University of Central Florida
STARS

Electronic Theses and Dissertations, 2020-

2020

Mill Cove Complex Lithic Typology: Understanding Early Mississippian Period Social Exchange in Northeastern Florida

Sherman Johns
University of Central Florida

Part of the Archaeological Anthropology Commons
Find similar works at: https://stars.library.ucf.edu/etd2020
University of Central Florida Libraries http://library.ucf.edu

This Masters Thesis (Open Access) is brought to you for free and open access by STARS. It has been accepted for inclusion in Electronic Theses and Dissertations, 2020- by an authorized administrator of STARS. For more information, please contact STARS@ucf.edu.

STARS Citation

Johns, Sherman, "Mill Cove Complex Lithic Typology: Understanding Early Mississippian Period Social Exchange in Northeastern Florida" (2020). *Electronic Theses and Dissertations, 2020-*. 64.
https://stars.library.ucf.edu/etd2020/64

MILL COVE COMPLEX LITHIC TYPOLOGY: UNDERSTANDING EARLY MISSISSIPPIAN PERIOD SOCIAL EXCHANGE IN NORTHEASTERN FLORIDA

by

SHERMAN LEE JOHNS JR
B.A. University of North Florida, 2016

A thesis submitted in partial fulfillment of the requirements
for the degree of Master of Arts
in the Department of Anthropology
in the College of Sciences
at the University of Central Florida
Orlando, Florida

Spring Term
2020

©2020 Sherman Lee Johns Jr.

ABSTRACT

A large focus of Mississippian period archaeological research concerns itself with the role groups have played in the long-distance social exchange networks prevalent across the Mississippian World. The Mill Cove Complex, a Mississippian period (A.D. 900-1250) village and dual sand mound burial complex situated on the periphery of the Mississippian World in Jacksonville, Florida is one such case. The St. Johns II people living at the Mill Cove Complex had connections deep into the Mississippian southeast reaching all the way to Cahokia. Understanding the role of these unique people within the large social networks requires an examination of all archaeological material recovered from the site. The lithic assemblage from modern excavations (1999 – present) is the final missing component in building this understanding. This lithic typology, based upon macroscopic and geochemical analysis, provides the final foundational set of data required for future research necessary to gain a more complete view of the St. Johns II people and their role in Mississippian long-distance social exchange. It lends insight into local community practices as well, highlighting the importance of lithic raw material in ritual use, illustrating direct connections with Cahokia based upon the presence of projectile points from the American Bottom, and demonstrating the resourcefulness of a people who overcame a lack of raw material within their geographic area through the maintenance of social networks and conservative use and maximization of procured stone resources.

ACKNOWLEDGMENTS

I would like to thank my advisor and co-advisor, Dr. Brigitte Kovacevich and Dr. Sarah Barber for their assistance and guidance in navigating the research and administrative processes involved in the pursuit of this work. I extend deep thanks and reverence to my mentor, Dr. Keith Ashley, who has been a constant source of inspiration, guidance, and unwavering support throughout the entirety of my archaeological career. If I amount to be merely half the archaeologist he is, I will consider myself abundantly successful. To my family, thank you for your understanding and endurance during this time-consuming task. Most importantly, thank you to my partner Lauren and my three daughters Isabella, Madison, and Amelia. Without your motivation, understanding, and love I would not have been able to accomplish this research.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

μA: microampere

A.D.: Anno Domini (In the year of the lord)

Elements:

- As: arsenic
- Ba: barium
- Ca: calcium
- Co: cobalt
- Cr: chromium
- Cu: copper
- Fe: iron
- Mn: manganese
- Mo: Molybdenum
- Nb: niobium
- Ni: nickel
- Rb: rubidium
- Rh: rhodium
- Sb: antimony
- Sn: tin
- Sr: strontium

Th: thorium

Ti: titanium

U: uranium

Y: yttrium

Zn: zinc

Zr: zirconium xii

eV: electronvolt

keV: kiloelectronvolt

MCC: Mill Cove Complex

n.d.: no date

ppm: parts-per-million

XRF: X-ray fluorescence

ROI: region of interest

SECC: Southeastern Ceremonial Complex

UID: Unidentified

XRF: x-ray fluorescence

CHAPTER 1: INTRODUCTION

Long-distance social interaction networks have long been the foci of researchers concerned with the Mississippian period. Alongside the examination of the rise in social complexity, hierarchy, inequality, and agriculture, this area of study has played an important role in uncovering the complex nature of Mississippian economy, religion, and social interaction. These interaction and exchange networks were webs of power, exerting control and perpetuating Mississippian elitism through competitive gifting, centralized crafting distribution of labor, and diffusion of ideology. Groups imbued nonlocal goods with value based on raw material, origin location, distance travelled to obtain them, social costs, and ceremonial connection. The use of distant social connections promoted widespread expansion of materials and ideas, emanating from one of the most influential polities of the time, Cahokia (Ashley 2012; Ashley and Thunen 2020; Austin 2015; Brown 2004; Meyers 2017; Pauketat 1997, 2004). The networks connected many peoples and spread the Cahokian lifeway far across the Mississippian frontier to groups existing along the periphery of the Mississippian World. Such is the case concerning the St. Johns II people of northeastern Florida.

The St. Johns II people thrived along the banks of the St. Johns River, utilizing vast natural resources for sustenance while building mound and village complexes along the shoreline. The Mill Cove Complex, a mortuary, ritual, and village site located in Jacksonville, Florida, is one of the best examples of St. Johns II culture excavated to date. Examination of the

role of the St. Johns II people within the broader Mississippian long-distance social networks has been the focus of research at the site since the late 1990s.

Evidence indicates the groups in northeastern Florida were highly active in early Mississippian long-distance interaction, maintaining direct relationships to Cahokia as evidenced by the presence of Cahokian exotica at the Mill Cove Complex (Ashley and Thunen 2020). Of particular importance to this research are the presence of two chert projectile points morphologically matching Cahokia Double-Notched points, which are typically found in a localized area around Cahokia with few exceptions.

While much has been revealed about the lives of the St. Johns II people at the Mill Cove Complex, a key piece of the puzzle has yet to be examined. The Mill Cove Complex lithic assemblage has set quietly upon a shelf waiting to tell its story and assist in the building of a complete image of life at the site and the role of this peripheral society within the greater scope of Mississippian period social interaction. The following lithic typology and geochemical analysis provides the answer to two basic, yet integral questions; what comprises the lithic Mill Cove Complex lithic assemblage and what insights might the chemical analysis of chert provide concerning the two Cahokia points? Beyond understanding what stone material is present at the Mill Cove Complex, this analysis offers scholars a platform for future research concerning both lithic technologies of late-prehistoric peoples and the role of the St. Johns II within the broader social networks of the greater Southeast. Additionally, it supplies a view of the lives of the St. Johns II at the Mill Cove Complex. General data derived from the composition point to the importing of unrefined chert material in small quantities for the production of lithic tools onsite

by the St. Johns II, often in ritual and mortuary contexts. It highlights the balance struck between the pragmatic use of stone for utilitarian tools in efforts to minimize cost, and that of wasteful action for intangible ritual benefits important to the entire community to include costly signaling and heirlooming. The assemblage also represents the social relationships necessary for material procurement and political alliance, with some extending all the way to Cahokia, and the connection between lithic production and the honoring of heritage and the deceased.

In this thesis, I use a mixed method approach to explore this topic both quantitatively and qualitatively. The research includes developing a typology of all lithic material from modern excavations (1999-2020) and employing X-ray fluorescence spectrometry for comparative analysis between 2 chert points believed to originate in the American Bottom and Pinellas points made from regional cherts. A secondary goal of geochemical analysis is to establish foundational methods for the examination of chert with the Bruker III-SD Handheld XRF though a testing of multiple power profiles. My findings suggest, with optimal settings, Manganese (Mn) and Iron (Fe) are discriminating elements, indicating the source material for Cahokia Points differ from the source material of chert Pinellas Points common to Florida. Understanding these chemical profiles is important as the presence of non-regionally sourced chert points may indicate a direct relationship with the major Mississippian polity of Cahokia. I argue, despite these findings, geochemical analysis is inadequate in determining objective differences useful in providing a secondary line of evidence supporting the notion these points come from Cahokia. This argument is based partially upon the innate limitations of chemical analysis in the examination of chert, and also the need for further artifact and source sampling. The chemical profiles of the Cahokia

points, when compared to each other, indicate a level of difference that further complicates attempts to discriminate and is only solvable by an expansion of data through an increase in sample size and direct source sampling. As it currently stands, typological analysis will allow for the most objective form of identification and comparative analysis of these chert tools. When extending this notion to the points which may have originated in the American Bottom, it becomes evident based upon morphology and material inclusions that they are indeed Cahokia points, clearly indicating a direct relationship between the St. Johns II people and Cahokia.

I navigate this relatively broad topic by first providing background into the Mississippian world, and what is currently known of the St. Johns II people, the Mill Cove Complex, and their role in Mississippian social networks. Second, I explain the methodology and findings behind my typology, providing detail concerning the approaches I took in examination of the lithic assemblage and the resulting data. Third, I provide the methodology and results from the geochemical analysis and address the problematic nature of chert. Lastly, I discuss the revelations discovered from researching this key component of the Mill Cove Complex archaeological record. To expound upon the generalized question concerning assemblage composition, the discussion attempts to elucidate ideas concerning social action that may be derived from the assemblage data in the areas of material procurement, tool count and distribution, debitage count and distribution, and the presence of unmodified stone. Exploring these ideas provides meaningful points of discussion leading toward a holistic view of the St. Johns II people and their use of stone material at the Mill Cove Complex.

The Mississippian World

Cahokia: At the center of the Mississippian World

Some scholars consider the formation of Cahokia as marking the beginning of the Mississippian period (Pauketat 1994). The site sits adjacent to the Mississippi River in the floodplain zone known as the American Bottom in southwest Illinois. Cahokia is comprised of a large plaza and over one hundred mounds of different shapes, sizes, and functions (Cobb 2000:13; Pauketat 2004). Pauketat (2004) views Cahokia as the apex of Mississippian culture and argues for its consideration as a major city rather than simply a mound center, complex, or ceremonial center. Cahokia represents the basic model of Mississippian, a term encompassing a form of political organization that archaeologists call chiefdoms. Chiefdom, a highly debated concept, is generally defined as socially stratified societies with a hierarchical political structure and institutionalized inequality (Cobb 2003; Ashley and White 2012:17). Outside of political structure, most Mississippians are known for their use of shell-tempered ceramics, wattle-and-daub constructed wall-trench houses, maize farming, and mound and village construction of various sizes (Cobb 2000:13). The widespread expansion of Mississippian ideology is exhibited in material culture by the presence of distinctive artifacts adorned with Mississippian iconography called the Southeastern Ceremonial Complex (SECC), found in mortuary contexts far from Cahokia. SECC motifs are linked to ancestor worship, falcon-warrior ideology, temple rites, and earth-fertility symbolism (Knight 2006; Pauketat 2004:13). Scholars debate the scope of the spread of Cahokian/Mississippian influence, but most agree it extended as far west as

Oklahoma, north into Illinois, east across the southern Appalachians to the Atlantic coast, and south into the Florida Panhandle and Gulf Coast (Cobb 2000:13).

Cahokia served as inspiration for hundreds of years of prehistoric Native American culture across the Southeast. Cahokian ideas were founded upon the traditions of their ancestors, yet their expression of symbols and monumental architecture impacted the futures of many people across a vast expanse between the eleventh and seventeenth centuries A.D. (Pauketat 2004:1). The official end of the Mississippian period will differ based upon the scholar and is often relative to a particular geographic area. If one takes a Cahokia centric viewpoint of Mississippian culture, then it is argued the period ends around A.D. 1400 (Milner 1998:22). Researchers debate the cause of Cahokia's demise, but it's decline beginning in the thirteenth century A.D., subsequent reduction in influence as evidenced by a loss in value of the SECC, and reduction in mound building by the fourteenth and fifteenth century A.D., had a ripple-effect throughout the greater Southeast impacting groups as far away as the Mill Cove Complex in northeastern Florida (Ashley 2012:124; Cobb 2003:78; Pauketat 2004:13).

Mississippian: A Selective Fraternity

What does it mean to be Mississippian? Definitions have changed over time; from pottery styles and cultural traditions to artifact complexes, and an association with the chiefdom concept (Ashley and White 2012; Blitz 2010; Caldwell 1958; Griffin 1967; Holmes 1903; Peebles and Kus 1977). Archaeologists today often reserve acceptance into this elite club for Native American groups in the Midwest and Southeast between A.D. 1000-1550 exhibiting the

traditionally accepted characteristics of fortified communities, maize agriculture, earthen mounds, and similarity in religious symbolism (Ashley and White 2012:9; Blitz 2010). Emerson suggests Cahokia was the catalyst, spreading these hard and fast characteristics across to the borders defined by archaeological sites exhibiting the above listed characteristics (Emerson et al. 2003). But Ashley and White remind us the Southeast was not a homogenous landscape (Ashley and White 2012:9). Late-prehistoric North America was a dynamic period experiencing the rise and fall of polities and the movement of people. Groups existing on the periphery of the Mississippian World, outside of the boundaries defined by modern scholars, had contact with those imbedded deep within through complex social networks of interaction, trade, and exchange. Therefore, research must encompass a variety of groups ranging from those falling into the traditional Mississippian category and those who do not (Ashley and White 2012:9-10). If we are to understand what life was truly like in the Mississippian World, we must not isolate cultures through modern boundaries, but explore the open system of interaction leading to groups encompassing both Cahokia influenced lifeways and local tradition.

The Mississippian Period in Northeastern Florida

Northeastern Florida: Defined

When I reference northeastern Florida in this paper, I am utilizing Ashley's (2012:101) definition in which he describes it as, "the extreme corner of the state that includes Nassau, Duval, and northern St. Johns counties."

St. Johns Culture

The St. Johns culture developed in Florida by 500 B.C., and by later periods, extended from the Atlantic coast in Brevard County westward to central Florida and north to Amelia Island. These fisher-hunter-gatherers lived in the forests and along wetlands, consuming the shellfish, fish and other animals for subsistence (Milanich 1998: 40). The St. Johns people utilized technology like fishhooks, weirs, bows and arrows, and snares for the procurement of food. Additionally, they crafted a variety of goods utilized for daily tasks, ritual, and trade like stone projectile points, bone pins, shell beads, and pottery. The St. Johns people are also well known for their mounds of shell, referred to as middens, left behind from thousands of years of consumption. Agriculture, maize in particular, found its way into the lives of the St. Johns people at varying times. Milanich (1998:43-46) believes maize agriculture started at different times by different regional groups with some not incorporating the practice at all. With the abundance of resources available from the natural landscape of central and east Florida, there was not a large need for the intensive maize farming tradition exhibited by other Mississippian groups. The St. Johns lineage extends beyond post-European contact, with their descendants being the Timucua and Mayaca Indians of the Colonial period (Milanich 1980:211, 1998:54).

St. Johns II Culture

The St. Johns II culture is a chronological division of the general St. Johns culture. It is primarily marked by the introduction of St. Johns Check Stamped pottery (Goggin 1952:53). St. Johns II in northeastern Florida is dated between A.D. 900-1300, making the period

contemporaneous with the early-Mississippian groups of the American Bottom and greater Southeast (Ashley 2012:101). The St. Johns II people lived in villages along the St. Johns River basin and had a few large mound centers loosely similar to their traditional Mississippian counterparts. That is where the similarity ends though, as no evidence indicates St. Johns II villages had wooden palisades and the use of platform mounds is not present outside of the Fort Walton, Pensacola, and Safety Harbor sites along the Gulf Coast and in the Florida panhandle (Ashley 2012; Harris 2012; Marrinan 2012; White et al 2012). The best-known St. Johns II mound complexes are Mt. Royal (8PU35), Thursby Mound (8VO36), Shields Mound (8DU12), and Grant Mound (8DU14) (Ashley 2005:151). It is hypothesized many of the St. Johns II people abandoned the northeastern corner of the state and moved upriver by A.D. 1250-1300. Their exodus correlates with the decline of Cahokia and could be the result of waning interaction networks and reduced prominence within them (Ashley 2012: 124).

The Mill Cove Complex

The Mill Cove Complex is an early St. Johns II (A.D. 900-1250) ceremonial center located along the southern shoreline of the St. Johns River, 15 km west of the river's mouth in Jacksonville, Florida. The Mill Cove Complex is comprised of two burial mounds, one ritual or special use area, and an associated domestic area. The complex is home to the largest communal sand mortuary mounds in the region, the Grant Mound (8DU14) and the Shields Mound (8DU12), situated approximately 750 m apart (Ashley 2005; 2012). Fifty meters northwest of Shields Mound lies Kinzey's Knoll, a ceremonial feasting and corpse preparation area exhibiting

the richest St. Johns II deposits excavated in the St. Johns River basin to date (Ashley 2012:109, Ashley and Rolland 2014; Ashley and Thunen 2020). Variable density domestic middens sit between the Grant and Shields mounds. No other St. Johns II mound center is comparable in size, amount of interments, and presence of exotic material (Ashley 2012:104).

Excavations at the Mill Cove Complex began in the late nineteenth century. C.B. Moore, a wealthy Philadelphia socialite, explored the Florida peninsula in the 1890s. He excavated many mounds along the St. Johns River, including the Grant and Shields mound. His initial visit to the Shields Mound in 1894 was met with some superstitious trepidation by the landowner. Moore was allowed only a cursory examination of the site but did manage to dig a few trenches across the summit of the mound (Moore 1894b:204). He recovered 5 "arrow points," an earthenware pendant, and made note of human remains in all but one of the trenches (Moore 1894b:204-205). Moore described Shields mound as being situated 137 m from the river atop high ground, having a base diameter of 65 m and an oblong summit plateau with rounded corners measuring 33 m across. He emphasized the uniqueness of the graded approach to the upper level on the northern side, measuring 38 m in length and 27 m across (Moore 1894b:204, 1895:454). Additionally, Shields Mound has a unique fishhook shaped ridge on the southern side with an initial elevation of 30 cm and a maximum of 4.1 m approximately 150 m southwest of the mound. The maximum elevation point marks the location where it turns abruptly back to the north, where it gradually decreases in height to the surface at the tip of the hook (Ashley 2005:153; Moore 1895:454).

Moore returned to Mill Cove and the Shields Mound in 1895. This venture proved more successful as the new owner, Mr. Shields, allowed for investigation of greater intensity. Moore's team spent 17 days excavating and recovered a multitude of both domestic and exotic artifacts. Excavations yielded plain, check stamped, and cordmarked pottery, alongside a variety of lithic artifacts including polished celts, bannerstones and gorgets, hammers, blades, and projectile points. Other artifacts of interest were clay and stone tobacco pipes, shell beads, shark's teeth, incised bone pins, sheets of mica and copper, cubes of galena, and whelk shells. Moore (1895) recovered many of the artifacts alongside human remains, present at approximately 150 points in the mound.

Moore also excavated the Grant Mound during his 1894 and 1895 trips to Mill Cove. He spent 5 weeks digging the mound. He described it as being a truncated cone approximately 9 m high with a base diameter of 66 m and a summit plateau of just 7 m. Many of the artifacts recovered were similar to those of the Shields Mound, although they varied in quantity, with much greater amounts of copper present in the Grant Mound. The exception was a set of conical wood-earpieces overlain with copper, and the presence of two copper long-nosed god maskettes (Moore 1895).

Modern excavations in the vicinity of the Shields Mound began in 1999, with the exception of a grant-funded project in the late 1980s. Excavations continue under the supervision of Keith Ashley in association with the University of North Florida (UNF), often serving as a field school opportunity for students (Ashley 2005:160). A location of particular importance discovered during UNF excavations is Kinzey's Knoll. The dome-shaped midden, is

densely packed with shell and contains large quantities of faunal remains, St. Johns pottery, and other, bone, stone, and metal artifacts. Ashley argues that Kinzey's Knoll represents a mortuary ritual and feasting locus associated with the Shields Mound (Ashley 2005; Ashley and Thunen 2020). Of particular interest to my research was the recovery of two chert projectile points from the knoll matching the morphology of Cahokia side-notched points. These point types originate in the American Bottom and are rarely found outside of the Mississippi River Valley (Ashley and Rolland 2014; Boszhardt 2003:75) (Figure 1).

In sum, the Mill Cove Complex, with its commanding position atop the bluff along the St. Johns River and vast quantity of local and nonlocal goods, represents an important communal burial and ceremonial center for the St. Johns II people of northeastern Florida.

Figure 1: Kinzey's Knoll Cahokia Side Notched points

Mississippian Long-Distance Interaction Networks

Political Economy and Prestige Goods Economy

Archaeologists began shifting theoretical focus away from migration and diffusion and towards inequality and power dynamics of Mississippian chiefdoms in the 1970s (Marcoux 2007:232). This new political economy approach has been an important part of Mississippian scholarship ever since. The prestige goods economy model functions under the over-arching umbrella of political economy theory. The model arose as a way to examine the intersection of ideology, politics, and economy in chiefly societies. Friedman and Rowlands created the model and defined it as describing a system of exchange where political power was held by those controlling access to exotic items gained through external exchange relationships (Friedman and Rowlands 1977; Frankenstein and Rowlands 1978:76; Marcoux 2007:232). Elites utilized exotica as payment of social debt and as a form of debt placed upon others, creating value upon the items used in this competitive system where participants constantly battled for power (Marcoux 2007: 232). The competitive cycle lead to hierarchical stratification along economic, political, and social planes in even egalitarian societies (Frankenstein and Rowlands 1978:76-78; Marcoux 2007). The subsequent rise of inequality led to the initiation of laws by elites granting them control over what constituted prestige goods and allowing them to solidify their elevated societal position (Marcoux 2007). Elites had to constantly work to maintain their high status. They had to uphold strict control of the availability of nonlocal items while ensuring a constant flow of locally crafted goods. Elites perpetuated their sociopolitical power when the supply of

exotics were well controlled. Any disruption in the system could inhibit an elite's inability to meet ritual and social obligations, causing loss of control over the group (Marcoux 2007:233).

Inadequacy of The Prestige Goods Economy Model

Some archaeologists call for a shift away from the classic prestige goods model when examining the political economy of Mississippian groups in certain cases. Pauketat (1997:9-10) agues the model places an over-emphasis on the elite's dependence on nonlocal display goods and long-distance exchange networks. He claims evidence at Cahokia does not support their inclusion in a competitive system of gifting but rather points toward elite control over locally produced display goods. Marcoux (2007) illustrates how the prestige goods model fails to adequately describe the Moundville chiefdom as display goods there do not constitute the primary source of power for elites.

Ashley describes the political economy of the Mill Cove Complex, as a departure from the classic model (Ashley 2002:171-72, 2003:344-48, 2012:119). He argues the possession or control of distribution of nonlocal display goods does not automatically mean elites maintained power over surplus labor and goods. He points out an additional weakness of the model is its conflation of exotica under a single category, placing similar value upon all items (Ashley 2012:118). Ashley offers an alternative view for northeastern Florida. He suggests there existed a form of communal political economy rather than institutionalized distinction between elites and commoners supported by nonlocal display goods. He supports his assertion with 2 key points of evidence (Ashley 2012:119). First, there is no evidence of St. Johns II non-mound burials,

indicating all deceased persons where allowed to be buried in a communal cemetery sand mound (Ashley 2012:120). Second, evidence from the Mill Cove Complex and Mt. Royal show highly valued goods were confined to communal areas utilized for group interactions like feasting, ritual, and mound burial (Ashley 2012:118; Ashley and Thunen 2020). Thus, Ashley argues high valued exotica did not serve as tools for elites seeking to maintain power during the early Mississippian period in northeastern Florida. He acknowledges the intensive role of the St. Johns II people in exchange networks but believes the evidence points to the purpose of these connections and exchange of goods as being one of diplomacy, ritual, social alliance, and social reproduction. Exotica served to bind individuals and communities in relationships maintained through giving and receiving (Ashley 2012:121; Ashley and Thunen 2020; Mauss 1967; Sahlins 1972).

