; (n=15)</td>
<td>4.99 m; (n=6)</td>
<td>No Data</td>
</tr>
<tr>
<td><strong>Average Rim Thickness 2</strong></td>
<td>8.93 mm (n=9)</td>
<td>7.73 mm (n=9)</td>
<td>7.62 mm (n=5)</td>
<td>No Data</td>
</tr>
<tr>
<td><strong>Rim Eversion</strong></td>
<td>Dir (n=9) Exc (n=3)</td>
<td>Dir (n=6) Exc (n=7) Inc (n=3)</td>
<td>Dir (n=2) Exc (n=4)</td>
<td>No Data</td>
</tr>
<tr>
<td><strong>Lip shape</strong></td>
<td>Flt (n=3) Rnd (n=3) Bev (n=2) Combo (n=5)</td>
<td>Flt (n=8) Rnd (n=5) Pnt (n=1)</td>
<td>Flt (n=2); Rnd (n=1) Pnt (n=1) Combo (n=2)</td>
<td>No Data</td>
</tr>
<tr>
<td><strong>Lip Modification</strong></td>
<td>Ext (n=5) StExt (n=2) StInt (n=1)</td>
<td>Ext (n=1) Int (n=1) StExt (n=1)</td>
<td>Ext (n=1)</td>
<td>No Data</td>
</tr>
<tr>
<td><strong>Mean Orifice Size</strong></td>
<td>14 cm (n=4)</td>
<td>14.18 cm (n=11)</td>
<td>No Data</td>
<td>No Data</td>
</tr>
<tr>
<td><strong># Vessel Lots w/Residues</strong></td>
<td>n=4</td>
<td>n=4</td>
<td>n=4</td>
<td>n=1</td>
</tr>
<tr>
<td><strong>Inclusion Densities</strong></td>
<td>1 (n=4) 2 (n=5) 3 (n=3) 10 (n=5) 20 (n=2)</td>
<td>1 (n=6) 2 (n=2) 3 (n=7) 5 (n=5) 10 (n=4)</td>
<td>2 (n=1) 5 (n=3) 10 (n=5) 20 (n=3)</td>
<td>10 (n=2) 3 (n=1)</td>
</tr>
<tr>
<td><strong>Average Minimum Tempor Size</strong></td>
<td>.474 mm</td>
<td>.424 mm</td>
<td>.528 mm</td>
<td>.286 mm</td>
</tr>
<tr>
<td><strong>Average Maximum Tempor Size</strong></td>
<td>2.61 mm</td>
<td>2.16 mm</td>
<td>2.87 mm</td>
<td>1.74 mm</td>
</tr>
<tr>
<td><strong>Primary Inclusion Type</strong></td>
<td>Feld (n=7) Org/Shell (n=4) Qtz (n=6)</td>
<td>Feld (n=1) Org/Shell (n=13) Qtz (n=10)</td>
<td>Feld (n=5) Qtz (n=7)</td>
<td>Mica (n=1) Qtz (n=2)</td>
</tr>
<tr>
<td><strong>Inclusion Type</strong></td>
<td>Grit (n=11) Mixed (n=1) Org/Shell (n=5)</td>
<td>Grit (n=9) Mixed (n=6) Org/Shell (n=9)</td>
<td>Grit (n=11); Mixed (n=1)</td>
<td>Grit (n=3)</td>
</tr>
<tr>
<td><strong>Hematite Presence</strong></td>
<td>PnP (n=5) NotVis (n=12)</td>
<td>PnP (n=13) NotVis (n=8) P (n=3)</td>
<td>PnP (n=6) NotVis (n=3) P (n=3)</td>
<td>NotVis (n=2) P (n=1)</td>
</tr>
<tr>
<td><strong>Paste Consistency Values</strong></td>
<td>1 (n=1) 2 (n=7) 3 (n=3) 4 (n=6)</td>
<td>2 (n=3) 3 (n=3) 4 (n=6)</td>
<td>2 (n=6) 3 (n=4) 4 (n=2)</td>
<td>2 (n=2) 3 (n=1)</td>
</tr>
<tr>
<td><strong>Average Cordage Thickness</strong></td>
<td>1.38 mm</td>
<td>1.37 mm</td>
<td>1.60 mm</td>
<td>1.42 mm</td>
</tr>
<tr>
<td><strong>Cordage Ply</strong></td>
<td>1 Ply (n=10) 2 Ply (n=7)</td>
<td>1 Ply (n=5) 2 Ply (n=18)</td>
<td>1 Ply (n=1) 2 Ply (n=6)</td>
<td>1 Ply (n=1) 2 Ply (n=2)</td>
</tr>
</tbody>
</table>
APPENDIX B
FIGURES

Figure 1: Map Showing Select Site Locations Referenced in Text
Figure 2: Map Illustrating River Valleys Referenced in the Text
Figure 4: Pie Charts Comparing Inclusion Types by Time Period and Location
Figure 5: Box Plot Comparisons of Inclusion Size by Time Period and Location
Figure 6: Inclusion Density Chart, after Philpotts (1989) and Walker and Cohen (2009)
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Figure 8: Photograph showing an example of “friable” ceramic fabric (Level 2)

Figure 9: Photo Showing an Example of “Very Compact” Fabric (Level 5)
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Figure 11: Pie Charts Comparing Rim Form by Time Period and Location
Figure 12: Histogram Comparing Hematite Levels in CP2-3 Vessel Lots
Figure 13: Illustration Showing Vessel Morphology
Figure 14: Photograph showing fabric-impressed ceramic surface (CP1) Knox Site

Figure 15: Photograph of Rocker Dentate Rim (CP2) Eddington Bend Site
Figure 16: Photograph Showing Dentate Rim (CP3) Knox Site

Figure 17: Photograph of Cord-Wrapped Stick Rim (CP4) Eddington Bend Site
Figure 18: Photograph Showing Manufacturing Scrap, Site 108-26 Howland Area
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