Community Benefit: Cost Control, Costly Signaling, and Heirlooming

Cost control is an important aspect of social practice related to the St. Johns II community based economic model argued to exist by Ashley (2012). It is clear that all lithic material are imported goods based upon the geologically poor location of the Mill Cove Complex. Isolation from toolstone combined with the importance of lithics to St. Johns II community ritual creates a cost-benefit situation that allows for one to examine the nature of economic balance within a social group. With the community need for lithics necessary for both utilitarian and ritual use, the demand for stone was likely quite high, creating an elevated value for the resource (Austin 2015:417).

The rational choice approach, often utilized by those interested in the practical reasons for the practice of ritual, argues people act purposefully; respond to changes in costs and benefits; and will make choices yielding the greatest net benefit (Austin 2015; Iannaccone 2016). This economic model, when applied to lithic resources in northeastern Florida, explains both the pragmatic and wasteful behavior evident at the Mill Cove Complex. The great distance involved in lithic raw material procurement means the St. Johns II needed to endure tangible costs related to travel and collection of stone. These costs would extend to the maintenance of social alliances necessary for access to quarries outside of their localized area. Mitigation and control of these costs often comes in the form of material size, quality, and stage of development (Austin 2015). The St. Johns II were bringing in small pieces of chert and creating large amounts of unimarginal tools from poor quality material. Utilization of stone resources of even the poorest quality ensured the maximization of cost expenditure for material obtainment. Contrarily, a lack of preforms and large frequency of debitage in ritual contexts, indicative of production, suggests a cost-minimization focus did not always meet a net benefit standard for the group. Often times the benefits associated with material are intangible, providing benefit to the greater community in the form of religious practice, reinforcement of identity, dissemination of gained knowledge, and group cohesion (Austin 2015; B'enabou and Tirole 2011; Chai 1997; Edel 1968; Ellison 1995; Granovetter 1985; Sosis and Bulbulia 2011). This is illustrated at the Mill Cove Complex through the high frequency of lithic material in ritual contexts, both debitage and tools, and in the potential for wasteful action like costly signaling occurring at the site.

Costly signaling is an approach to the examination of stone tools use, production, and discard and those actions relate to social meaning. It is concerned with wasteful displays or actions serving to convey importance (Quinn 2015). Cultural items convey information and are vital to the social relationships of a group. The information from these artifacts are both passively and actively displayed, disseminated, and received (Quinn 2015). With the already established ideas of cost associated with material procurement and the subsequent value innate to these nonlocal goods, it is clear that costly behavior associated with stone items would convey a sense of importance and reverence for the individual or group that the behavior was being conducted for. The people investing in this signaling behavior would do so for the attainment of some level of benefit which may not be tangible in nature (Quinn 2015:202). The breaking of stone tools, so precious based upon the costs incurred for their obtainment and production, would be one such behavior. This type of action has been previously recorded in Florida at the Woodland Period site of Fort Center, in the southern portion of the state (Austin 2015). This seems to be a possibility at the Mill Cove Complex as well, where 12 unidentified (UID) and hafted bifaces that have been broken in half are present in the assemblage, 6 of those coming directly from Kinzey's Knoll. While these items may simple represent broken tools and nothing more, the intensive ritual contexts at the Mill Cove Complex and the amount of artifacts coming from those contexts suggest that these broken bifaces could be indicative of costly signaling utilized for further enhancement of community benefit.

A final component of the St. Johns II community based political economy important for consideration when examining the lithic assemblage is that of heirlooming. The

continued use of items previously utilized by persons with an ancestral link to the living can serve to objectify a groups memories and history. These items, or heirlooms, provide the living with a connection to their distant past (Lillios 1999:235-236). At the Mill Cove Complex, 78 projectile points were recovered from the Grant and Shields mounds by Moore and were later identified as being archaic by Wilcox (2010). This typology has added 3 more archaic projectile points to the total, with their origins being Kinzey's Knoll and the South of Kinzey's Knoll site areas. The presence of these highly valued lithic heirlooms and their location within ritual and mortuary contexts illustrates the importance of ancestral connections to the St. Johns II people. The communal nature of ritual practice at the Mill Cove Complex suggests that heirlooms would have reinforced identity for the entire group, providing direct links to the past beneficial for all and further supporting the argument against the application of a prestige goods model in northeastern Florida.

General Overview of Mississippian Exchange Systems

Group interaction played a vital role in the Mississippian period Southeast. The transfer of objects through expansive networks served as an essential function of social activity (Brown 2004:677). Networks of exchange resulted in large-scale transfer of exotic non-utilitarian objects, the creation of regional decorative styles, and the construction of monumental earthworks serving large congregations of individuals (Brown 2004:677). Exchange did more than just satisfy group demands for nonlocal goods. In some cases, it promoted and reinforced hierarchical power structures while in other instances fostered diplomacy, ritual, social alliance,

and social reproduction (Ashley 2012: 121; Brown 2004:677). Examination of the Mill Cove Complex lithic assemblage helps to partially define the role of the St. Johns II people within this complex web of interaction. It will provide depth and detail through an added layer of evidence, illustrating the importance and acceptance of those utilizing the Mill Cove Complex despite their enactment of sociopolitical agency.

Exchange Network Chronology

Tracing the rise of complex long-distance interaction networks of the Mississippian period begins in the Archaic period. Seasonal sedentism arose during this time in areas with rich resources (Brown 2004:678). Groups established small-scale regional exchange networks and built large mounds, representing nodes in the system. The size and location of the mound correlated to its scope within the network (Brown 2004:678). The Woodland period was an extension of the Archaic system with continued use of a restricted system of exchange (Brown 2004:679).

The spread of the network expanded greatly by the eleventh century, the early-Mississippian period. Widespread use of maize offered a stable form of subsistence fueling network growth (Brown 2004:678). Circulation of Gulf Coast marine shell followed by the trade of other exotics including copper, shell tempered pottery, and raw lithic material like Mill Creek chert marks a time of increased network complexity and use (Brown 2004:679-680). Groups constructed large mounds and plazas associated with ritual activity. Mound locations like Cahokia, Macon Plateau, and Mt. Royal became nodes within the expansive network stretching

across the Mississippian frontier (Brown 2004:680). Transfer of cult-material associated with temple rites, earth-fertility symbolism, falcon-warrior ideology, and ancestor worship began to spread throughout the Southeast. Inspiration for the Southeastern Ceremonial Complex (SECC) originated with Cahokia and spread as far as Mt. Royal, upriver from the Mill Cove Complex in Florida (Brown 2004:681; Emerson et al. 2003; Pauketat 2004:13). SECC material included engraved shell cups, shell gorgets, copper long-nosed god maskettes, and copper repoussé plates (Brown 2004:681).

The robust Mississippian trade networks were in decline by the fifteenth century. SECC exotics lost their value, earthwork construction declined, and the long-distance interaction system witnessed a great contraction. Network diminishment played into movement of people and the abandonment of areas like the Macon Plateau and the Mill Cove Complex (Ashley 2012:124; Brown 2004). Exchange of exotica was limited to Southern Appalachia by the end of the Mississippian period, while other regions focused upon localized systems of exchange (Brown 2004:682).

The Role of the Mill Cove Complex in Exchange Networks

Examination of St. Johns II political economy provides a foundation towards an understanding of the role of the Mill Cove Complex within the greater Mississippian period interaction networks. According to Ashley (2012), data recovered from St. Johns II domestic middens show them as fisher, hunter, gatherers with access to an abundant amount of resources provided by their estuarine habitat. Their ease of access to resources for daily sustenance limited

the ability of local leaders to establish control over each community's food supply (Ashley 2012:120). St. Johns II domestic material culture was not exotic, but rather comprised of simple bone and shell tools, pottery, and regionally sourced stone tools to include small triangular arrow points. Exotic materials served the entire community in ritual and mortuary contexts, possibly reinforcing group identity and connections with both long-dead ancestors and the recently deceased (Ashley 2002:172, 2003:347, 2012:121-122; Ashley and Rolland 2014; Ashley and Thunen 2020). Ashley acknowledges inequality in a communal sociopolitical construct and does not claim the St. Johns II people were egalitarian. He offers the possibility some individuals may have elevated roles within the polity due to involvement within exchange networks, but he argues against a highly stratified St. Johns II society (Ashley 2012).

Evidence suggests St. Johns II people participated in long-distance interaction networks starting in the early Mississippian period. They likely served as major exporters of marine shell to groups in the interior Southeast while importing exotica. Their involvement represented a reciprocal relationship of exchange involving; alliance building, diplomacy, ritual, social reproduction, and gifting (Ashley 2002:167-168, 2012:115-121; Ashley and Thunen 2020). St. Johns II influence and connection appears to be of a wide range. The presence of copper, stone, mica, and galena links them to the north. Goad's (1978:136-48) trace element analysis of copper artifacts from Grant Mound and Mt. Royal illustrate ties to Appalachia and the Great Lakes region (see also Ashley 2002, 2012:114; Ashley and Thunen 2020). Ocmulgee pottery, both imported wares and local copies, on St. Johns II sites indicates a connection into Georgia. This is further supported by the presence of St. Johns pottery and marine shell found in the Macon

Plateau (Ashley 2012:112-114; Ashley et al. 2015). Similarities in technology, culture, and mortuary ritual links the Mill Cove Complex upriver to Mt. Royal, one of the large mound sites noted by Brown to have been a node in Mississippian interaction spheres alongside Cahokia and the Macon Plateau (Ashley 2002:169, 2012:112; Brown 2004:680; Moore 1894b: 203-4). Cahokia side notched points recovered from Kinzey's Knoll at the Mill Cove Complex (Figure 1) and the Cahokia triple-notched point discovered by Moore at Mt. Royal represent additional connection between the two sites and also relationships extending outward to Cahokia. These projectile points are not typically found outside a restricted area surrounding Cahokia and the American Bottom, yet appear at Mt. Royal and the Mill Cove Complex, suggesting a direct connection with the major Mississippian city rather than a result of down-the-line trading (Ashley 2012:121; Ashley and Thunen 2020; Boszhardt 2003:75; Moore 1894a). Copper artifacts recovered from both the Mill Cove Complex and Mt. Royal further support the hypothesis of a direct relationship with Cahokia. Grant Mound yielded copper-veneered wooden biconical ear plugs and long-nosed god maskettes, while Mt. Royal produced multiple copper repoussé plates. The two long-nosed god maskettes recovered from Grant Mound are of particular interest. Research indicates a possible connection with the legend of Red Horn, a character in the history of the Ho-Chunk people who wears human heads as earrings (Ashley 2012:116; Hall 1997:149; Pauketat 2004:116). Hall suggests these maskettes could represent an adoption ceremony linking the powerful elites associated with a large polity, like Cahokia, with their political clients (Hall 1997:151).

Research clearly highlights the ability of the St. Johns II people to operate within an expansive social system dominated by highly stratified polities while maintaining a unique sociopolitical identity. The importance of the Mill Cove Complex and aboriginal Floridians to the greater Mississippian social landscape becomes undeniable when one considers its partnership with the major Mississippian city of Cahokia, evidenced by the recovery of long-nosed god maskettes, copper ear-plugs, and Cahokia side-notched projectile points. Despite the power wielded by the domineering Mississippian polity of Cahokia, the St. Johns II did not adopt their hierarchical political structure or rely upon agriculture for subsistence. Instead they maintained their position as influential economic agents while remaining faithful to their own unique identity and communal ideology that emphasized group inclusion in ritual, mortuary practice, and exchange.

The following chapter details the methodology and findings from the typology constructed for the Mill Cove Complex lithic assemblage. It serves as a foundation for future research geared toward a holistic understanding of the social role of the St. Johns II in the greater contemporaneous Southeast while providing data enabling a cursory look at the lives of those utilizing the Mill Cove Complex.

CHAPTER 2: TYPOLOGY

Classification of stone artifacts from the Mill Cove Complex serves two main purposes; reduce the variability of material into generalized descriptive units ensuring clear communication across broad archaeological spectrums; building a foundation for comparative research and the generation of future research questions. The typological findings were subsequently used to create GIS maps for added depth in understanding the lithic assemblage at the Mill Cove Complex, while creating more data for future study.

The lithic data derived from the typological findings do allow for an additional cursory look into the daily lives of the St. Johns II people, revealing key general characteristics. The assemblage is comprised of both lithic debitage and tools, most of which were produced from chert and sandstone, with small quantities of basalt and quartz/quartzite items. While all material is technically non-local, some of these items are regionally common, like the lithic hafted biface Pinellas Points, a derivative of the abundant Mississippian Triangular Point. Others are exotica, like the two Cahokia Points recovered from the Kinzey's Knoll ritual area. These items represent direct, long-distance social interactions with the great polity of Cahokia and would have been highly valued items due to their symbolic nature and cost of procurement. The presence of debitage at the Mill Cove Complex suggests the St. Johns II found the production of their own tools to be important, although further analysis must be conducted to objectively conclude production occurred and debitage is not present due to other activity like lithic retouch. Material coming in for production arrived in small, easy to carry packages and in poor condition,

evident from a lack of large chert nodules and the abundance of material with relatively large amounts of cortex present, all of which are characteristic of cost minimization tactics. Artifact distribution per cubic meter illustrates a somewhat even distribution across all site areas, while artifact count indicates large quantities of the assemblage were recovered from ritual contexts. When lithic count is placed within the context of the extreme concentration of faunal and ceramic artifacts recovered in the Kinzey's Knoll ritual area, it becomes evident the importance of lithics to the ritual and mortuary practice of the St. Johns II. This concept if further supported by the presence of broken hafted bifaces, indicative of costly signaling, and of archaic projectile points representing heirloom items.

As-a-whole, the following typology not only provides constructive means of communication regarding lithic items, but additionally illustrates the complexity of these fisher-hunter-gatherers who utilized difficult to obtain, and therefore valuable, material for community benefit rather than emulating the hierarchical practices of their Mississippian counterparts.

Macroscopic Typology Limitations

Stone artifacts exhibit a broad range of morphological variability. Because of this, there exists an innate subjectivity in lithic analysis and typology creation unavoidable by any researcher. With no previous typology available for northeastern Florida, I required a standardized and replicable starting point to achieve the goal of ensuring clear understanding, communication, and generation of future research questions across a broad audience. I therefore chose to begin with the generalized morphological chipped stone tool typology offered by

Andrefsky (2005). Choosing this typology is subjective in itself, as future researchers will surely utilize differing approaches based upon their specific research agenda. Ultimately their research questions will determine the attributes being examined and will lead to an expansion of, or complete disregard of my approach. It is rare indeed that two typologies produced by different researchers would ever turn out to be the same. One must understand that there may be as many types within a sample of artifacts as the number of artifacts within the assemblage, or there may only be one type (Andrefsky 2005:63). It is solely dependent upon the researcher, and this subjectivity stands as the single greatest limitation. Typology is not without its benefits, as this starting platform allows for the initial identification and classification of artifacts necessary for subsequent work. Obtaining a basic understanding of what lithic material is present at the Mill Cove Complex opens the doors to an endless amount of future research and discovery. Andrefsky's typological model is not perfect though, and was never meant to be. I modified the typology as required to account for lithic material not falling within the purview of its scope. This would include unmodified lithic material like river stones and non-chipped stone artifacts like ground stone. Despite the limitations and subjectivity of this typological approach, it firmly supports the intended research agenda proposed herein.

Macroscopic Typology

This typology is macroscopic, employing the use of the unaided eye along with a 10X loupe for analysis. The approach is limiting in its ability to discriminate use wear often only

visible through microscopic means, yet is appropriate based upon its purpose of general assemblage compositional discovery and avoidance of functional determination.

For the purposes of this typology, a type is considered to be a group of specimens within a population that exhibits similarity in their respective defined characteristic. Typology is therefore logically defined as "the systematic arrangement of types in a population (Andrefsky 2005:62)." I based the classification of types on morphological characteristics, referred to henceforth as attributes, that provide the most internal cohesion while ensuring the maximization of external isolation (Andrefsky 2005:63; Cormack 1971:329). These attributes are based upon typological rules that assist in accuracy and provide the replicability required for valid scientific research.

The typological rules I administered determine the attribute scale, the order of attribute evaluation, and the weight of attributes. Attributes examined in this typology are morphologically based and nominal in scale, as no attribute is of any greater value than another. Attribute evaluation begins with an initial determination of humanly modified or unmodified stone material. The specimens are subsequently split by determination of objective piece or debitage, with unmodified material being described as lithic "other." The typology continues to group the human modified artifacts into tool types for objective pieces and debitage types for debitage. Nominal attributes based upon tool production are weighted over functional or metric attributes as determination of intended artifact purpose or metric comparison is not within the scope of this research agenda.

I employed a monothetic approach and divisive strategy in which I began by viewing the sample as belonging to a single population with subsequent gradual division based upon association or disassociation of a single attribute at a time. I intentionally avoided common lithic terminology which may directly or indirectly indicate function such as drill, honing tool, knife, dart point, etc. This avoidance is to maintain the basic nature of this typology, ensuring it does not address or imply function, but rather serves to simply identify and organize the artifacts to facilitate future research and communication concerning the composition of lithic material recovered from the Mill Cove Complex.

Provenience and Material Data

I began analysis of each artifact by recording key provenience and identification information prior to the implementation of morphological analysis. Each stone specimen was listed with the state site identification number, excavation area name, field specimen number, unit, level, applicable unit notes, and date of excavation if available. Additionally, I listed the material type (chert, sandstone, basalt, etc.).

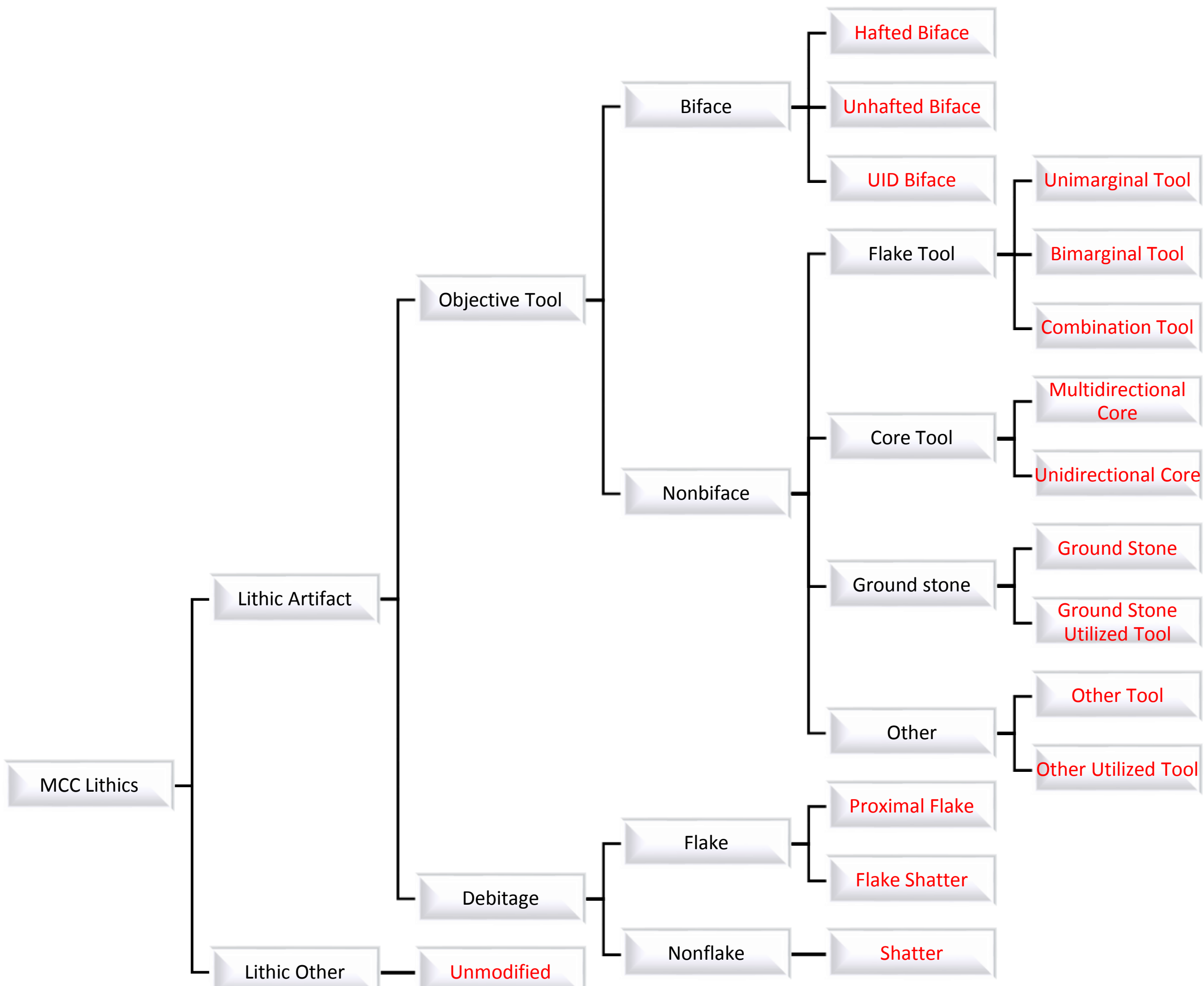

Figure 2: Mill Cove Complex typology flow chart

Lithic Artifact or Lithic Other

The first morphological distinction of this typology is between stone material that has been modified by humans and unmodified stone material. All stone examined that did exhibit indication of human modification, to include implements produced as a result of chipped stone technology, grinding and polishing, those showing macroscopic signs of use wear, and those with abrasive wear patterns, was considered modified lithic artifacts. All stone material which do not exhibit any signs of the human modification listed above were considered lithic “other” and typed as umodified. The unmodified type was not reduced any further as it is not relevant to the scope of this research. This does not mean that these “other” lithic items had no cultural purpose or function. That determination is left to the work of future research. Unmodified material was described by material type and count as a courtesy to those interested in pursuing related research questions (Figure 2).

Lithic Artifact: Objective Tool / Debitage

All modified lithic artifacts underwent a second split, placing them within the category of objective artifacts or debitage. Objective artifacts are those that have been intentionally modified through human behavior and reduced to a product that has less weight than before it was modified (Andrefsky 2005:76). All objective pieces are considered tools based on the intention of some form of cultural use. The material that is removed from the artifact through the process of creating and shaping the objective piece are debitage (Andrefsky 2005:76).

Objective Tool: Bifacial / Nonbiface

Objective artifacts were subsequently stratified into one of two general tool categories, biface and nonbiface. Bifaces are those objective pieces exhibiting extensive modification on two sides and have two sides or edges that meet together to form a single edge circumscribing the artifact (Andrefsky 2005:77). If the tool does not have extensive bifacial flaking across the majority of the surface of both sides, then it falls into the nonbiface category. This distinction is important as it discriminates between the intention to make a bifacial tool through extensive bifacial flaking of the artifact which contrasts with a simple bifacial edge that would fall into a separate category. Nonbifacial tools were categorized based upon their disassociation with bifacial attribute characteristics.

Biface: Hafted / Unhafted / Unidentified (UID)

Bifacial tools were given a final category based upon the presence or lack of a hafting element. Hafting elements are the portion of a bifacial tool that serve to articulate with a handle or shaft for the purpose of securing the tool to a secondary object (Andrefsky 2005:77) (Figure 3). Hafting element recognition was based on the presence of notches or shoulders. Wear along the edges of a biface in the form of ground or dull edges also indicates the lashing of the tool to a secondary object, thereby constituting it as a hafted biface. Those bifacial tools not exhibiting the these attributes for hafting elements were categorized as unhafted bifacial tools (Figure 4). Some bifacially worked artifacts were broken, so it was not possible to objectively determine if they were hafted or unhafted. In these cases the biface is typed as unidentified (UID) (Figure 5).

Figure 3: Mill Cove Complex 8DU12 Shields hafted bifaces: From left to right (a) Pinellas (b) Santa Fe (c) UID (d) Hernando (e) UID (f) Cahokia Side Notched (g) Cahokia Side Notched

Figure 4: Mill Cove Complex 8DU12 Shields unhafted bifaces

Figure 5: Mill Cove Complex 8DU12 Shields UID bifaces

Nonbiface: Flake / Core / Ground stone / Other

Nonbifacial tools fall into one of 4 sub-categories; flake tool; core tool; ground stone; other. Nonbiface flake tools are those nonbifacial tools made on a flake. Flake tools therefore must exhibit a distinguishable ventral and dorsal surface, striking platform, bulb of percussion, and proximal and distal ends. Flake tools were then divided into one of three types: unimarginal, bimarginal, and combination tools. Intentional human modification is the key component distinguishing flake tools from their flake debitage counterparts. This modification comes in the form of edge, surface, or shape retouching or chipping. Unimarginal tools have only been modified on one surface, either the ventral or dorsal (Figure 6). At times, the modification

comes in the form of use wear along an otherwise unmodified edge. These flakes exhibiting no modification outside of use wear are classified here as unimarginal tools. Bimarginal tools exhibit modification on both dorsal and ventral surfaces at the same location upon the flake (Figure 7). This means that the modified edge is very similar to the edge of a biface. The difference between the two is in the extent of the modification. Bifaces will have flakes removed from the entire ventral and dorsal surface of the tool. Bimarginal flake tools only have material removed from the edge. It is not uncommon to find nonbifacial tools with multiple utilized or modified edges. In such cases, some edges may have bimarginal attributes while other edges upon the same artifact are unimarginally modified. In these cases, the artifact falls into the combination tool type (Andrefsky 2005: 79-81) (Figure 8).

Figure 6: Mill Cove Complex 8DU12 Shields unimarginal tools

Figure 7: Mill Cove Complex 8DU12 Shields bimarginal tools

Figure 8: Mill Cove Complex 8DU12 Shields combination tools

The core tool category is reserved for those objective pieces that have had flakes removed from its surface for the purpose of supplying flakes that can be used for the production of flake tools. In this typology, lithic cores were placed within the tool category because they exhibit purposeful human modification as an objective piece rather than being a secondary byproduct of tool production. Core tools were split into two generalized types: unidirectional and multidirectional. Unidirectional core tools have detached material being removed in a singular direction. Multidirectional core tools have detached material being removed in multiple directions (Andrefsky 2005:81-82) (Figure 9). At times, core tools can have a utilized edge. In such cases they were still categorized under the unidirectional or multidirectional category but were also described in the same manner as flake tools based on edge attributes: unimarginal, bimarginal, or combination.

Figure 9: Mill Cove Complex 8DU12 Shields multidirectional core tools

Ground stone tools are those objective pieces created through an abrasive action or pecking. In some instances, ground stone tools can be the product of shaping though use such as honing and grinding stones (Figures 10-12). Ground stone tools within this assemblage are comprised of basalt and sandstone implements exhibiting the above attributes. In instances where the ground stone artifact has an edge exhibiting use wear, the artifact was further described as being utilized. It was not described as unimarginal, as seen with flake tools, because the utilized edges are not the product of chipped stone technology.

Figure 10: Mill Cove Complex 8DU12 Shields sandstone ground stone tools

Figure 11: Mill Cove Complex 8DU12 Shields basalt ground stone tools

Figure 12: Mill Cove Complex 8DU12 Shields quartz/quartzite ground stone tools

“Other” tool is a catchall dissociative type meant to describe all other objective, nonbifacial artifacts that do not exhibit the attributes necessary for their placement within one of the three preceding no bifacial types. This lithic tool type encompasses utilized flakes that do not exhibit all flake characteristics, utilized shatter, and culturally significant unmodified material like galena (Figures 13-15). Tools expected to be objective and therefore have cultural significance were typed as “other.” Those “other” tools exhibiting use wear are types as “other utilized tools.”

Figure 13: Mill Cove Complex 8DU12 Shields "other" tool coal

Figure 14: Mill Cove Complex 8DU12 Shields “other” tool galena

Figure 15: Mill Cove Complex 8DU12 Shields other utilized tools

Debitage: Flake / Nonflake

All non-tool material resulting from chipped stone technology was classified as debitage. These are the discarded and unused pieces that have been detached from an objective tool during the reduction process (Andrefsky 2005:82). Initial debitage stratification divides the artifacts into flake and nonflake types. The flake debitage must exhibit some, but not all of the traditionally accepted flake characteristics: a single recognizable ventral and single recognizable dorsal surface are all that is required. Nonflake material are those debitage which disassociate from those typological rules.

Flake: Proximal Flake / Flake Shatter

Debitage artifacts that have been typed as flakes are subsequently divided into their final type, proximal flake or flake shatter. Proximal flakes are flake debitage that exhibit a single recognizable ventral and dorsal surface, proximal and distal ends, a striking platform, and bulb of percussion (Figure 16). Debitage that does not fit the proximal flake typological rules are typed as flake shatter (Figure 17).

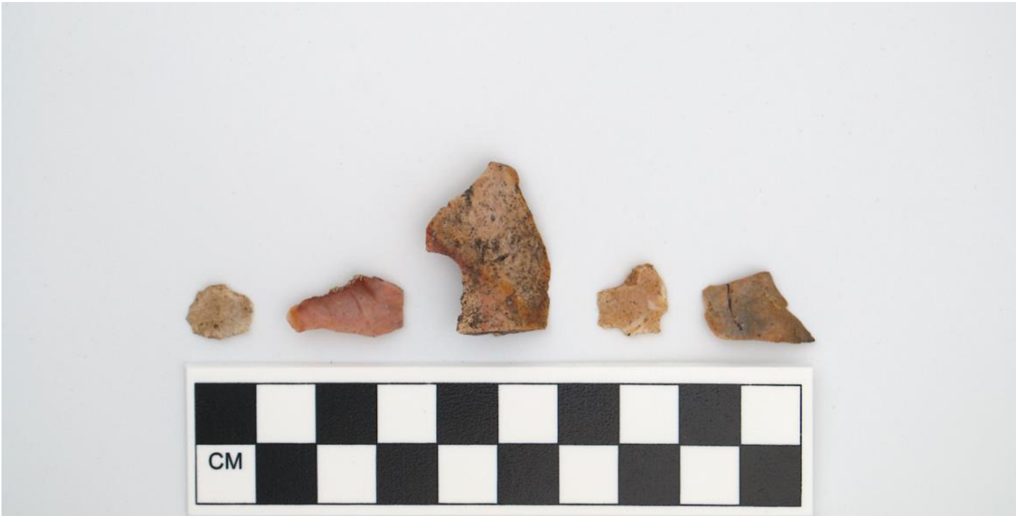

Figure 16: Mill Cove Complex 8DU12 Shields debitage proximal flakes

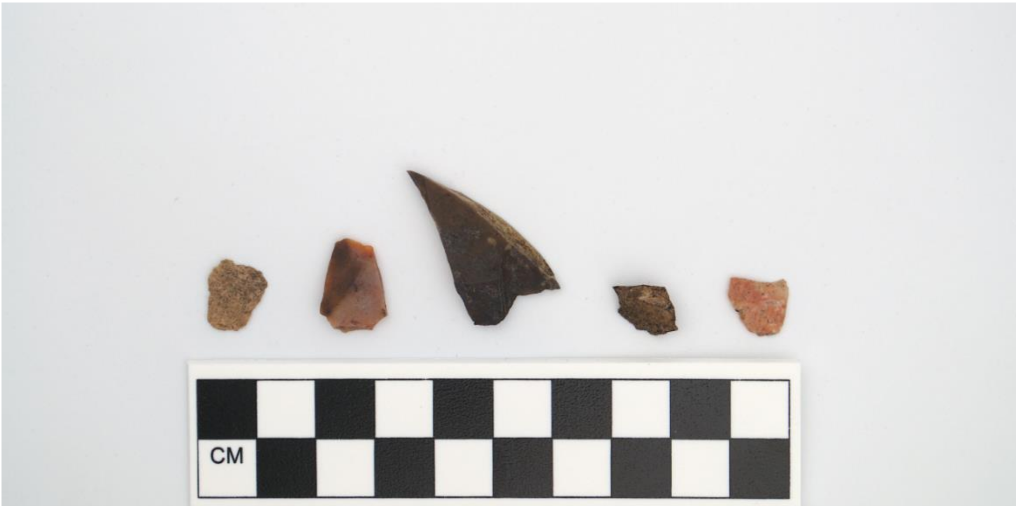

Figure 17: Mill Cove Complex 8DU12 Shields debitage flake shatter

Nonflake: Shatter

All debitage not meeting the criterion for flake debitage were typed as nonflake. All nonflake debitage was considered to be shatter (Figure 18). Shatter is not limited to angular

shatter as seen in some typologies. This is to minimize any assumption that shatter must adhere to a specified shape. Here, shatter is simply all debitage produced from chipped stone technology which do not exhibit flake characteristics.

Figure 18: Mill Cove Complex 8DU12 Shields debitage shatter

Provenience: GIS Map Creation

A visual representation of typological results is helpful in gaining an understanding of lithic activity at the Mill Cove Complex. I utilized ArcMap to create maps depicting the spatial distribution of material by type. This is not for the purpose of answering any specific research question but to provide a visual representation of the typology that assists in the general

understanding of the sites lithic composition. Within this chapter these maps serve as descriptive elements only, with derived interpretations discussed in chapter 4.

Map production began by creating a fishnet grid overlay covering a georeferenced base layer. I created the fishnet from a starting datum used to create the initial site grid for excavations at the Mill Cove Complex. I utilized the northing and easting coordinate data from the excavations to depict the units that have been excavated to date. I then created individual points for each artifact, depicting their horizontal site provenience. I subsequently utilized artifact counts to create heat maps that show the quantity of artifacts present within a given unit and provide an illustration of type distribution across the site.

Typology Findings

Description of the Mill Cove Complex lithic assemblage begins with an exploration of the site areas examined along with a broad overview of the counts and distribution of both tools and debitage through the use of charts and maps. I subsequently provide the counts and distribution data for the 16 lithic types produced through this typology.

Data concerning the Grant Mound site area is limited due to the nature of excavation of the site. During the construction of a housing development in the early 1980's, restricted excavation was conducted and minimal material was recovered relative to the Shields site. Accurate provenience data, outside of unit and grid coordinates, was not able to be documented during these excavations. The mapping of Grant artifacts is not accurate outside of the general site placement due to this lack in provenience data. The assemblage distribution map of the

entire Mill Cove Complex is simply present for clarity in large-scale site location and should not be referenced for information concerning artifact location at the Grant site area (Figure 19). Most of the data presented here will be focused upon the distribution of material recovered from the Shields portion of the Mill Cove Complex, as detailed provenience data is available for all artifacts recovered from that location (Figure 19).

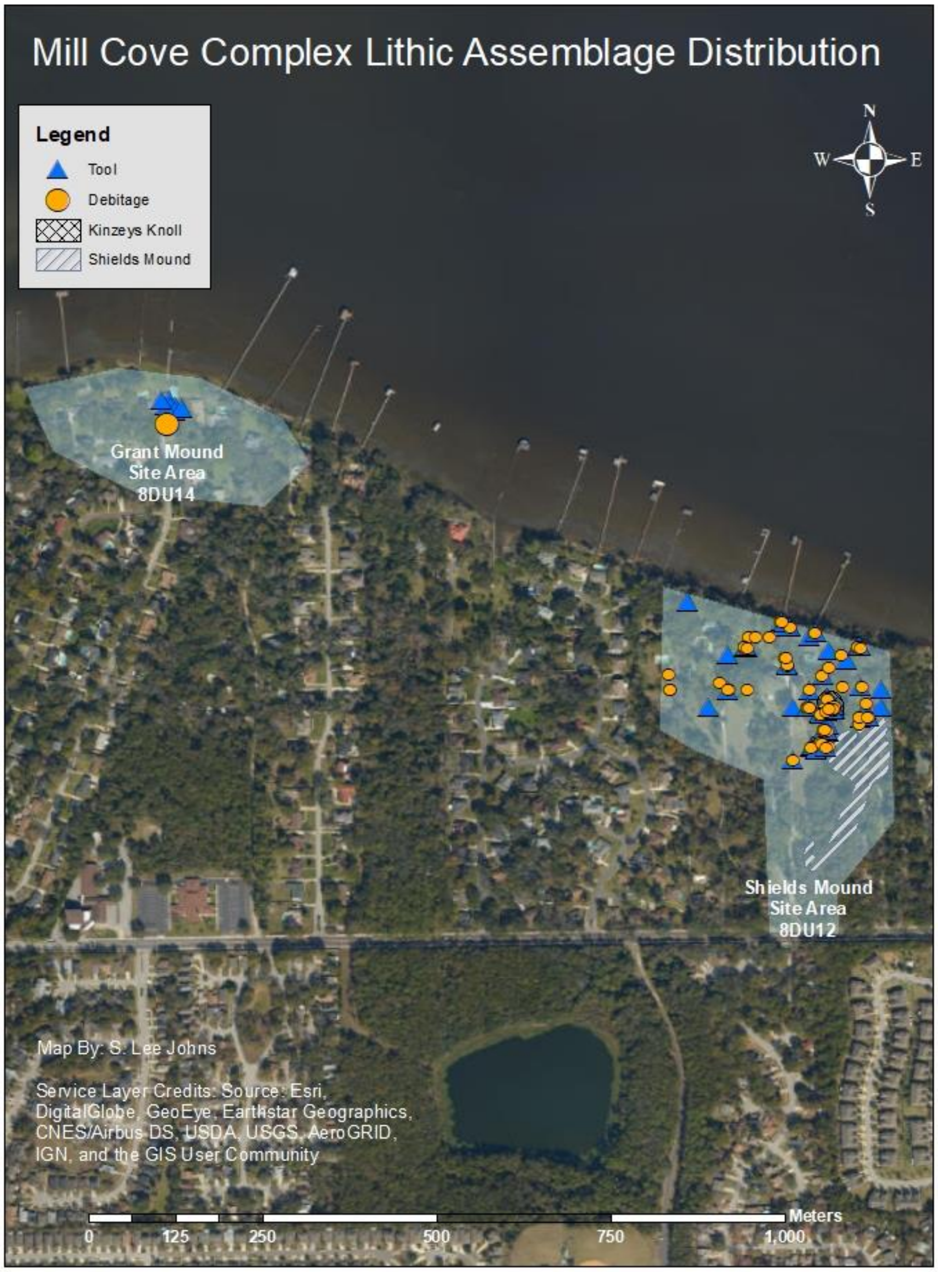

Figure 19:Mill Cove Complex lithic assemblage distribution map

Figure 20:Shields 8DU12 site areas map

Excavation units from the Shields site have been subdivided into 17 site areas determined by Keith Ashley during fieldwork conducted in association with the University of North Florida (Figure 20). These site areas allow for the facilitation of meaningful discussion concerning material distribution across the Shields site. I utilize these site area names in this work but will refer to the entirety of the Shields Mound site area as the Shields site. When referring to the Grant Mound site area I use the name Grant site. I do so to ensure the understanding that material examined herein do not derive from the burial mounds themselves, but rather from the surrounding area. When referring to the combination of both the Grant site and the Shields site, I use the term Mill Cove Complex.

Tools and Debitage

The Mill Cove Complex lithic assemblage is comprised of 529 individual lithic artifacts. One-thousand-twenty individual unmodified stone specimen were examined but not considered lithic artifacts for the purpose of this typology due to their lack of human modification. Future work may indicate these implements had cultural meaning, and they are therefore described in count and charted by site area to provide the basis for future research. This brings the combined specimen total to 1549 individual stone items for the modern assemblage count (Table 1; Figure 21).

There exists an approximate even split between lithic tools and debitage at the Mill Cove Complex, with tools constituting 47% of the overall assemblage and debitage 53%. The majority of lithic tools were sandstone implements, unimarginal flake tools, and hafted bifaces (Figure

22). The majority of debitage is nonflake shatter (Figure 23). Concerning artifact distribution, the Kinzey's Knoll site area, a location associated with ritual feasting and mortuary preparation for the Shields site exhibits the highest concentration of both lithic tool and debitage deposition by count (Ashley and Thunen 2020) (Figure 24; Figure 25; Figure 26). In an effort to avoid sampling bias, I have included an artifact per cubic meter of material excavated measurement. This metric reveals a more even distribution of lithic artifacts across the entirety of the complex (Figure 26; Figure 27). Figure 27 represents the combining of three site areas, Kinzey's Knoll, Kinzey's Knoll NE Edge, and Kinzey's Knoll West Edge. These three site areas represent the Kinzey's Knoll ritual area proper. Figure 27 therefore exhibits a more realistic depiction of artifact distribution in relation to village versus ritual contexts. While the distribution is somewhat even when compared to count alone, the presence of these lithics in conjunction with the rich deposits of faunal and ceramic artifacts in Kinzey's Knoll still highlights the significance of modified stone implements to St. Johns II ritual practice. In addition, it reveals the need for more excavation in West of Kinzey's Knoll, which may yet hold more data useful in determination of purpose for that site area in particular.

Table 1: Mill Cove Complex lithic assemblage counts

Type	Count
Tool	250
Debitage	279
Unmodified	1020
MCC Totals	1549

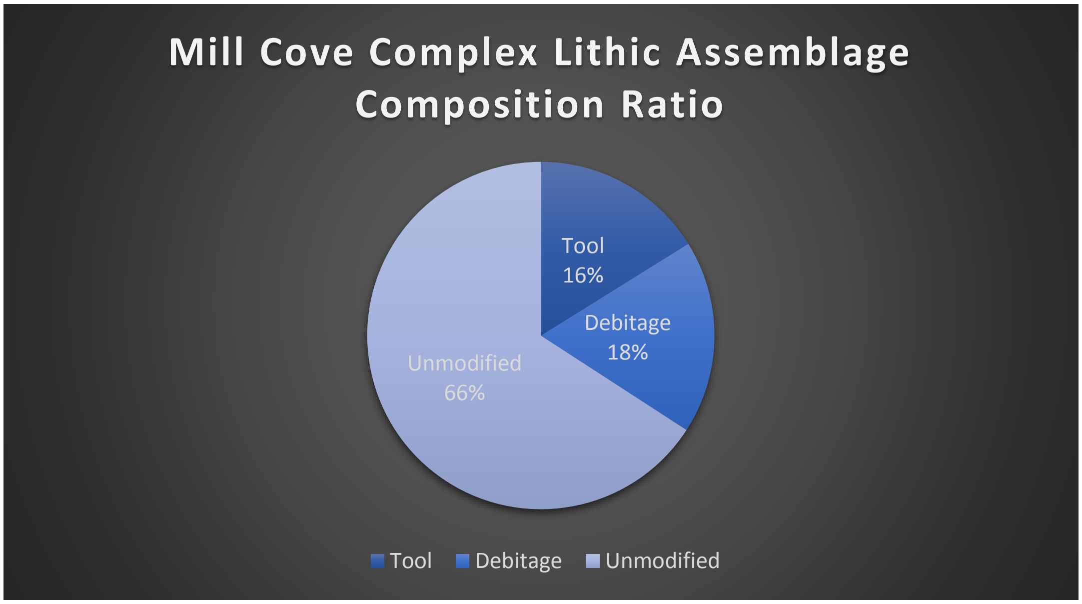

Figure 21: Mill Cove Complex lithic assemblage composition ratio

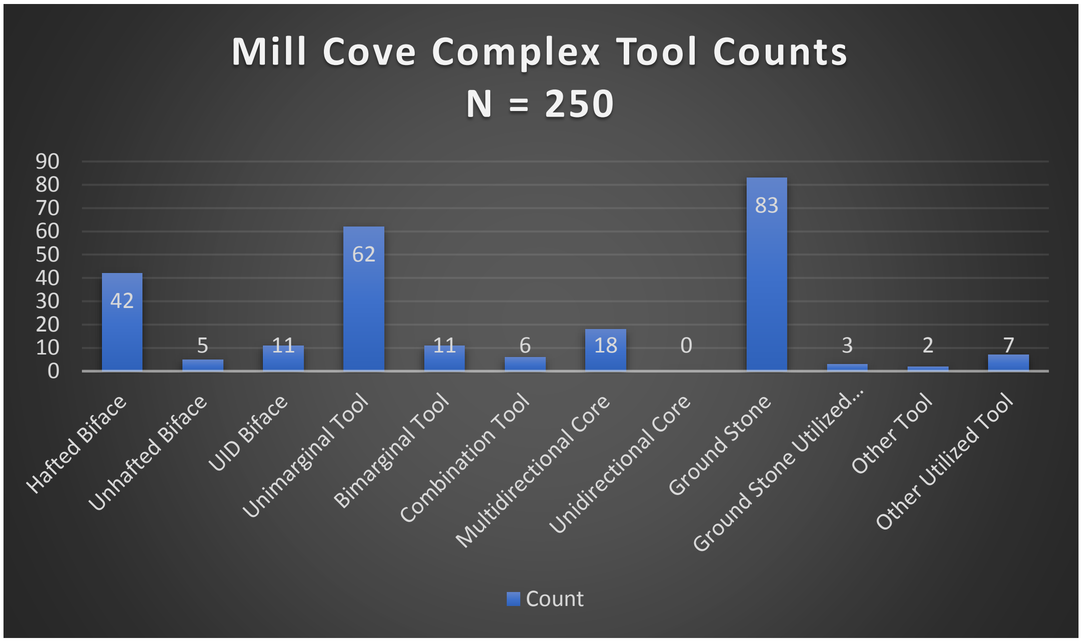

Figure 22: Mill Cove Complex tool counts

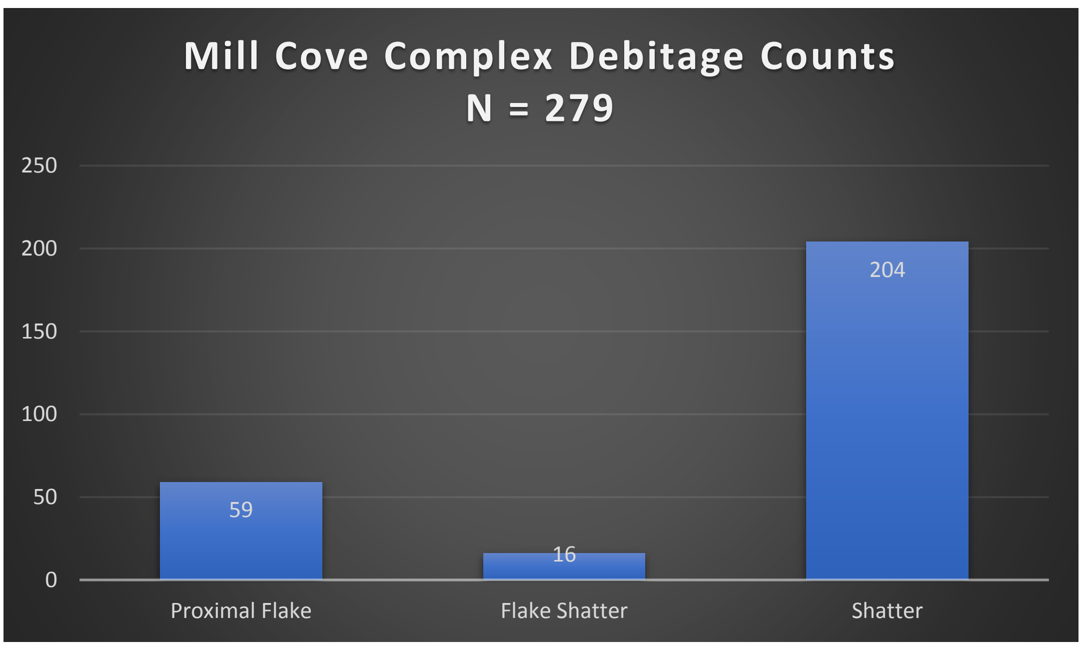

Figure 23:Mill Cove Complex debitage counts

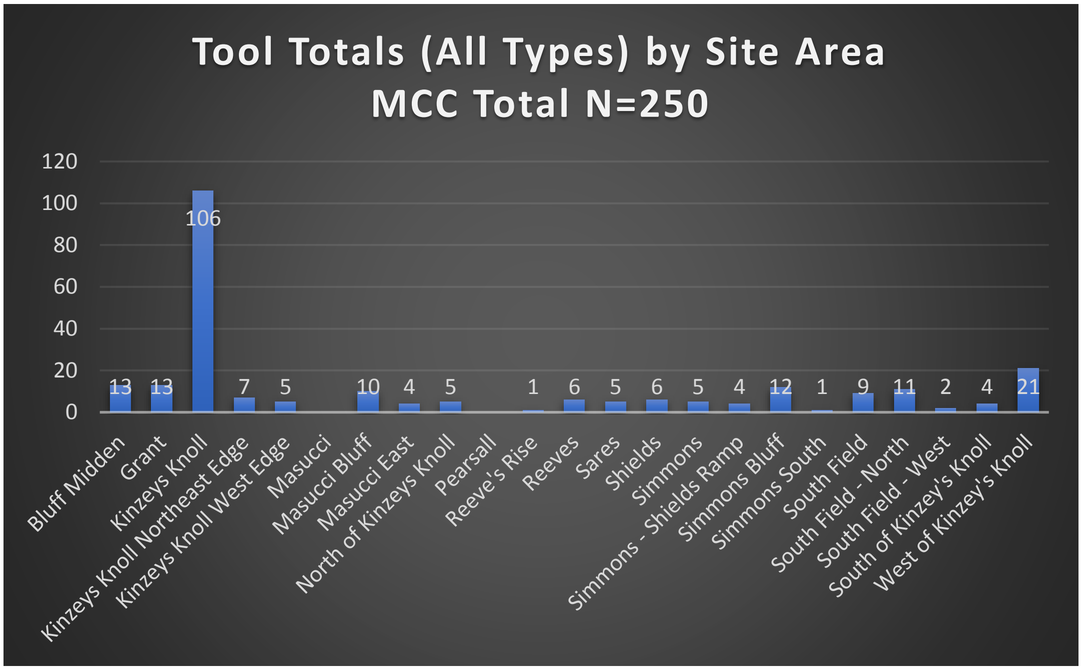

Figure 24:Mill Cove Complex tool totals by site area

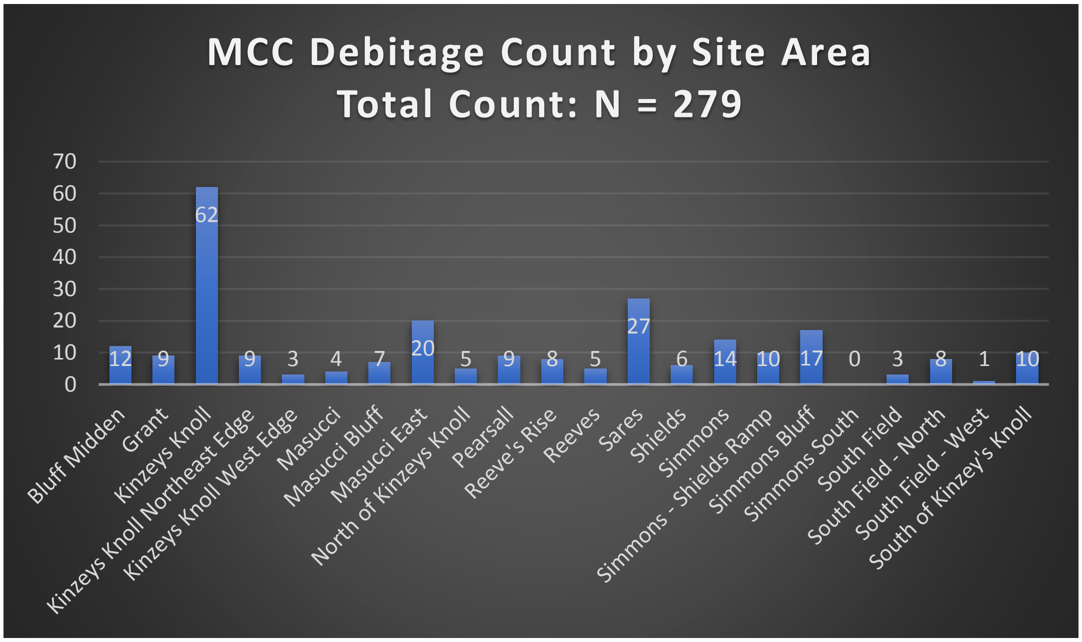

Figure 25:Mill Cove Complex debitage count by site area

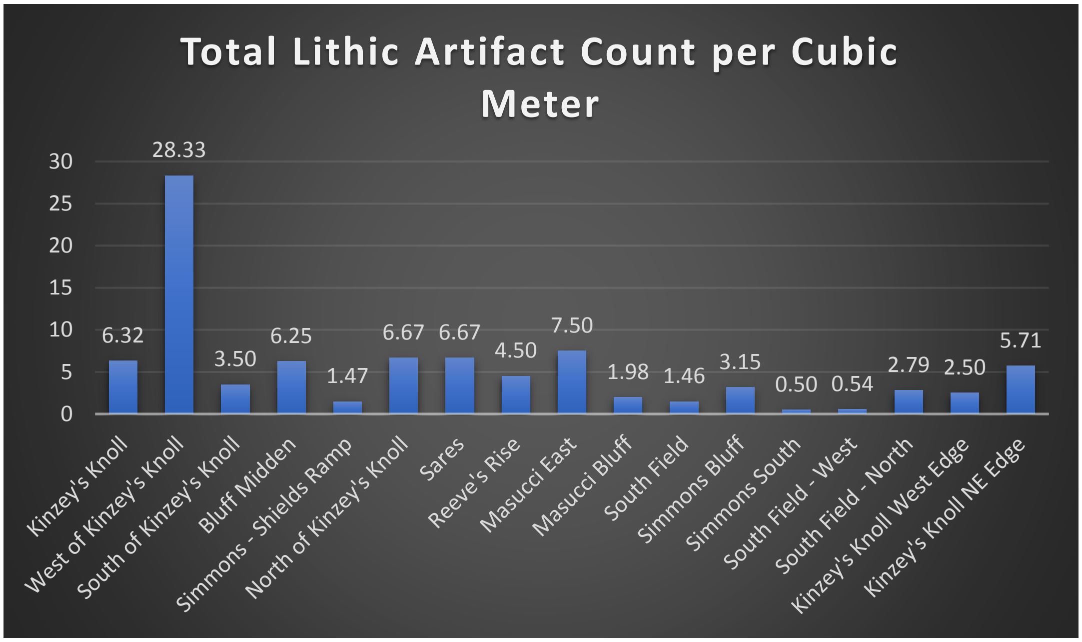

Figure 26: Mill Cove Complex lithic artifact count per cubic meter excavated

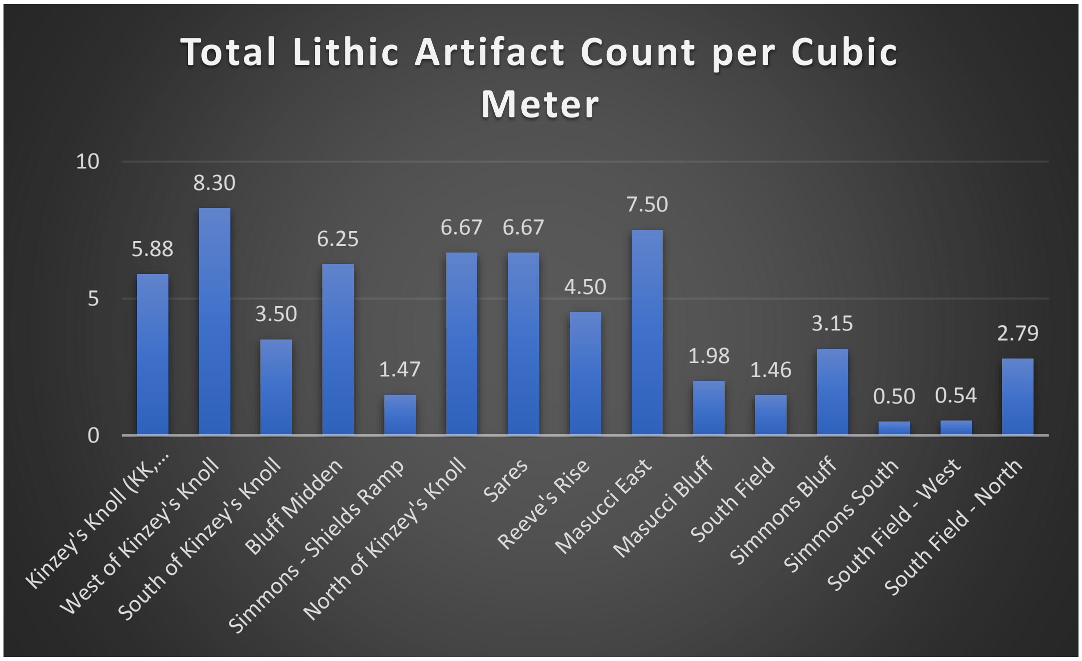

Figure 27" Mill Cove Complex lithic artifact count per cubic meter excavated with Kinzey's Knoll, Kinzey's Knoll NE Edge, and Kinzey's Knoll West Edge combined

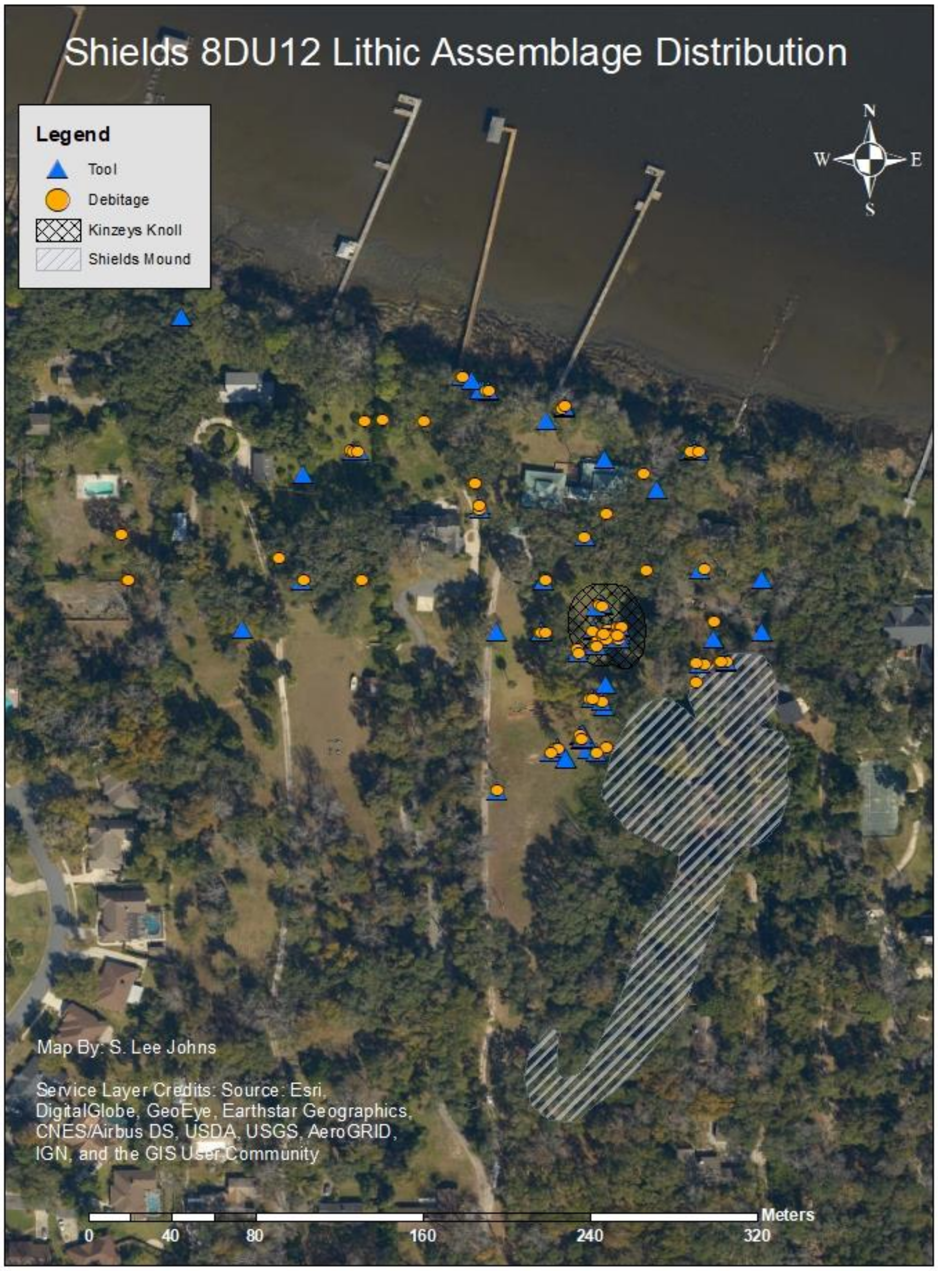

Figure 28:Shields 8DU12 lithic assemblage distribution map

Bifaces

While the typology focuses upon descriptive macroscopic categories of tools, it is understood that regional typing is important to many researchers concerned with lithic technology. I avoid these types purposefully, as some are tied to implications of tool use, and that is not within the scope of this work. Nevertheless, I will informally mention regional types here briefly for the sole purpose of facilitating discussion about social practice at the Mill Cove Complex. The types listed are derived from morphological descriptions provided by Bullen (1975) and Boszhardt (2003).

Fifty-eight bifaces were recovered across the entirety of the Mill Cove Complex, representing 11 percent of the total lithic artifact assemblage and 23 percent of the total lithic tool assemblage 72 percent of the biface assemblage were hafted bifaces (n=42), with the majority of those being Pinellas points (n=27), a regional version of the common small triangular points found across the contemporaneous Southeast (Table 2; Figure 29) Two of the hafted bifaces are Mississippian period triangular points known as Cahokia, non-local triangular point derivatives originating in the American Bottom. The assemblage is not composed of only Mississippian period projectile points though, three of the points originate from the early Archaic (B.C. 500) through the Woodland period directly preceding the Mississippian, one Santa Fe, Hernando, and Hardee types. Hafted bifaces were distributed widely across the Shields site, with 50 percent of them (n=21) being concentrated in the Kinsey's Knoll site area. All of the pre-Mississippian period points (n=3) were recovered from the general Kinzey's Knoll area, with the Santa Fe and the Hernando coming directly from Kinzey's Knoll and the Hardee point coming

from the South of Kinzey's Knoll site area. Both Cahokia points were recovered from Kinzey's Knoll as well (Figure 30; Figure 33).

Table 2: Mill Cove Complex biface counts

Type	Count
Hafted Biface	42
UID Biface	11
Unhafted Biface	5
MCC Total	58

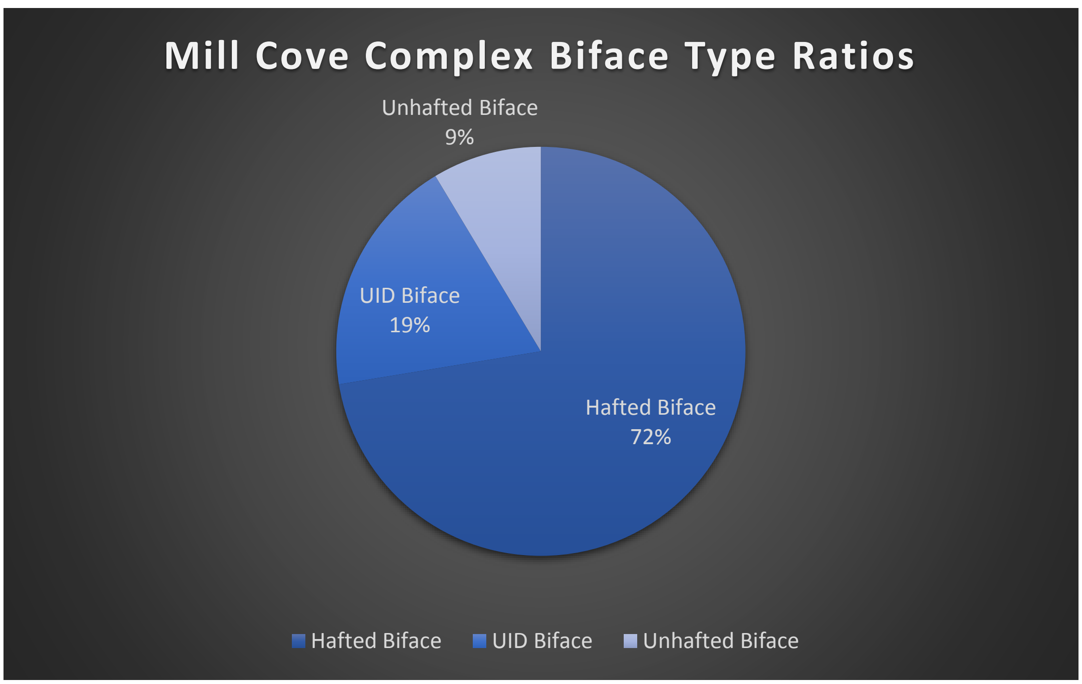

Figure 29: Mill Cove Complex biface type ratios

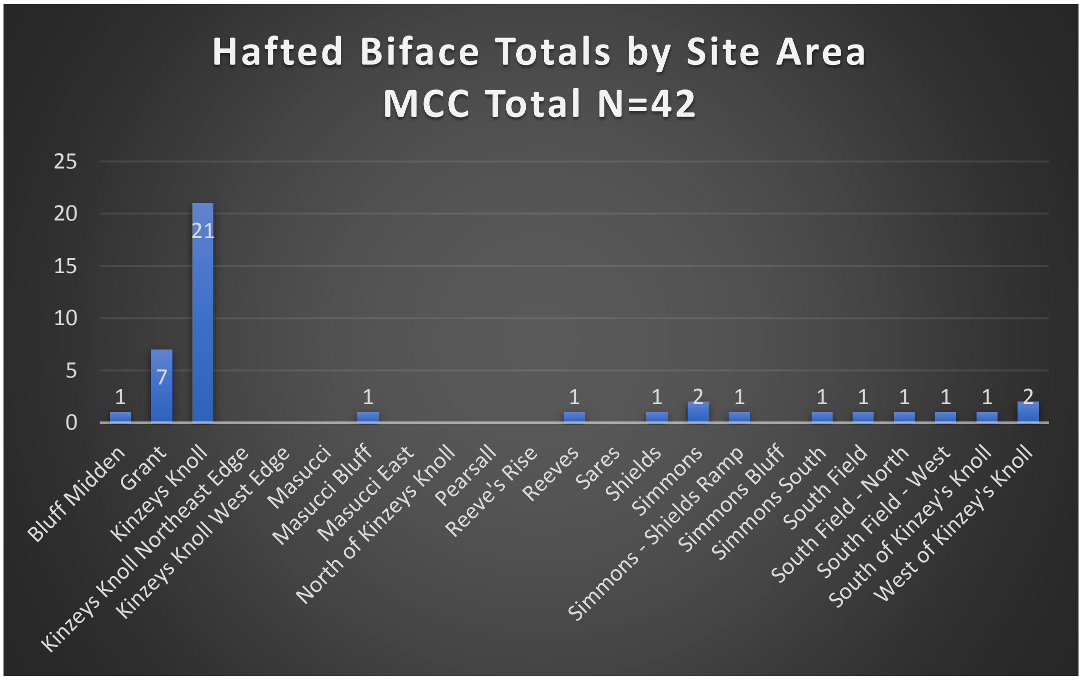

Figure 30:Mill Cove Complex hafted biface totals by site area

Five unhafted bifaces were recovered from the Mill Cove Complex, with all of them coming from the Shields site. Eighty percent (N=4) originated in the Kinzey's Knoll site area, with the only other instance occurring in the Reeves site area (Figure 31).

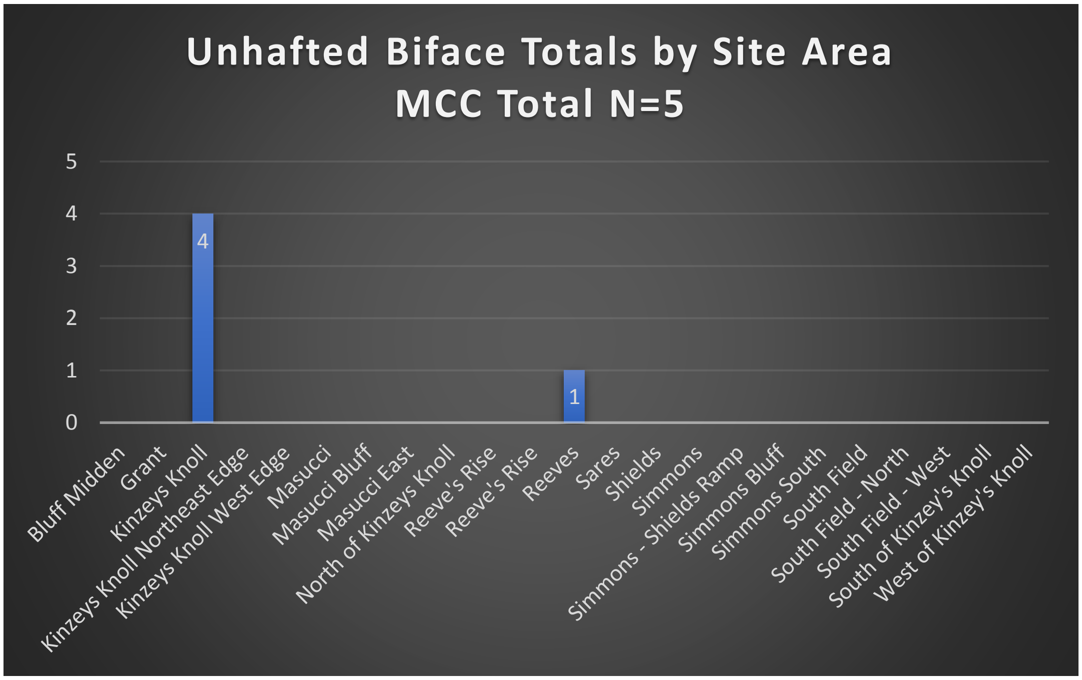

Figure 31: Mill Cove Complex unhafted biface totals by site area

Eleven bifaces examined exhibited an amount of damage that made them unidentifiable regarding their status as hafted or unhafted. These occurred across 8 of the 23 site areas from the Mill Cove Complex, including the Grant site (Figure 32).

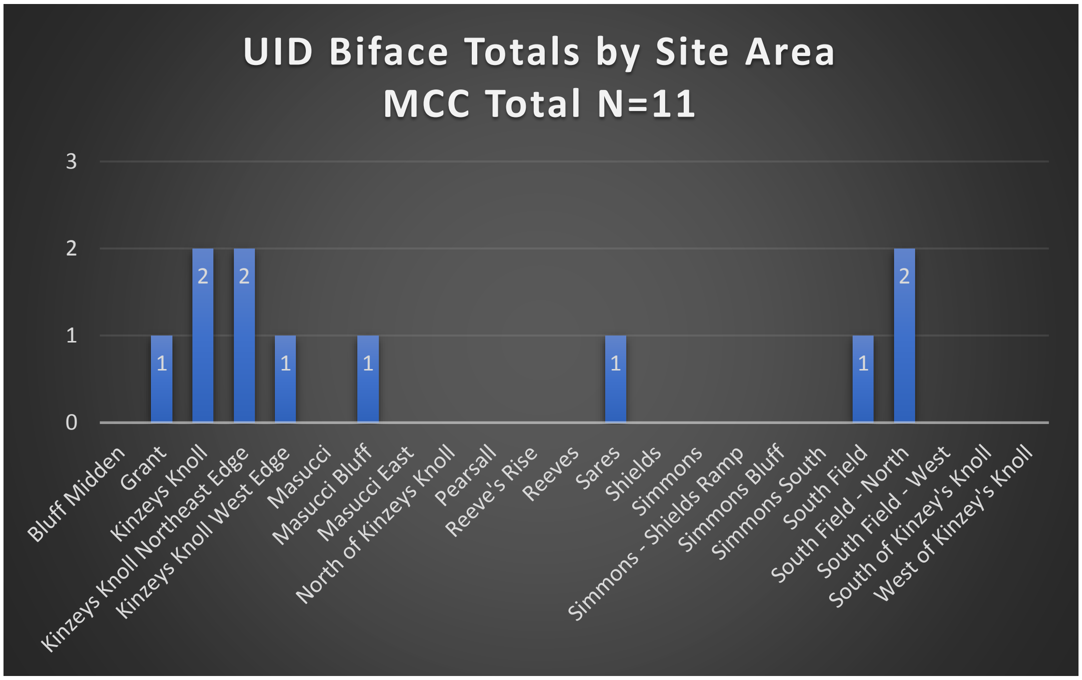

Figure 32: Mill Cove Complex UID biface totals by site area

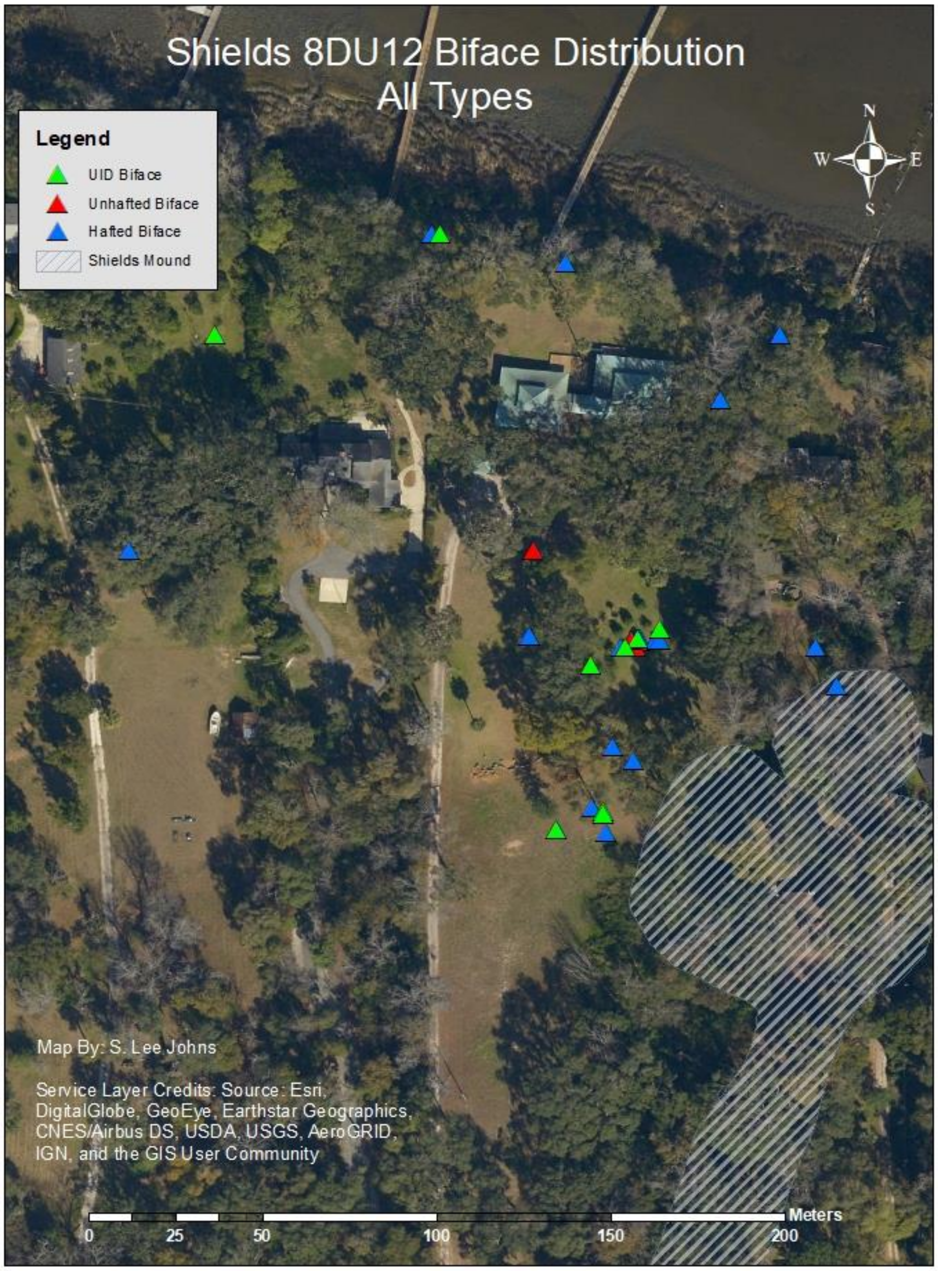

Figure 33: Shields 8DU12 biface distribution map (all types)

Nonbiface Tools

Nonbiface tools include unimarginal, bimarginal, and combination flake tools, multidirectional and unidirectional core tools, ground stone, and "other" human modified lithic implements. This section will proceed in the above listed order, covering each nonbiface type findings in detail.

Seventy-nine nonbiface flake tools, representing 15 percent of the total lithic artifact assemblage and 32 percent of the total tool assemblage, were recovered from the Mill Cove Complex, with only four of those tools originating from the Grant site (Table 3). Seventy-eight percent of the nonbiface flake tool assemblage are unimarginal tools (n=62) (Figure 34). Unimarginal tools are widely spread, being encountered in 15 of the 23 site areas. The greatest frequency of unimarginal tools originates in the Kinzey's Knoll site area (n=19) with 31 percent being recovered from that location. The West of Kinzey's Knoll site area also had a relatively high frequency of unimarginal tools (n=14) with 23 percent of the unimarginal assemblage originating in that area (Figure 35). Bimarginal and combination tools are relatively rare and are also most frequently found in the Kinzey's Knoll site area (Figure 36; Figure 37). The general trend of flake tool frequency at Kinzey's Knoll heavily contrasts against the wide-spread, low frequency nature of flake tools from other site areas (Figure 38).

Table 3: Mill Cove Complex nonbiface tool counts

Type	Count
Unimarginal Tool	62
Bimarginal Tool	11
Combination Tool	6
MCC Total	79

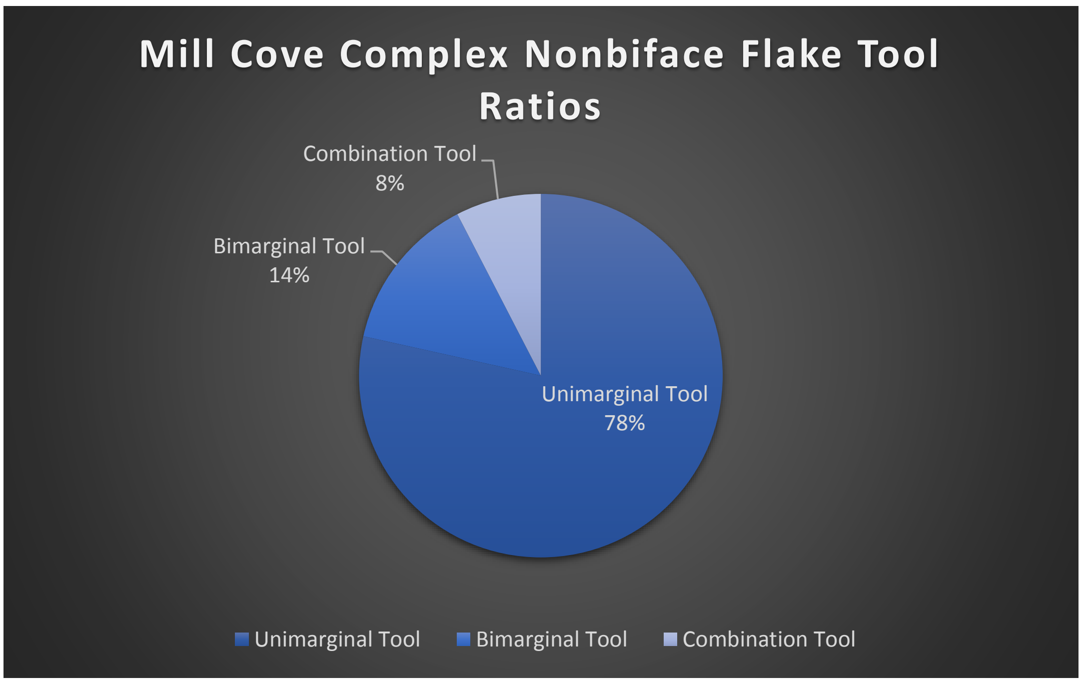

Figure 34:Mill Cove Complex nonbiface flake tool ratios

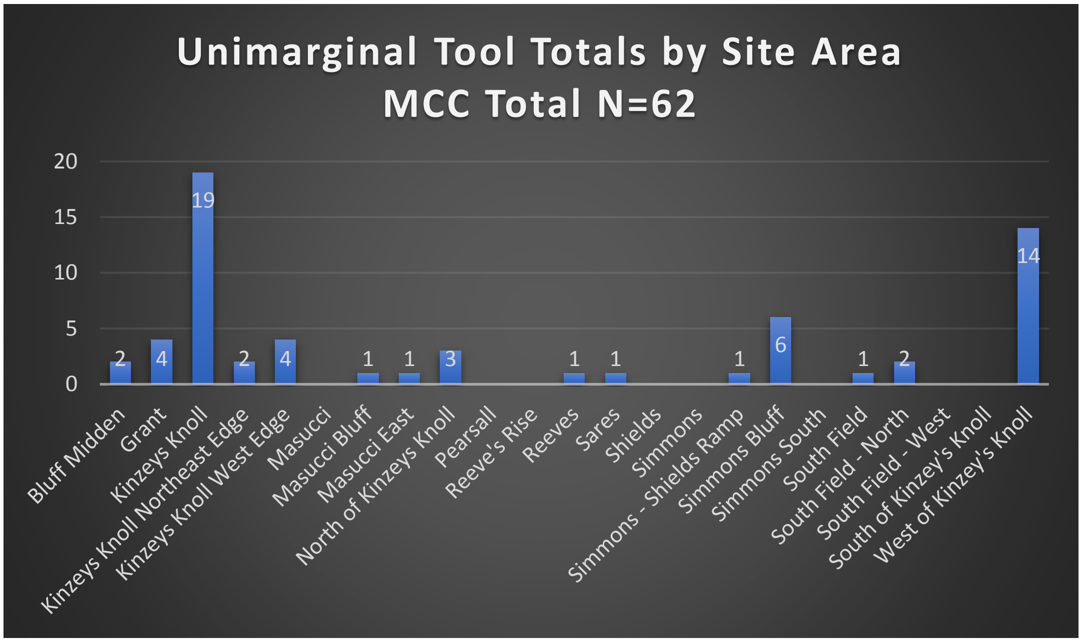

Figure 35:Mill Cove Complex unimarginal tool totals by site area

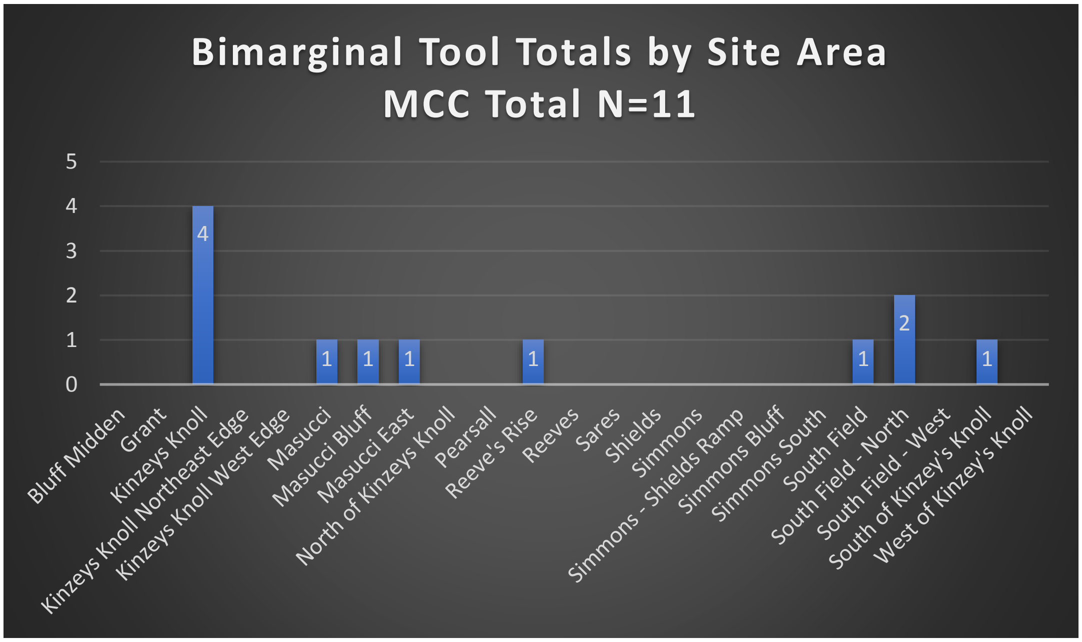

Figure 36:Mill Cove Complex bimarginal tool totals by site area

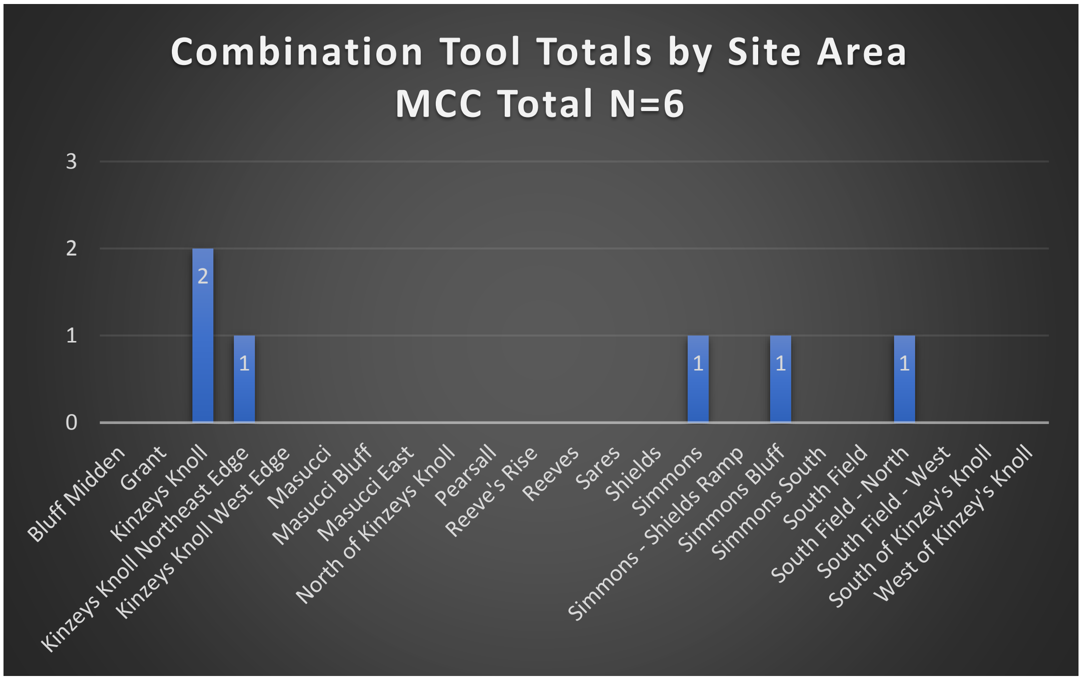

Figure 37:Mill Cove Complex combination tool totals by site area

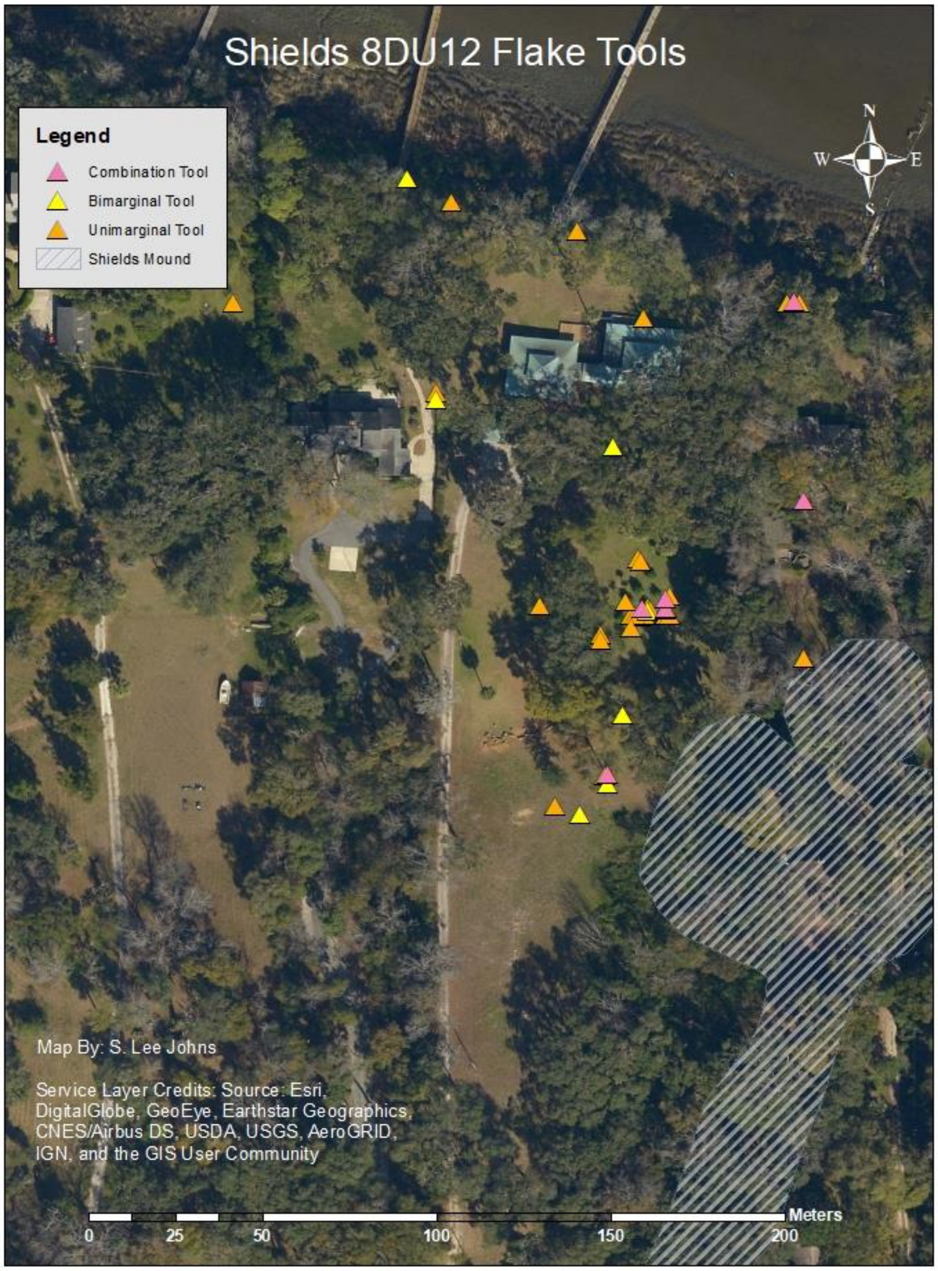

Figure 38:Shields 8DU12 flake tools map

Nonbiface Core Tools

The Mill Cove Complex core tool assemblage does not currently contain any unidirectional core tools. Eighteen multidirectional core tools were recovered, representing 4 percent of the total lithic artifact assemblage and 7 percent of the total lithic tool assemblage (Figure 39). Only one multidirectional core tool originates from the Grant site, with the 17 others coming from Shields. Kinzey's Knoll had the greatest frequency, with 44 percent (n=8) being found at that location (Figure 39; Figure 40).

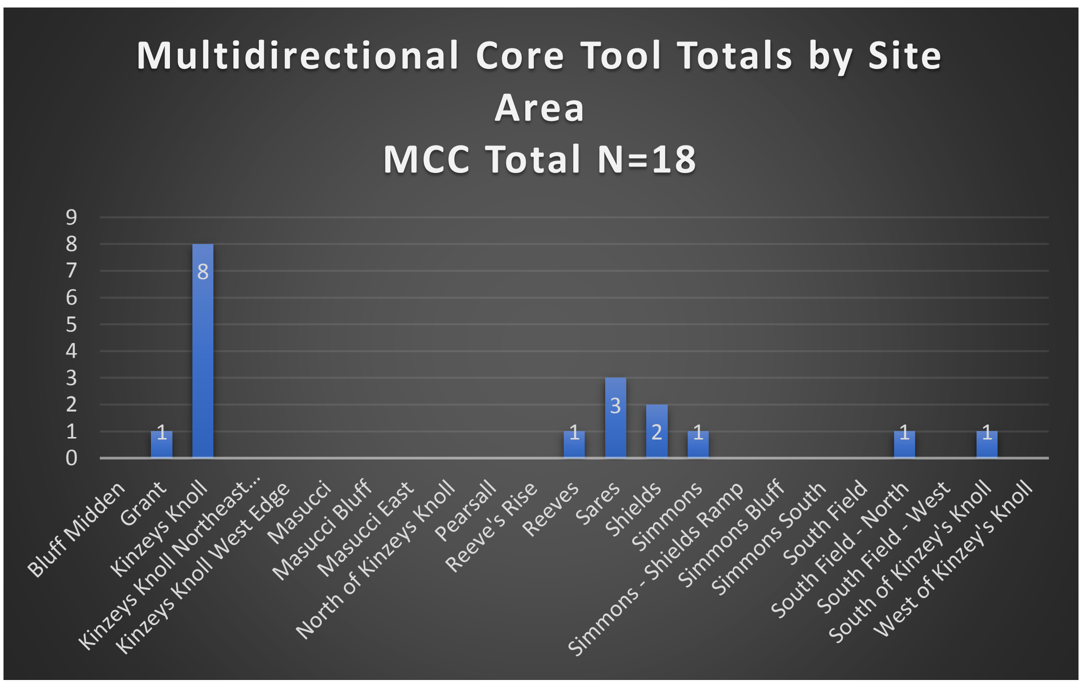

Figure 39:Mill Cove Complex multidirectional core tool totals by site area

Figure 40:Shields 8DU12 core tools map

Nonbiface Ground Stone Tools

The ground stone assemblage from the Mill Cove Complex is comprised of 86 specimens made from three identified material types; sandstone, basalt, and quartz/quartzite (Table 4). The ground stone tool sample constitutes 16 percent of the total lithic artifact assemblage and 34 percent of the total tool assemblage and is the most prevalent tool type present at the Mill Cove Complex (Figure 22). All ground stone artifacts were recovered from the Shields site. Many of the artifacts recovered are small, fragmented and worked pieces. The quantity of broken artifacts potentially provides an artificial inflation to artifact count and should be taken into consideration when comparing tool ratios.

Seventy-nine percent (n=68) of the ground stone assemblage are made of sandstone. Fifty-six percent (n=38) of these were recovered from the Kinzey's Knoll site area. These sandstone artifacts are widely distributed across the Shields site, being found at 13 of the site areas (Figure 41; Figure 42; Figure 45).

Fourteen percent of the ground stone assemblage are made from basalt. Artifact distribution is narrow when compared to sandstone, encompassing only seven site areas. 42 percent (n=5) of basalt ground stone artifacts come from the Kinzey's Knoll site area (Figure 41; Figure 43; Figure 45).

Quartz/quartzite ground stone tools comprise 4 percent (n=3) of the ground stone tool assemblage. Two of these originate in Kinzey's Knoll, with the final artifact also occurring close to the Shields Mound in the Simmons – Shields Ramp site area (Figure 41; Figure 44; Figure 45).

Table 4: Mill Cove Complex ground stone material type counts

Ground Stone Material Type	Count
Basalt	12
Quartz/Quartzite	3
Sandstone	68
UID	3
MCC Total	86

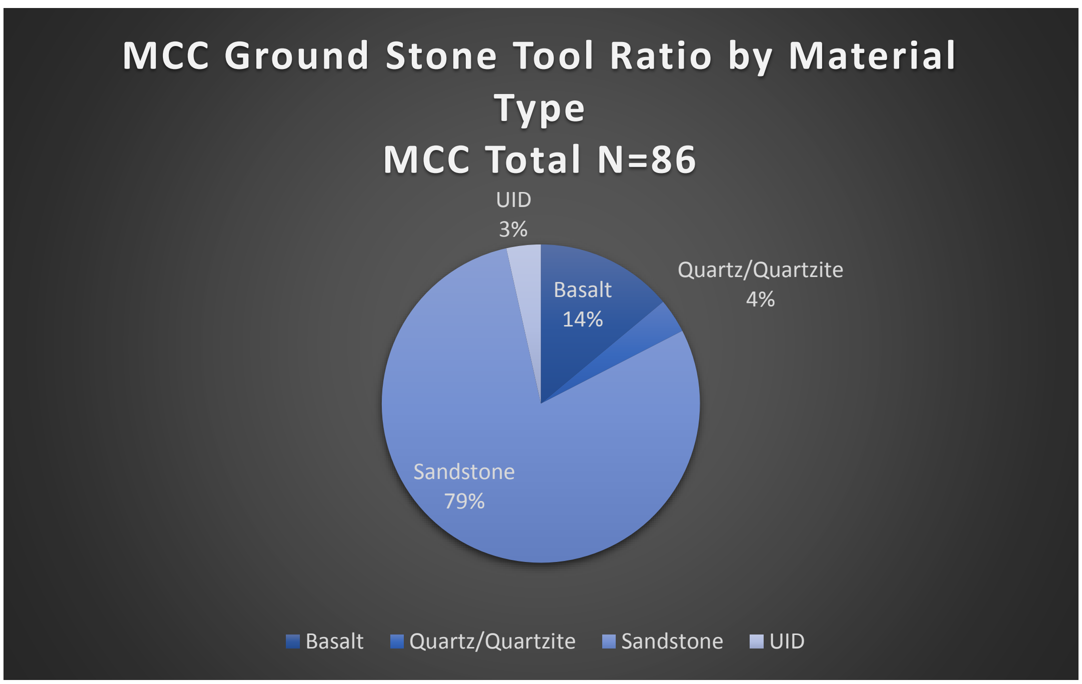

Figure 41:Mill Cove Complex ground stone tool ratios by material type

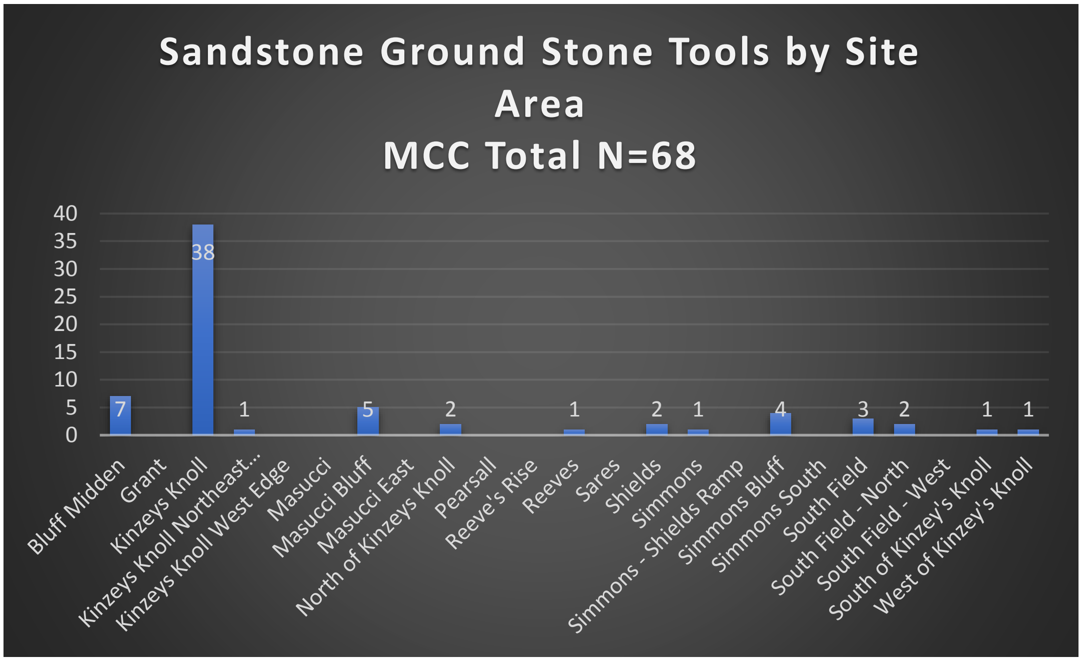

Figure 42:Mill Cove Complex sandstone ground stone tools by site area

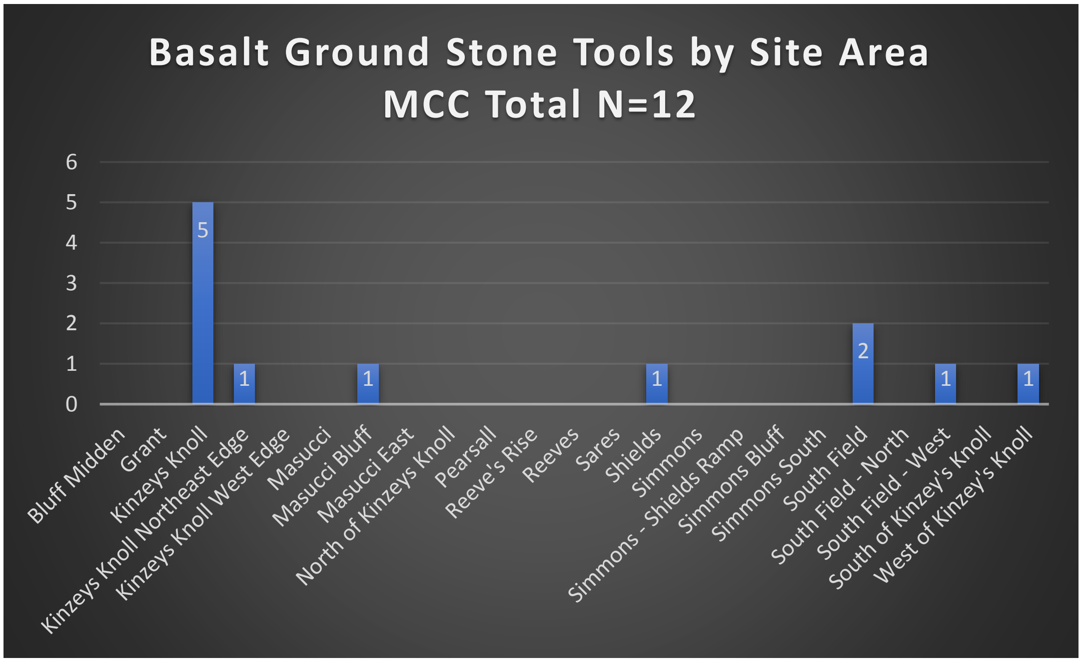

Figure 43:Mill Cove Complex basalt ground stone tools by site area

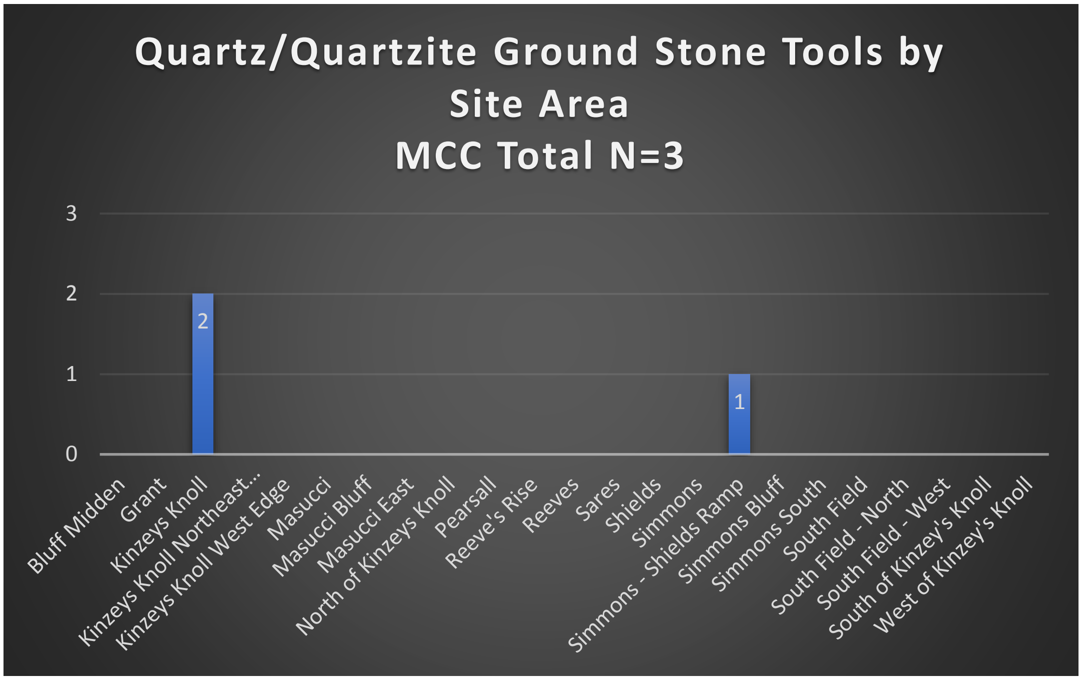

Figure 44:Mill Cove Complex quartz/quartzite ground stone tools by site area

Figure 45:Shields 8DU12 ground stone tools map

Other Tool

Other tools is a category comprised of all objective artifacts not exhibiting the metrics that might place them into another tool type category. This includes utilized tools and lithic material which are most likely to have some form of cultural significance. Other tools comprise 2 percent of the total Mill Cove Complex lithic artifact assemblage and 4 percent of the total lithic tool assemblage (n=9) (Table 5). Tool distribution seems to be arbitrarily spread across the Shields site, occurring in five of the site areas. No other tools were recovered from the Grant site (Figure 46).

Seventy-eight percent of the other tool assemblage are utilized tools (n=7). These include utilized flakes and shatter (Table 5; Figure 47). 12 percent (n=2) of the other tool assemblage are lithic specimen considered to be culturally significant based upon the material itself. This includes one piece of coal, and one piece of galena (Table 5; Figure 48).

Table 5: Mill Cove Complex other tool counts

Type	**Count**
Other Tool	2
Other Utilized Tool	7
MCC Total	9

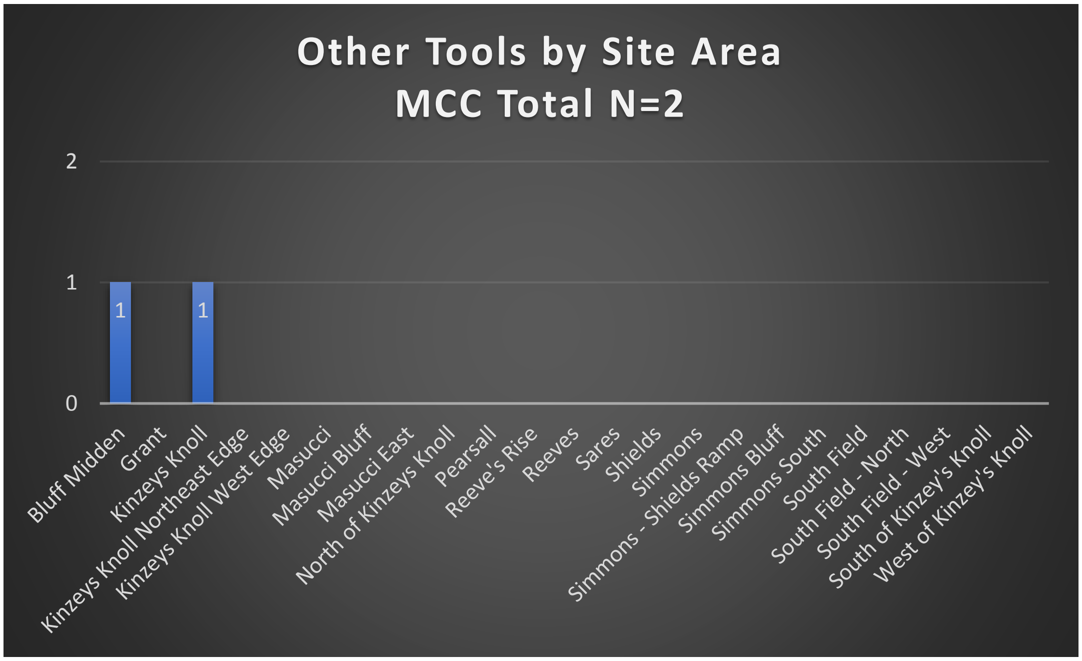

Figure 46:Mill Cove Complex other tools by site area

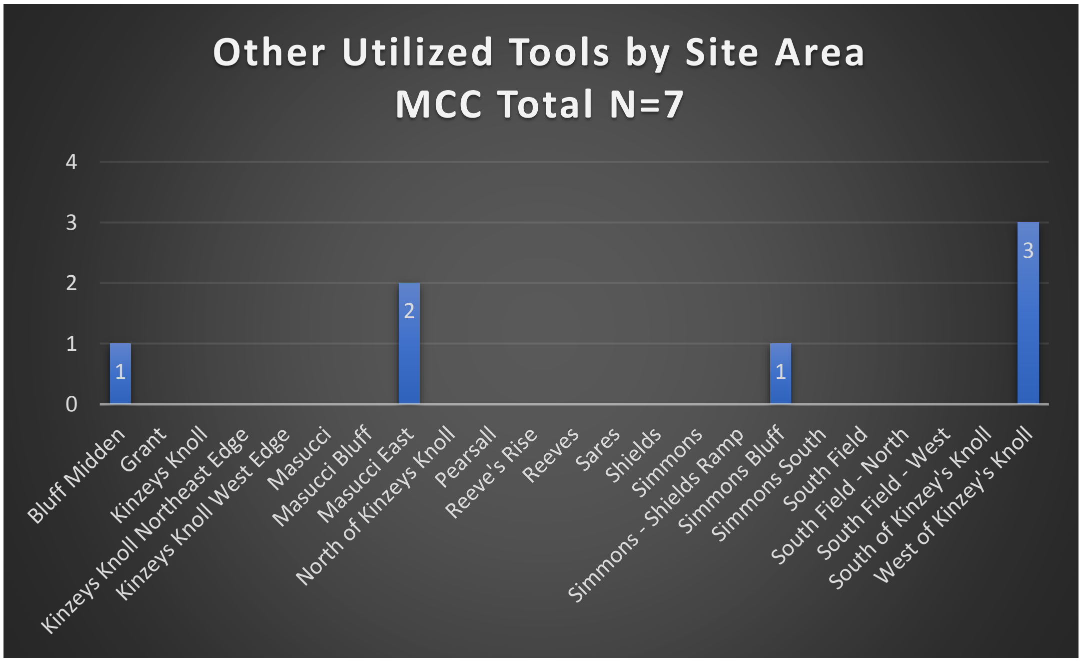

Figure 47:Mill Cove Complex other utilized tools by site area

Figure 48:Shields 8DU12 other tools

Debitage

Debitage types are composed of flake debitage and shatter. Flake debitage is further delineated into proximal flakes and flake shatter. Flake shatter differs from non-flake shatter in that non-flake shatter does not exhibit flake characteristics (Figure 49).

Flake debitage constitutes 14 percent of the total Mill Cove Complex lithic assemblage (n=75) and 27 percent of the lithic debitage assemblage (Table 6). Seventy-eight percent of the flake debitage are proximal flakes (n=59) with the other 12 percent being flake shatter (n=16) (Table 6). Flake debitage is widespread and present at both the Shields and Grant sites. 13 flake debitage artifacts were recovered at Kinzey's Knoll, representing only 17 percent of the total flake debitage assemblage. No one site area exhibited a drastic difference in artifact count relative to other site areas containing flake debitage (Figure 50; Figure 51; Figure 53).

Non-flake shatter is 39 percent of the total Mill Cove Complex lithic assemblage and constitutes the majority of the lithic debitage assemblage at 73 percent (n=204) (Table 6; Figure 47). Shatter is the most widely spread artifact at the Mill Cove Complex, occurring at all but two site areas, Simmons South and South Field – West. The largest amount of shatter was recovered from Kinzey's knoll, with 24 percent (n=49) being recovered from that location (Figure 52; Figure 53).

Table 6: Mill Cove Complex debitage counts

Type	Count
Proximal Flake	59
Flake Shatter	16
Shatter	204
MCC Totals	279

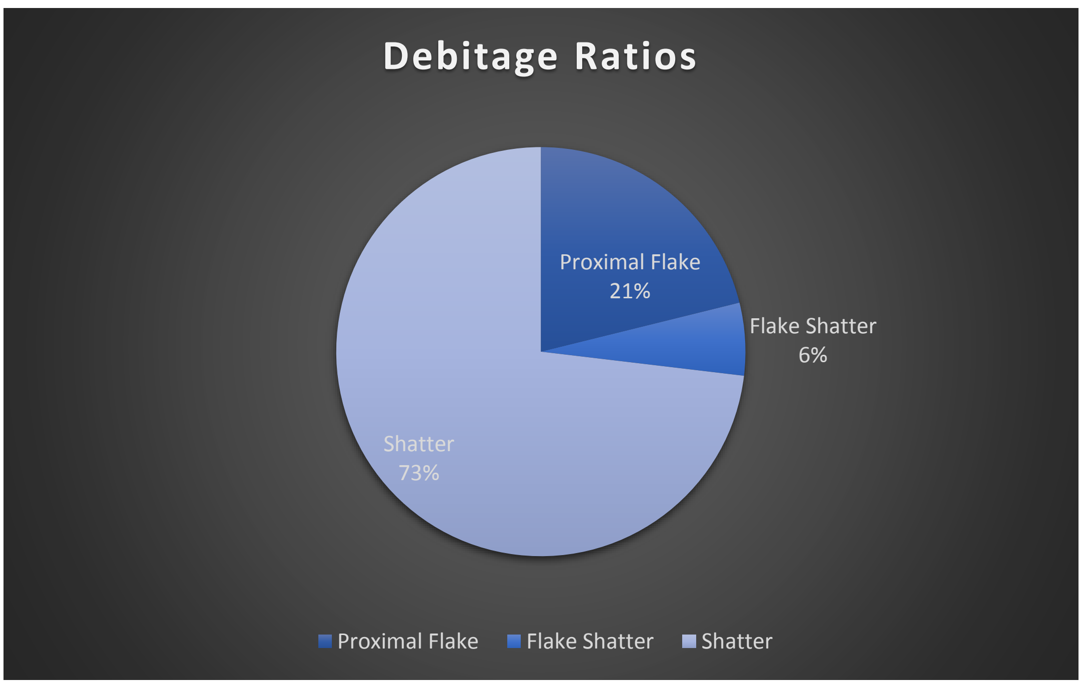

Figure 49:Mill Cove Complex debitage ratios

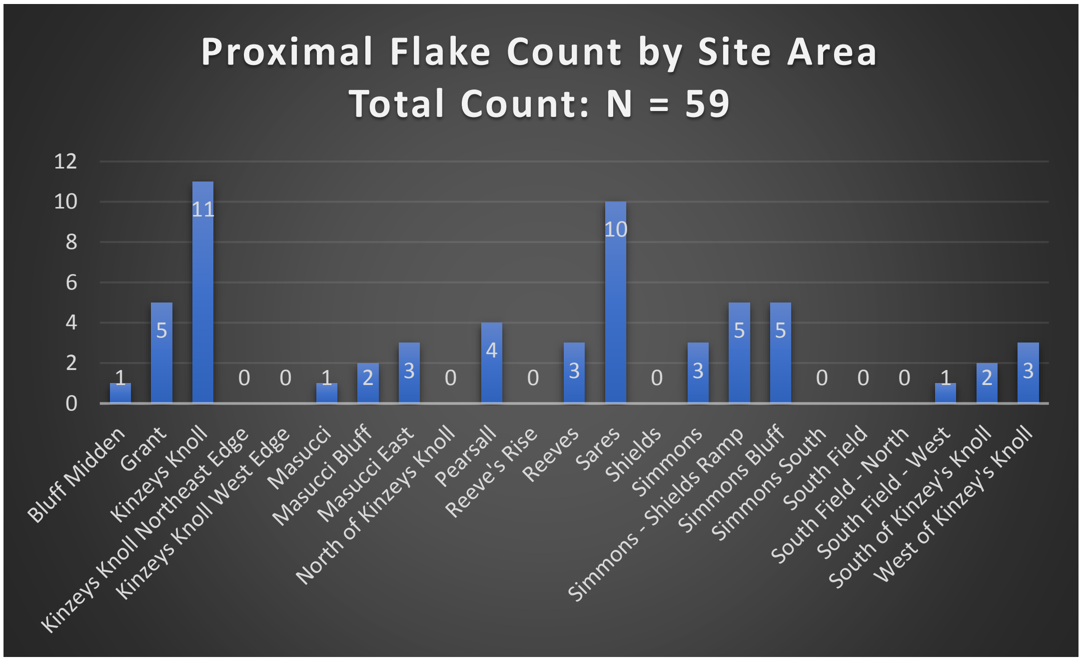

Figure 50:Mill Cove Complex proximal flake count by site area

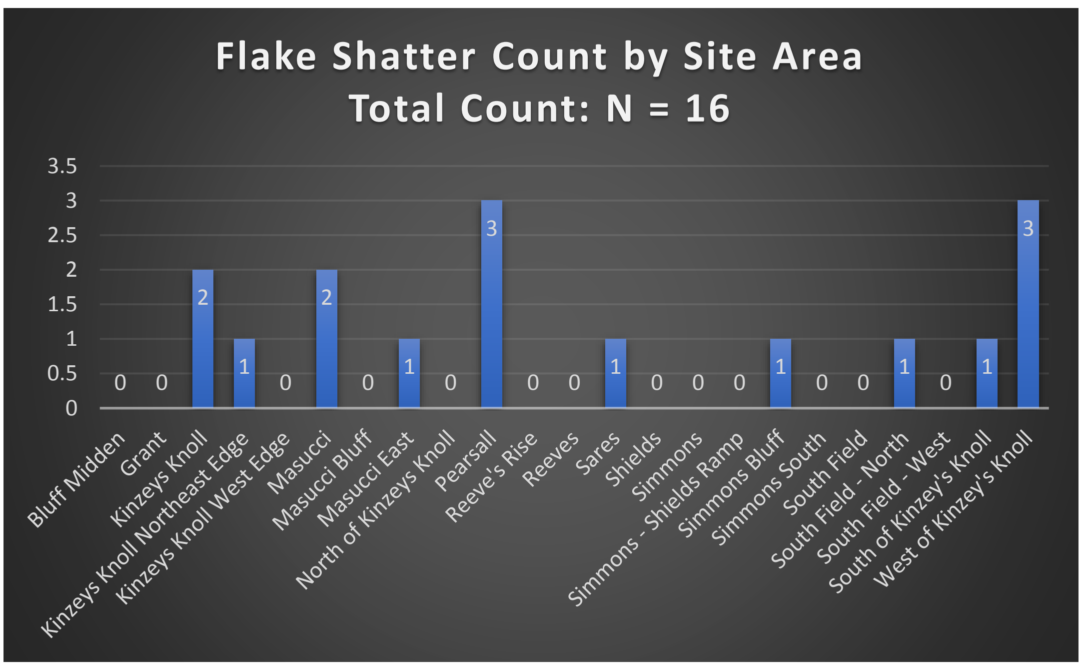

Figure 51:Mill Cove Complex flake shatter count by site area

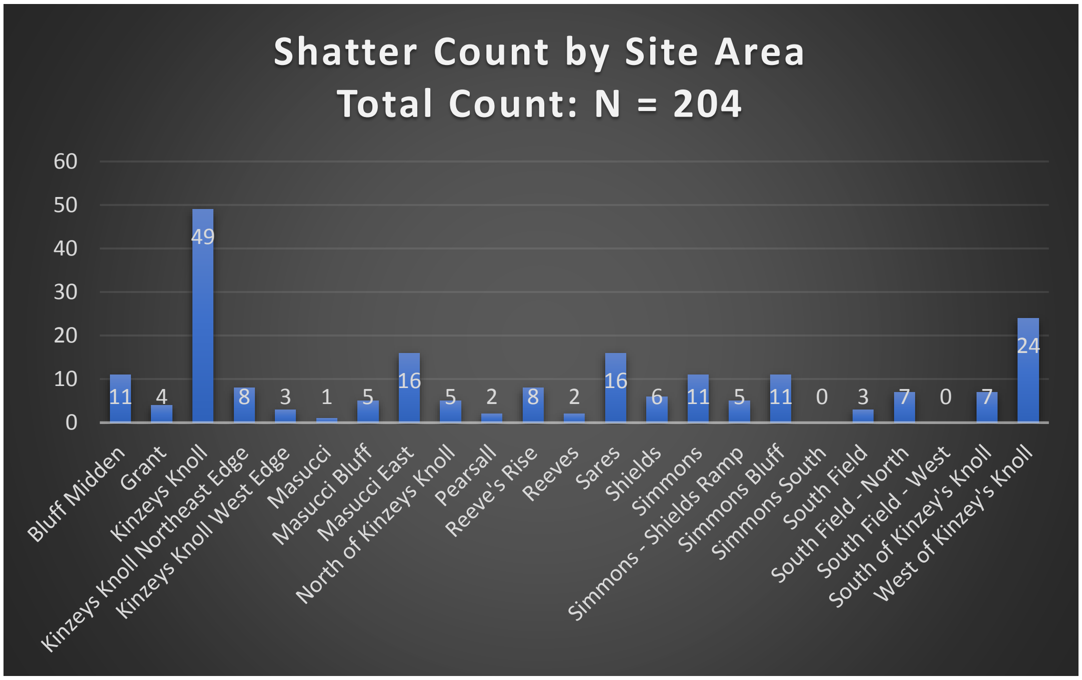

Figure 52:Mill Cove Complex shatter count by site area

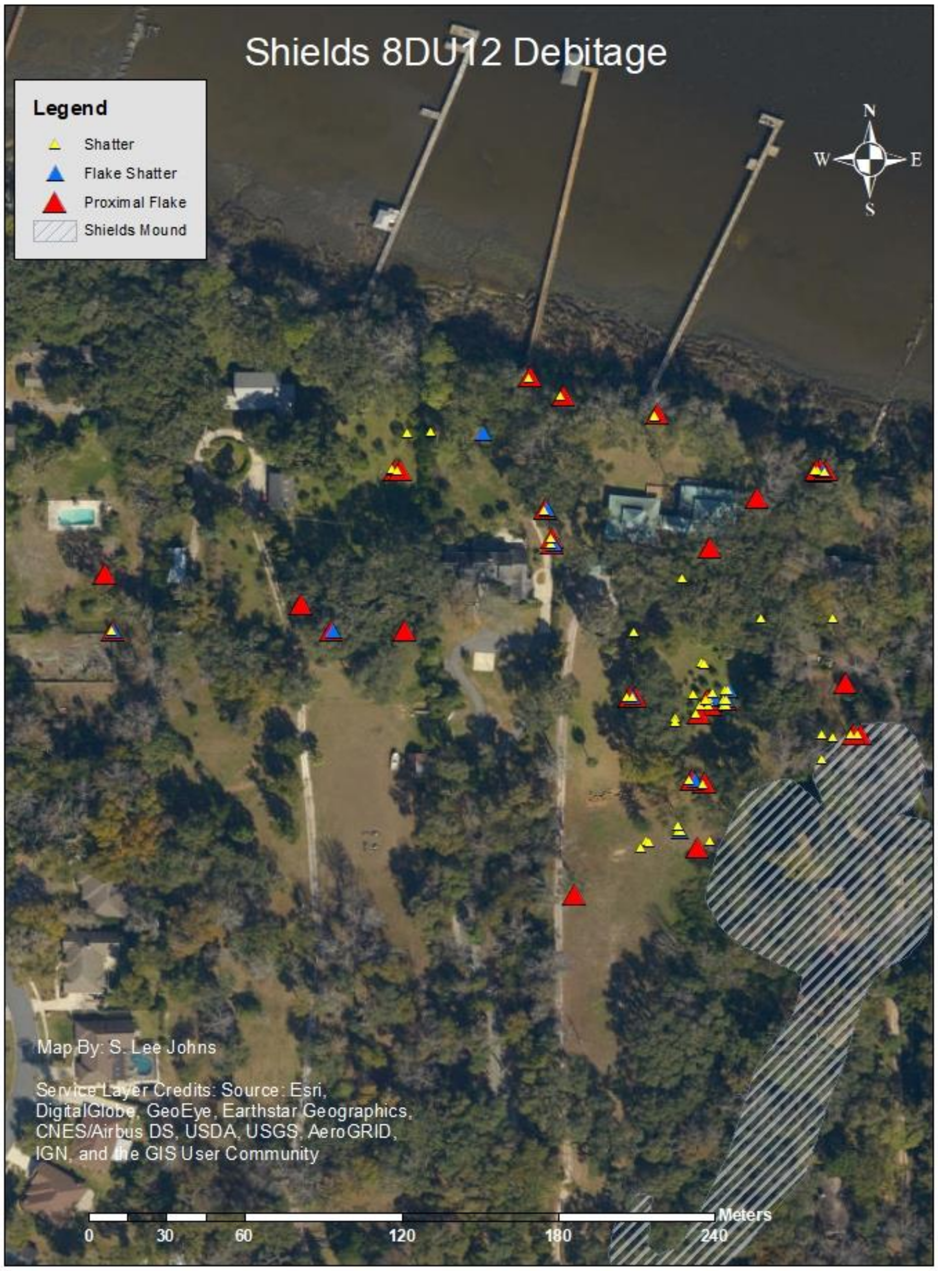

Figure 53:Shields 8DU12 debitage map

Typology Summary

Traditional typologies utilized by researchers across a wide spectrum of geographic regions are typically composed of a combination of functional, contextual, and morphological characteristics (Andrefsky 2005:84). The typology I present here is broad in scope and is intended to sort the Mill Cove Complex lithic assemblage into broad categories with enough generality to be comparative in manner to regional typologies existing outside of northeastern Florida. An undertaking of this kind has never before been attempted in the region, and it standardizes the assemblage, providing a crucial starting point for future research. This typology provides the foundation for those interested in pursuing in-depth lithic questions related to both the region and the role of its people within the greater contemporaneous landscape.

The results of the typology also highlight the importance of lithic production and use to the St. Johns II people despite their geologically poor geographic position. It makes evident the act of production and use of lithic tools within the context of ritual feasting and mortuary preparation and provides insight into the methods of procurement of stone material. It reveals a dichotomy of practice, both pragmatic and wasteful, and brings to life the realities of existence in prehistoric Florida.

CHAPTER 3: GEOCHEMICAL ANALYSIS

Geochemical Methodology

Geochemical analysis, in contrast to the typology, acts in a focused way for this research. It is intended to provide evidence for the existence of a direct relationship between Cahokia and the people of northeastern Florida through the examination of two suspected Cahokia points, which would have originated in the American Bottom. I made all efforts in this analysis to create a replicable test while minimizing subjectivity. In addition to this main task, I sought to establish guidelines for the best power profile to be used on the Bruker III-SD, for the analysis of chert. Determination of these profiles would give future chert researchers a starting point for geochemical analysis.

The following methods and findings illustrate the process by which I attempted to accomplish the aforementioned tasks, but as is often the case in scientific research, yield little in terms of useful results due to the issues involved with attempting geochemical analysis of a heterogenous material like chert. Despite the limited nature of this testing, I present the process here in good faith, to serve as a cautionary tale to others and possibly provide useful information in the future determination of a better approach to chemically analyzing chert. As it currently stands, visual examination of morphology and material inclusions like quartz pockets and fossils found in chert serves as the best indicator for chert identification and regional typing of chert projectile points.

The goal of geochemical testing was to utilize X-Ray fluorescence spectrometry (XRF) to objectively determine if the two Cahokia points recovered from Kinzey's Knoll at the Mill Cove Complex exhibit a different elemental make-up in comparison to regionally common projectile points. Additionally, I sought to determine the proper voltage, anode current, assay time, and filter combination that would yield the best discriminating results for trace elements in the Cahokia and Pinellas points. Determining a discriminating profile would represent the beginning steps in utilizing X-ray fluorescence analysis to objectively identify source locations for the points recovered and assist in determining if the Cahokia points are exotic, non-local material or copies of exotic points crafted from local source material. While the identification of a useful power profile was a success, I argue that Handheld XRF testing of chert showed to be too problematic, based upon the limitations of the approach, for objective determination of difference in chert provenance.

XRF provides a non-destructive way to examine the elemental composition of material by exciting electrons with high-energy electromagnetic waves from a controlled X-ray tube. When the energy strikes an atom, an electron will dislodge from its orbital shell, making the atom unstable. It must fill the void to regain stability by replacing the electron with another from a higher energy orbit. When the electron reduces energy to fill the void in the lower energy orbit it fluoresces, creating a readable emission. This energy loss measurement is unique to each element and will therefore provide a list of the elemental composition present within each artifact. Elemental composition can subsequently be used for in-group material comparison or to determine geological areas of material origin (Guthrie 2012; Shackley 2012).

Equipment

I utilized the Bruker III-SD portable X-Ray spectrometer (Handheld XRF) for elemental composition analysis. USGS Columbia River Basalt BCR-2 (0408) served as the reference standard. The software ARTAX provided element net photon counts derived from Region of Interest (ROI) analysis. I used IBM Statistical Package for the Social Sciences (SPSS) for means testing of the net photon counts.

Power Profiles

Determining the proper power settings started with an examination of the 24 total points utilizing 3 different power profiles. I emulated the approach of Mehta, who chose to examine material from major chert quarries in the American Bottom across 3 power settings (Mehta et al. 2017). The first profile (Table 7) utilized 15kV, 25μA, 200 pulse length, 200 second assay time, and no filter. I used the low voltage, high current setting with long assay time as a general approach to indicate elemental composition without excluding anything due to the use of a filter. It became evident the main elements of concern were mostly low atomic weight transition metals (Table 7). I utilized this information in the determination of the other 2 power setting to be used.

Table 7: 15kV, 25µA, 200 pulse length, 200 second assay time, no filter

Element	Cahokia N	Cahokia NPC Mean	Cahokia SD	Pinellas N	Pinellas NPC Mean	Pinellas NPC SD	Total Range	P Value	A Level
Silicone (Si)	2	59924.50	1034.50	22	52979.30	1672.65	30168	.233	.05
Calcium (Ca)	2	39001.00	24846.32	22	45034.14	38129.79	160779	.957	.05
Titanium (Ti)	2	2275.50	279.31	22	3369.36	1571.91	6368	.181	.05
Manganese (Mn)	2	4427.50	642.76	22	7320.95	7378.32	35472	.181	.05
Iron (Fe)	2	31157.50	3766.76	22	81300.45	76515.23	282102	.043	.05*
Nickel (Ni)	2	12718.50	710.64	22	12741.91	435.02	1768	.945	.05
Copper (Cu)	2	4239.50	94.05	22	4184.82	365.19	1595	.235	.05
Zinc (Zn)	2	1957.50	266.58	22	2188.45	751.88	3727	.797	.05

Scott Speakman (n.d.) provided the suggested parameters for testing of the metals prevalent in my initial testing. I utilized these for my second profile (Table 8). They were 40kv, at 10µA with no filter. I used a pulse length of 200 and a 200 second assay time to mimic the parameters of the first power profile. This approach added Vanadium (V) to the list of measurable transition metals but Nickel (Ni) dropped off and no longer had measurable peaks (Table 8).

Table 8: 40kV, 10µA, 200 Pulse Length, 200 Seconds, Yellow Filter

Element	Cahokia N	Cahokia NPC Mean	Cahokia SD	Pinellas N	Pinellas NPC Mean	Pinellas NPC SD	Total Range	P Value	A Level
Silicone (Si)	2	685.50	55.86	22	696.95	94.30	427	.869	.05
Calcium (Ca)	2	1603.00	762.26	22	1738.77	828.60	2805	.826	.05
Titanium (Ti)	2	1181.00	41.01	22	1253.68	119.04	415	.408	.05
Manganese (Mn)	2	222.50	20.51	22	426.09	745.01	3608	.877	.05
Iron (Fe)	2	3311.00	272.94	22	15050.64	19085.17	64517	.014	.05*
Vanadium (V)	2	105.50	6.36	22	135.14	30.22	114	.188	.05
Copper (Cu)	2	2763.00	14.14	22	2672.32	97.49	383	.211	.05
Zinc (Zn)	2	1513.50	17.68	22	1416.09	178.21	925	.065	.05

I utilized lower voltage and higher current for the last profile. (Table 9). This approach used a voltage setting of 25kV, 15µA, 200 pulse length, and a shorter 90 second assay time with the yellow filter. Again, Nickel (Ni) was not present while Vanadium (V) exhibited measurable peaks (Table 9).

Table 9: 25kV, 15µA, 200 Pulse Length, 90 Seconds, Yellow Filter

Element	Cahokia N	Cahokia NPC Mean	Cahokia SD	Pinellas N	Pinellas NPC Mean	Pinellas NPC SD	Total Range	P Value	A Level
Silicone (Si)	2	253.50	62.93	22	254.68	39.98	177	1.00	.05
Calcium (Ca)	2	525.00	203.65	22	609.68	438.19	2067	1.00	.05
Titanium (Ti)	2	216.00	4.24	22	248.18	53.54	220	.304	.05
Manganese (Mn)	2	41.50	16.26	22	147.68	218.14	1048	.043	.05*
Iron (Fe)	2	893.00	171.12	22	3681.45	4529.86	16873	.043	.05*
Vanadium (V)	2	39.50	0.71	22	48.82	19.19	74	.508	.05
Copper (Cu)	2	656.00	11.31	22	649.95	26.83	108	.759	.05
Zinc (Zn)	2	472.00	39.60	22	443.05	64.16	295	.304	.05

Data Collection

I conducted handheld XRF testing with these three power profiles using the Bruker III-SD portable X-Ray fluorescence spectrometer. I prepared all artifacts for testing by cleaning the testing surface with 91% isopropyl alcohol. Quantities of elements were saved as PDZ files for use in the ARTAX analysis software. I conducted a Region of Interest (ROI) analysis in ARTAX to get the net photon counts of each element within each projectile point. I subsequently transferred all raw data into Microsoft Excel in preparation for hypothesis testing.

Hypothesis Testing

Hypothesis testing began by inputting the raw data (net photon counts) into IBM Statistical Package for the Social Sciences (SPSS) for means comparison testing. I tested each of the eight elements in both the Cahokia and Pinellas points for each power profile. I utilized an alpha level of .05 for all testing.

Before proper means testing can occur, one must determine if the sample is normally distributed. When a sample is non-normally distributed, the mean is not a good representation of central tendency, requiring the use of non-parametric testing methods. I conducted a Shapiro-Wilk test to objectively determine normality. For normally distributed data, I conducted a Levene's test for equality of variances to determine if equal variances should be assumed. I then used a standard two sample independent t-test to compare the net photon count of the element being tested between Cahokia and Pinellas points to determine if a statistical difference existed.

For non-normally distributed data I utilized two-sample Wilcoxon-Mann-Whitney non-parametric tests than compared ranked medians rather than means for a better representation of central tendency.

Geochemical Limitations

Subjectivity remains a major problem inherent in lithic analysis. At this stage of handheld XRF research, net photon count is the only data available to work with. Net photon count is the quantification of excited electron emissions for each element, which emit energy in the form of photons. Region of Interest analysis, the approach utilized to examine net photon counts for grouping tendency, is only semi-quantitative. A fully quantitative approach would require the application of a calibration which would produce a parts per million output. Unfortunately, there exists no good calibration for chert, making semi-quantitative analysis the best option. I attempted to counteract this limitation by using statistics to inject an objective lens. T-testing is a useful tool for artifact comparison but it is not faultless. Sample size was the greatest challenge here as the presence of only 2 Cahokia points is problematic at best. The small sample size is not an accurate representation of the population. Compounding the issue is the heterogeneous nature of chert itself. Chert is a secondary formation and occurs within geologic sources that span large geographic areas. The variability within an individual element present in a sample is so wide there is no objective way in determining difference in provenance between artifacts. The range of net photon count for an identified element from material

suspected to be from Cahokia is so wide that it encompasses the range of the same element present in artifacts sourced from regionally located quarries in Florida.

Geochemical Analysis Findings

The following test results are grouped by power profile and subsequently listed first by elements with no statistical difference in net photon count followed by those elements that did indicate a difference.

15kV, 25μA, 200 Pulse Length, 200 Seconds, No Filter

Silicone (Si), Calcium (Ca), Titanium (Ti), Manganese (Mn), Nickel (Ni), Copper (Cu), and Zinc (Zn) net photon count comparisons between Cahokia and Pinellas points did not indicate any statistical difference exists between the two point types.

Iron (Fe) was the single element that exhibited a statistical difference in net photon count between Cahokia and Pinellas points (Table 7).

40kV, 10μA, 200 Pulse Length, 200 Seconds, Yellow Filter

Silicone (Si), Calcium (Ca), Titanium (Ti), Vanadium (V), Manganese (Mn), Copper (Cu), and Zinc (Zn) net photon count comparisons between Cahokia and Pinellas points did not indicate any statistical difference exists between the two point types.

Iron (Fe) was the only element that exhibited a statistical difference in net photon count between Cahokia and Pinellas points (Table 8).

25kV, 15µA, 200 Pulse Length, 90 Seconds, Yellow Filter

Silicone (Si), Calcium (Ca), Titanium (Ti), Vanadium (V), Copper (Cu), and Zinc (Zn) net photon count comparisons between Cahokia and Pinellas points did not indicate any statistical difference between the two point types.

Manganese (Mn) and Iron (Fe) represent the two elements that exhibited statistical difference in net photon count between the Cahokia and Pinellas projectile points (Table 9).

Geochemical Analysis Summary

While test results indicate that the Bruker III-SD could discriminate the Cahokia points out from Pinellas points based upon a power profile of 25kV, 15µA, 200 Pulse Length, 90 Seconds, Yellow Filter, the findings provide limited utility. The problematic nature of chert wins this battle every time, defeating all attempts for comparative study based upon its key characteristics of wide-spread deposits and heterogeneous makeup. Although manganese and iron discriminate within this extremely small sample, the variability within those elements among the variety of chert across Florida and the rest of the Southeast make true separation impossible. While the goal of providing a secondary objective line of evidence supporting the origin of the Cahokia points being the American Bottom is not a complete success, it does provide one key revelation. The best way to type these Cahokia points is visually, based upon morphology and material inclusion, which can be compared to points known to originate from Cahokia.

CHAPTER 4: DISCUSSION & CONCLUSION

The St. Johns II people, practicing a fisher-hunter-gatherer subsistence strategy and communal sociopolitical structure, thrived along the shores of the St. Johns River in Jacksonville, Florida during the Mississippian period. Their geographical position outside that of the traditionally accepted boundaries of the Mississippian world along with their difference in social structure relative to their contemporaneous Mississippian counterparts does not mean they existed in isolation (Ashley and White 2012). These people were active participants within a large social interaction system spanning across the greater southeastern United States. Much effort has been put into the examination of their role within this system with one vital piece missing from the puzzle. The lithic assemblage from the Mill Cove Complex provides the data necessary to fill this void. It is not only the platform for future lithic research that will provide a nuanced view of the complex social lives of aboriginal Floridians, but also the basis for a general understanding of social activities at the Mill Cove Complex in relation to stone material procurement and use. These characteristics are the foci of the following discussion.

We see, at the most general level, an assemblage comprised of both lithic tools and debitage mainly produced from chert and sandstone, with some implements of basalt and quartzite in small quantity. The presence of debitage across the site suggests the St. Johns II were not merely importing completed tools, but rather constructed their own. Raw material in poor condition is common in the assemblage, with many exhibiting large amounts of cortex. The frequent presence of cortex indicates material did not come into the complex as preforms, but

rather in a very raw and unrefined state. No large chert nodules are present in the assemblage, suggesting that most lithic pieces arrived in small, easy to carry packages that maximize cost expenditure in resource procurement (Austin 2015). Large quantities of the assemblage were recovered from ritual contexts, indicating their importance in mortuary practice.

In the following discussion, I examine potential insights gained about the social lives of the St. Johns II people from this cursory examination of the Mill Cove Complex lithic assemblage. I will first discuss the economics of material sourcing. Second, I will examine what the count and distribution of lithic tools may reveal about the activities at the Mill Cove Complex. Third, I will explore what information may be inferred from the count and distribution of lithic debitage and unmodified stone material. Lastly, I summarize with my final conclusions regarding the site, as a whole, and possibilities for future research.

Economics of Raw Material Sourcing

Northeastern Florida is a stone poor geologic location. Most stone quarries are located in the north-central and northwestern portions of the state, with some extending into the panhandle region. This places the nearest raw material source approximately 160 kilometers away on the western border of what is now known as the Osceola National Forest along the modern northern border of Florida and Georgia (Austin 2018). Although it is not certain from which quarry location the material from the Mill Cove Complex originates, or if more than one source was utilized, the large amounts of lithic material recovered at the Mill Cove Complex indicate the importance of stone to the St. Johns II people for both ritual and daily use.

It is argued that native groups who acquired goods originating from some geographic distance imbued those items with a form of power, which enhanced their importance and value to those utilizing them based upon their existence outside of the normative world and their exotic nature (Ashley 2020; Austin 2015; Helm 1993). In addition to the symbolic power of these items, economic cost also contributed to their value. Procuring items from great distance required the expenditure of economic resources related to travel, trade or exchange, and the maintenance of social relationships. This caused some groups to develop strategies to minimize cost through the importing of finished items or those close to completion. They would additionally make use of discarded tools, reuse broken items, and conserve raw material (Austin 2015). This was often the case for southern prehistoric Floridians, as noted by Dr. Robert Austin (2015) based upon their lack of stone resources and is evident at the Mill Cove Complex whose people were in a similar situation regarding chert sourcing. Conservation of raw material is exhibited at the Mill Cove Complex by the quantity of unimarginal tools constructed from poor pieces of chert. Reuse of broken items is illustrated with retouched bifaces, but the lack of preform material alongside the large quantity of lithic debitage suggests a departure from the cost-minimization model in that regard.

If the minimization of lithic goods does not describe the totality of circumstance at the Mill Cove Complex, the natural question concerning the discarding of economic prioritization arises. Ritual, beliefs, and social customs influence economics. The costs incurred through ritual practice provide unique benefits to groups which often take a non-material form like identity formation, peer approval, information, and group cohesion (Austin 2015; B’enabou and Tirole

2011; Chai 1997; Edel 1968; Ellison 1995; Granovetter 1985; Sosis and Bulbulia 2011). This seems to be the case for the Mill Cove Complex, where lithic tools and debitage were recovered alongside rich ceramic and faunal deposits in the Kinzey's Knoll site area, a location associated with mortuary preparation and communal ritual feasting (Ashley and Thunen 2020) (Figure 24; Figure 25). The quantity of debitage and multidirectional cores at Kinzey's Knoll suggests the St. Johns II were willing to expend more resources to gather raw material, rather than premade lithic goods, and create their own tools for ritual use. It also illustrates the importance of lithic tools within the ritual complex of the St. Johns II people. Constructed lithic tools were not the only lithic items present in ritual context though. The presence of archaic bifaces, broken bifaces, and Cahokia projectile points sets apart these unique items from the already important constructed ritual lithic implements found in ritual contexts.

Tool Count and Distribution

Comprising only 16% of the total lithic assemblage, lithic tools represent the smallest proportion of stone material at the Mill Cove Complex. The majority of the tools are ground stone implements, but many of those artifacts were small, broken pieces that are most likely a part of a larger vessel. Bifaces and unimarginal tools are the next most common artifact, with similar counts of 58 and 62, respectively. These counts are more representative of the actual quantity due to their intact nature and are therefore quite likely to be the most common tools found at the Mill Cove Complex. Small quantities of core, bimarginal, combination, and other

utilized and culturally significant tools were recovered and lend further insight into the activities of the St. Johns II people.

Bifaces are seen across large portions of the Mill Cove Complex, with many being found around the Shields Mound within the Kinzey's Knoll site area. The ritual significance of this site in combination with the frequency of biface recovery at that location indicate a link between bifaces and ritual and/or mortuary practice. Most of the bifaces are regional variants of Mississippian small triangular points known locally as Pinellas (Figure 54). Three archaic bifaces were found in the general Kinzey's Knoll area as well. One Santa Fe (Figure 2b) and one Hernando point (Figure 2d) were recovered directly from the Kinzey's Knoll site area while one Hardee point, which can be seen on the far right of (Figure 55), came from the South of Kinzey's Knoll site area. The presence of these Archaic points indicates that the St. Johns II practiced rituals that reinforced connections to their ancestors and their primordial past. Broken projectile points were recovered from the Mill Cove Complex and could possibly represent costly signaling (Figure 55). This behavior is a form of symbolic communication and is done on items that are usually considered to be expensive. The wasteful imagery serves to enhance the importance of the act, and has been noted at other prehistoric sites in Florida (Alcorta and Sosis 2005; Austin 2015). The lack of stone resources and cost of material procurement surely place lithic bifaces into the expensive category. With the purposeful production of Pinellas points in the ritual areas of the site alongside the utilization of pieces of the past like archaic projectile points, and broken lithic tools, it is clear that the inclusion of locally crafted items were ritually significant. Local

bifaces were not the only items used though, as two Cahokia points indicate the importance of exotica in ritual as well.

Figure 54:Mill Cove Complex Pinellas Points

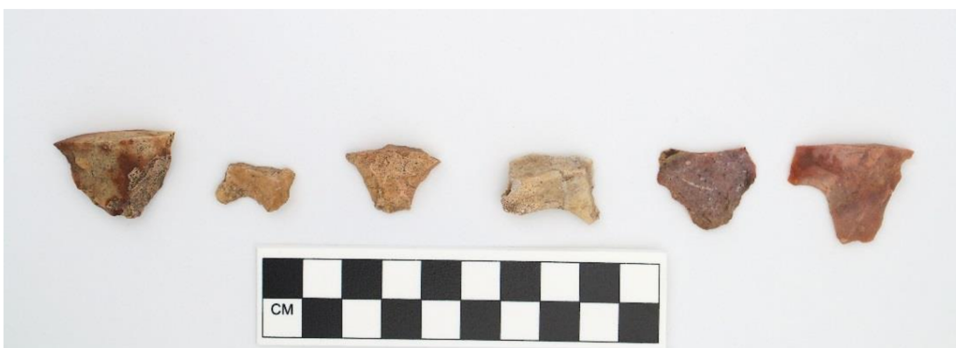

Figure 55:Mill Cove Complex broken bifaces

Morphologically speaking, the two Cahokia points are clearly just that, projectile points originating from the area surrounding Cahokia referred to as the American Bottom. I conducted

geochemical analysis of these points and compared the results to Pinellas points from the assemblage. This task was meant to serve a dual purpose. First, to establish baseline power profile settings with the handheld XRF machine for the examination of chert, and the second to provide an objective, secondary line of evidence showing that the two Cahokia points had a different provenance than local material, ultimately supporting the argument that these two bifaces are indeed from Cahokia. While I was successful in establishing best power profile settings and was also able to show discriminating elements separating the Cahokia points from the Pinellas, the testing as a whole was problematic. The heterogenous nature of chert meant that no adequate calibration was available to present data in parts per million. Additionally, no data extracted from the study can be used in comparative research unless all testing is done on this specific handheld XRF unit. Perhaps the largest concern is the variability within element quantity for chert in general. Chert from the same provenance can show immense variation from within its own sample, voiding the significance of any comparative analysis of variation between samples of differing provenance. Even the two Cahokia points themselves exhibited variation in chemical profile. This discovery, while interesting, illustrates the innate problems with the approach, as treating the Cahokia points as representing a single population is ultimately a flawed concept. The major finding from the geochemical study is to be wary of research using this technology for chert. Chert is simply too problematic due to its heterogenous nature and large geographic spread of source material to be useful in this comparative study. Visual confirmation of chert still remains the most objective form of determination of provenance

regarding the Cahokia points. Examination of color and content, to include inclusions, coupled with morphology is the most accurate way of typing chert projectile points.

Although the Cahokia points exhibit morphological traits identifying them as such, I sought further confirmation from Jonathan Schaefer, a graduate student at the University of Missouri who is familiar with Cahokia points and has great experience working with the Burlington chert common to the American Bottom. Schaefer identified what I will refer to as Cahokia point #1 (Figure 56) as being a Cahokia double notched, which are found in Missouri, Illinois, and across southeastern Iowa. There are regional variants of the Cahokia double notched, with this biface exhibiting traits of the Washita cluster based upon the side notches being located higher up on the base. The Washita variant occurs most often to the south and west of other Cahokia variants. Cahokia point #1 visually appears to be made of heat-treated Burlington chert based upon the color and presence of small quartz pockets and Crinoid fossil inclusions. Cahokia Point #2 (Figure 57) exhibits similar material characteristics with many more Crinoid fossil inclusions present in comparison to Cahokia Point #1. Schaefer identified this point as also being a member of the Cahokia double notched/Washita cluster made from Burlington chert. The most obvious morphological difference between the two points is the pronounced retouching of Cahokia point two, which may have been repurposed as a drill (Jonathan Schaefer, personal communication, 2020).

Figure 56:Cahokia Side Notched #1

Figure 57:Cahokia Side Notched #2

The presence of these two Cahokia points at the Mill Cove Complex are of great importance as they are indicative of connections between the St. Johns II and Cahokia, or at least the American Bottom. A lack of Cahokia point recovery at sites between northeastern Florida and the American Bottom indicate that they are not the result of down-the-line trading (Ashley and Thunen 2020). The rarity of these items makes them symbolically powerful to St. Johns II. The distance travelled, social experiences, and potential entanglement attained as they moved from Cahokia across the landscape add to their perceived social power, ritual importance, and overall value to the St. Johns II people (Ashley and Thunen 2020; Austin 2015; Helms 1993). Additionally, they are potentially a marker of political contacts and relations between the Cahokians and St. Johns II, perhaps serving as gifts or diplomatic tokens (Ashley and Thunen 2020; Pauketat 2007). Ashley and Thunen (2020:27) suggest the notion that a St. Johns II pilgrim may have obtained the Cahokia Points during a journey to the American Bottom or that someone from Cahokia may have brought them to the Mill Cove Complex directly. Either way, the recovery of the Cahokia points at the Kinzey's Knoll ritual feasting and mortuary preparation site area solidifies their importance to the greater St. Johns II community.

Unimarginal tools are almost exclusively constructed from chert, with the exception of one basalt artifact. These tools are most often made of what visually appears to be poor quality material based upon the amount of cortex left on the implements and the presence of inclusions that would make knapping a quality tool difficult. That is the case for both bimarginal and combination tools as well. Although use-wear analysis will assist in determination of the purpose of these tools, it is clear that the St. Johns II people were utilizing every piece of stone they

could, maximizing the utility of a resource that required a great deal of effort to obtain. The majority of these tools were also found in the Kinzey's Knoll site area and its surrounding site areas, with the second largest quantity coming from West of Kinzey's Knoll. This could be a function of their use for cutting or scraping of other materials related to mortuary ritual. Small quantities are found outside of ritual contexts, suggesting chert tool served both utilitarian and ritual purpose, or that they were produced in village areas and later transported to Kinzey's Knoll.

Ground stone tools are most often constructed of sandstone but do appear in small quantities of basalt and quartz/quartzite. They occur widely across the complex, with high frequency in the Kinzey's Knoll ritual area. Ground stone tools are made through an abrasive action and are often used as grinding stones, hones, celts, and polishing stones depending on the material they were constructed from (Andresfky 2005). Although most artifacts are broken, some intact pieces are present and provide insight about the use of these items. Sandstone hones exhibit long, narrow indentions that may indicate the sharpening of bone into needle like shapes, which correlate with the hairpins found at the Mill Cove (Figure 10). Another unique specimen is a sandstone mortar that has red ochre on the surface. Red ochre was often found to be an intentional admixture within the sand of burial mounds, as noted by C.B. Moore during his excavations, possibly making this item a mortuary preparation tool (Ashley and Rolland 2014:271; Moore 1895). All ground stone basalt implements from this assemblage are broken and not indicative of any particular tool. It is likely that these items could be the remains of celts, or polished hatchets, of which 12 were recovered by Moore from the Shields Mound

(Moore 1895). Only three quartz/quartzite ground stone tools have been recovered to date, making them the least frequent of the type. All three were recovered in ritually related site areas with two coming from Kinzey's Knoll and the final from Simmons – Shields Ramp, which contained a human burial. One of these artifacts recovered from Kinzey's Knoll is similar in shape to a burnishing stone used to polish ceramic wares.

A number of tools not fitting cleanly into any type category were typed as "other" tools. Understanding the use or purpose of these items is a task of future research. One of these tools do stand out as being of particular cultural importance though. A single piece of galena was recovered from the Kinzey's Knoll site area (Figure 14). The link to cultural significance and justification as a tool comes from the recovery of three cubes of galena by C.B. Moore during the excavations of the Shields Mound (Moore 1895). The only information provided by Moore is their recovery from various depths within the mound, but their placement within the mound does suggest some form of cultural significance and makes the discover of this artifact within the contexts of Kinzey's Knoll valuable in gaining an understanding of mortuary preparation practice.

One "other" tool existing in a state of suspect is a small piece of coal coming from the Bluff Midden (Figure 13). It is unknown if this item has any prehistoric cultural significance or if it represents modern use of coal on the property as conveyed by the current landowner to Dr. Keith Ashley (Keith Ashley, personal communication 2020).

Debitage Count and Distribution

The quantity of debitage at the Mill Cove Complex could possibly be the most significant finding from the examination of the lithic assemblage. Debitage reveals that the production of tools were quite possibly a part of the activities on site but requires further research for absolute verification. A technological analysis of the debitage could provide insight into the reduction activities onsite, helping to determine if the material recovered is from bifacial retouch versus bifacial thinning. The discovery of debitage also opens a doorway for a plethora of research foci, to include craft specialization, knowledge acquisition, production frequency, and purpose. Debitage was discovered at all but one site area at the Mill Cove Complex, to include the Grant site, with Simmons South being the only location with zero yield. The distribution indicates tool production occurred in both village and ritual areas and suggests that tool creation held both utilitarian and mortuary purpose. The presence of debitage at the Kinzey's Knoll site area further supports the importance of not only lithic tools in mortuary practice, but the act of production itself.

Unmodified stone

The largest amount of stone material present at the Mill Cove Complex in terms of count is unmodified stone and comes mostly in the form of smooth, small, river pebbles (Figure 58). Representing 66% of the sample, it should not be discarded as insignificant. C.B. Moore chronicled burial mounds with masses of pebbles that he states are found near to or in association with burials (Moore 1894:182) These items have been argued to be the result of intentional

collection practice and therefore require greater scrutiny to determine cultural significance (Austin 2018). It should be noted not all the unmodified material may be culturally significant, as some is modern fill. Future research into this area would include the separation of river stone and modern material and an analysis of the geographic distribution of river stone across the complex.

Figure 58:Unmodified river stone

Conclusion

The Mill Cove Complex lithic assemblage typology gives initial insight into the lives of the St. Johns II people existing along the periphery of the Mississippian world. It paints a picture of a socially complex group, who placed symbolic value over cost minimization, exhibited a pragmatic approach to tool production, honored their ancestors, respected and paid homage to

their dead, and who participated in community feasting and ritual for the benefit of all rather than the perpetuation of elitism. Their social networks were far-reaching and vastly important to their ability to procure materials for production. And despite their interactions with major Mississippian polities, like Cahokia, they maintained a sociopolitical structure most beneficial for their needs and subsistence patterns in their own geographic location.

The St. Johns II people represents the dynamic social nature of aboriginal people too often grouped under singular umbrella terms like Mississippian or chiefdom. Although they did not fall within the scholarly derived boundaries of the Mississippian World, or meet traditional Mississippian identity criteria, they surely operated within and amongst the social networks associated with those who do. The St. Johns II people were unique, active, social agents within these expansive Mississippian social exchange networks, and their ties with the major polity of Cahokia is testament to their importance. The addition of this lithic typology to the breadth of St. Johns II research provides a crucial element necessary for understanding their role within those networks and serves as the foundation and springboard for future research concerning lithic use, material provenance, ritual practice, and social exchange.

REFERENCES

Alcorta, C.S., and R. Sosis

2005 Ritual, Emotion, and Sacred Symbols: The Evolution of Ritual as an Adaptive Complex. *Human Nature* 16: 323-359.

Andrefsky Jr., William

2005 *Lithics: Macroscopic Approaches to Analysis.* Cambridge University Press, New York.

Ashley, Keith H.

2002 On the Periphery of the Early Mississippian World: Looking Within and Beyond Northeastern Florida. *Southeastern Archaeology* 21: 162-77.

2003 Interaction, Population Movement, and Political Economy: The Changing Social Landscape of Northeastern Florida (A.D. 900-1500). Ph.D. dissertation, Department of Anthropology, University of Florida, Gainesville.

2005 Introducing Shields Mound (8DU12) and the Mill Cove Complex. *Florida Anthropologist* 58: 151-73.

2012 Early St. Johns II Interaction, Exchange, and Politics: A View from Northeastern Florida. In *Late Prehistoric Florida: Archaeology at the Edge of the Mississippian World*, edited by Keith Ashley and Nancy White, pp. 100-125. University Press of Florida, Gainesville.

Ashley, Keith H., and Nancy M. White

2012 Late Prehistoric Florida: An Introduction. In *Late Prehistoric Florida: Archaeology at the Edge of the Mississippian World*, edited by K. Ashley and N. White, pp.1-28. University Press of Florida, Gainesville.

Ashley, Keith H., and Vicki Rolland

2014 Ritual at the Mill Cove Complex: Realms Beyond the River. In *New Histories of Pre-Columbian Florida*, edited by Neill J. Wallis and Asa R. Randall, pp. 262-282. Florida Museum of Natural History, Gainesville.

Ashley, Keith H., and Robert L. Thunen

2020 St. Johns River Fisher-Hunter-Gatherers: Florida's Connection to Cahokia. *Journal of Archaeological Method and Theory* (2020): 7-27.

Ashley, Keith H., Neill J. Wallis, and Michael D. Glascock

2015 Forager Interactions on the Edge of the Early Mississippian World: Neutron Activation Analysis of Ocmulgee and St. Johns Pottery. *American Antiquity* 80(2): 290-311.

Austin, Robert J

2015 The ritual uses of lithic raw materials during the Woodland period, Fort Center, Southern Florida. *Journal of Field Archaeology* 40(4): 413-27.

2018 *No Stone Unturned: Lithic Resource Use in South Florida*. Paper presented at the 75th annual meeting of the Southeastern Archaeological Conference Augusta, Georgia.

B'enabou, R., and J. Tirole.

2011 Identity, Morals, and Taboos: Beliefs as Assets. *The Quarterly Journal of Economics* 126: 805-855

Blitz, John H.

2010 New Perspectives in Mississippian Archaeology. *Journal of Archaeological Research* 18 1-39.

Boszhardt, Robert F.

2003 *A Projectile Point Guide for the Upper Mississippi River Valley.* University of Iowa Press, Iowa City.

Brown, James A.

2004 Exchange and Interaction Until 1500. In *Handbook of North American Indians: Southeast*, Vol. 14, edited by W. Sturtevant and R. Fogelson, pp. 677-85. Smithsonian Institution, Washington

Bullen, Ripley P.

1975 *A Guide to the Identification of Florida Projectile Points.* Kendall Books, Gainesville, Florida.

Caldwell, Joseph R.

1958 *Trend and Tradition in the Prehistory of the Eastern United States*. Memoir no. 88. American Anthropological Association, Washington, D.C.

Chai, S.

1997 Rational Choice and Culture: Clashing Perspectives or Complementary Modes of Analysis? In *Culture Matters: Essays in Honor of Aaron Wildavsky*, edited by R. J. Ellis and M. Thompson, pp. 45-56. Westview, Boulder.

Cobb, Charles R.

2000 *From Quarry to Cornfield: The Political Economy of Mississippian Hoe Production*. University of Alabama Press, Tuscaloosa.

2003 Mississippian Chiefdoms: How Complex? *Annual Review of Anthropology* 32: 63-84.

Cormack, Richard M.

1971 A Review of Classification. *Journal of the Royal Statistical Society: Series A (General)* 134(3): 321-353.

Edel, M.

1968 *Economic Analysis in an Anthropological Setting: Some Methodological Considerations. Department of Economics, Working Paper* Number 14. Cambridge, MA: Massachusetts Institute of Technology, http://dspace.mit.edu/bitstream/handle/1721.1/63517/economicanalysis00edel.pdf?sequence=1

Ellison, C. G.

1995 Rational Choice Explanations of Individual Religious Behavior: Notes on the Problem of Social Embeddedness. *Journal for the Scientific Study of Religion* 34: 89-97.

Emerson, Thomas E., Randall E. Hughes, and Mary R. Hynes

2003 The Sourcing and Interpretation of Cahokia-Style Figurines in the Trans-Mississippi South and Southeast. *American Antiquity* 68(2): 287-313.

Frankenstein, Susan, and Michael J. Rowlands

1978 The Internal Structure and Regional Context of Early Iron Age Society in Southwest Germany. *University of London Institute of Archaeology Bulletin* 15:73-112.

Friedman, Jonathan, and Michael J. Rowlands

1977 Notes Toward an Epigenetic Model of Civilization. In *The Evolution of Social Systems*, edited by Jonathan Friedman and Michael J. Rowlands, pp. 201-76. Duckworth, London.

Goad, Sharon I.

1978 Exchange Networks in the Prehistoric Southeastern United States. Ph.D. dissertation, Department of Anthropology, University of Georgia, Athens.

Goggin, John M.

1952 *Space and Time Perspective in Northern St. Johns Archaeology, Florida*. Yale University Publication in Anthropology 47. Yale University Press, New Haven, Conn.

Granovetter, M.

1985 Economic Action and Social Structure: The Problem of Embeddedness. *The American Journal of Sociology* 91: 481-510.

Griffin, James B.

1967 Eastern North American Archaeology: A Summary. *Science* 156:175-91.

Guthrie, James M.

2012 *Overview of X-ray Fluorescence*. University of Missouri Research Reactor. www.archaeometry.missouri.edu/xrf_overview.html.

Hall, Robert L.

1997 *An Archaeology of the South: North American Indian Belief and Ritual*. University of Illinois Press, Urbana.

Harris, Norma H.

2012 Defining Pensacola and Fort Walton Cultures in the Western Panhandle. In *Late Prehistoric Florida: Archaeology at the Edge of the Mississippian World*, edited by K. Ashley and N. White, pp. 275-95. University Press of Florida, Gainesville.

Helm, Mary W.

1993 *Craft and the Kingly Ideal: Craft, Trade, and* Power. University of Texas Press, Austin.

Holmes, William H.

1903 Aboriginal Pottery of the Eastern United States. In *Twentieth Annual Report of the Bureau of American Ethnology,* 1-201. Smithsonian Institution, Washington, D.C.

Iannaccone, Laurence R.

2016 Rational Choice. In *Rational Choice Theory and Religion: Summary and Assessment,* edited by L. Young. Routledge, New York.

Knight Jr., V.J.

2006 Farewell to the Southeastern Ceremonial Complex. *Southeastern Archeology* 25(1): 1-5.

Lillios, Katina T.

1999 Objects of Memory: The Ethnography and Archaeology of Heirlooms. *Journal of Archaeological Method and Theory* 6(3): 235-262.

Marcoux, Jon B.

2007 On Reconsidering Display Goods Production and Circulation in the Moundville Chiefdom. *Southeastern Archaeology* 26(2): 232-45.

Marrinan, Rochelle A.

2012 Fort Walton Culture in the Tallahassee Hills. In *Late Prehistoric Florida: Archaeology at the Edge of the Mississippian World*, edited by K. Ashley and N. White, pp.186-230. University Press of Florida, Gainesville.

Mauss, Marcel

1967 *The Gift: Forms and Functions of Exchange in Archaic Societies*. W. W. Norton and Company, New York.

Mehta, Jayur M., Grant McCall, Theodore Marks, and James Enloe

2017 Geochemical source evaluation of archaeological chert from the Carson mounds site in northwestern Mississippi using portable X-ray fluorescence (pXRF). *Journal of Archaeological Science: Reports* 11: 381-89.

Meyers, Maureen

2017 Social Integration at a Frontier and the Creation of Mississippian Social Identity in Southwestern Virginia. *Southeastern Archaeology* 36(2): 144-155.

Milanich, Jerald T.

1998 *Florida's Indians From Ancient Times to the Present* (*Native Peoples, Cultures, and Places of the Southeastern United States*). University Press of Florida, Gainesville.

Milanich, Jerald T., and Charles H. Fairbanks

1980 *Florida Archaeology*. Academic Press, New York.

Milner, George R.

1998 *The Cahokia Chiefdom: The Archaeology of a Mississippian Society*. Smithsonian Institution, Washington.

Moore, Clarence B.

1894a Certain Sand Mounds of the St. Johns River, Florida, Part I. *Journal of the Academy of Natural Sciences of Philadelphia* 10: 4-128

1894b Certain Sand Mounds of the St. Johns River, Florida, Part II. *Journal of the Academy of Natural Sciences of Philadelphia* 10: 129-246.

1895 Certain River Mounds of Duval County, Florida. *Journal of the Academy of Natural Sciences of Philadelphia* 10: 448-502.

Pauketat, Timothy R.

1994 *The ascent of chiefs: Cahokia and Mississippian politics in Native North America.* University of Alabama Press, Tuscaloosa.

1997 Specialization, Political Symbols, and the Crafty Elite of Cahokia. *Southeastern Archaeology* 16(1):1.

2004 *Ancient Cahokia and the Mississippians*. Cambridge University Press, New York.

2007 *Chiefdoms and Other Archaeological Delusions.* AltaMira Press, Lanham MD.

Peebles, Christopher, and Susan M. Kus

1977 Some Archaeological Correlates of Ranked Societies. *American Antiquity* 42: 421-48.

Quinn, Colin P

2015 Signals in Stone: Exploring the Role of Social Information Exchange, Conspicuous Consumption, and Costly Signaling Theory in Lithic Analysis. In *Lithic Technological Systems and Evolutionary Theory,* edited by Nathan Goodale and William Andrefsky, Jr., pp. 198-219. Cambridge University Press, New York.

Sahlins, Marshall

1972 *Stone Age Economics*. Aldine de Gruyter, New York.

Shackley, Steven M.

2012 Portable X-ray Fluorescence Spectrometry (pXRF): The Good, the Bad, and the Ugly. *Archaeology Southwest Magazine* 26(2).

Sosis, R., and J. Bulbulia

2011 The Behavioral Ecology of Religion: The Benefits and Costs of One Evolutionary Approach. *Religion* 41: 341-362.

Speakman, Scott A.

n.d. *Using the Brucker Tracer III-SD Handheld X-Ray Fluorescence Spectrometer using PC Software for Data Collection.* http://prism.mit.edu/xray/odite/Bruker%20XRF%20SOP.pdf.

White, Nancy M., Jeffrey P. Du Vernay, and Amber J. Yuellig

2012 Fort Walton Culture in the Apalachicola Valley, Northwest Florida. In *Late Prehistoric Florida: Archaeology at the Edge of the Mississippian World*, edited by K. Ashley and N. White, pp. 231-74. University Press of Florida, Gainesville.

Wilcox, Jennifer R.

2010 *An Assessment of Archaic Hafted Biface Use in Mississippian Burial Contexts at the Mill Cove Complex*. M. A. thesis, Department of Anthropology, State University of New York, Albany.