2018

Across an Ecotone: An Analysis of Late Prehistoric Artifacts from Southern Minnesota

Jamison M. Jordan
Minnesota State University, Mankato

Across an Ecotone: An Analysis of Late Prehistoric Artifacts from Southern Minnesota

By

Jamison M. Jordan

A Thesis Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Science

In

Applied Anthropology

Minnesota State University, Mankato

Mankato, Minnesota

December 2018

December 2018

Across an Ecotone: An Analysis of Late Prehistoric Artifacts from Southern Minnesota

Jamison M. Jordan

This Thesis has been examined and approved by the following members of the student's committee.

_____
Dr. Ronald Schirmer (Advisor)

_____
Dr. Kathleen Blue (Committee Member)

_____
Dr. Cynthia A. Miller (Committee Member)

ABSTRACT

Across an Ecotone: An Analysis of Late Prehistoric Artifacts from Southern Minnesota

Jamison Mathew Jordan

Master of Science in Applied Anthropology

Minnesota State University, Mankato

Mankato, Minnesota, 2018.

The transition zone between the Plains and Woodlands in Southern Minnesota is not homogenous, neither in terms of ecology or culture. The deciduous forests and oak barrens of the Eastern Woodlands present an ecological environment with a resource base much different than the tallgrass prairies of the Northeastern Plains, and the material remains left behind by peoples inhabiting both areas reflected this. Subjects such as the exchange of technology, such as one culture adopting select tools or traits from populations living on the other side of the ecotone, as well as the movement of people in general across this particular ecotone, have been the subject of study to many archeologists in the state.

In order to answer inquiries such as how much technology did cross the ecotone, which environments certain populations preferred, how heavily subsistence strategies changed with the environment, whether or not specific tools were created specifically for crossing the ecotone, whether or not certain groups regularly crossed the ecotone, and the intensity of tool use between populations, the material record may hold valuable information regarding these questions. Materials recovered by archeologists from a number of counties in Southern Minnesota from a transect crossing from the Prairie region east, across the ecotone to the western banks of the Mississippi River were examined for traits such as function, style, and intensity of re-use and

curation. The sites in question reflected a variety of cultures, including Late Woodland, Oneota, Plains Village, and Middle Missouri. Artifacts diagnostic of a time period and populations according to geographical areas, such as projectile points and distinctive pottery, were especially useful in determining exactly which populations were present in each section of the study area, and at what time the area was occupied.

While sample sizes were too small to perform most types of statistical analysis, some general trends were apparent. Overall, the mixture of artifacts studied reflected evidence that in Late Prehistory, both Woodlands and Plains populations crossed the boundary into the ecotone, as well as into the "opposite" biome. However, lingering issues such as the implications of the presence of an unnamed type of High Rim pottery found in the Prairie Lakes region, whether or not specific tools were created specifically for crossing the ecotone, the disparity between the high intensity of lithic tool curation in the western counties versus less intense tool curation observed in the eastern portion of Minnesota, may still be addressed by future research.

ACKNOWLEDGEMENTS

I am deeply indebted to the many people who encouraged and assisted in my pursuit of higher education, which in turn increased my level of knowledge, interest, and enjoyment in archeology. First and foremost, I would like to thank my family, Jay, Jan, and Josh Jordan for their support and patience over the course of these stressful years. I would also like to thank my advisor, Ronald Schirmer, as well as my colleagues and friends, Jason Riechel, Ty Warmka, Michelle Neumann, David Briese, Cory Nowak, Ryan Letterly, Ryan Howell, and Mike Wendt for their advice and guidance in the design and interpretations of this project. I extend my thanks to the members of my thesis committee, Kathleen Blue and Cyndi Miller, as well as the rest of the staff of the Department of Anthropology at Minnesota State University, Mankato, for assisting in the final stages of this thesis. Finally, I would like to thank the staff at the Minnesota Historical Society and the Mississippi Valley Archaeology Center, as well as their cohorts, particularly Pat Emerson, Leroy Gonsior, Bruce Koenen, Dave Radford, Constance Arzigian, Mike Bednarchuk, and Dan Wendt for allowing me access to their facilities to study the artifacts needed for this study, supplying the background information for relevant archeological sites, and lending their advice, knowledge, and expertise in this project.

TABLE OF CONTENTS

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

Problem Statement

Human cultures seldom exist without interacting with other cultures, both within their own environments, and in transition zones, whether these transitions are ecological or cultural. As stated by Green and Perlman (1985), boundaries are dynamic in cultural development. Transitional boundaries between large communities of plants and animals, also known as biomes, also do not exist in isolation; a number of transition zones exist between them. These transition zones are referred to as ecotones, are characterized by the presence of plants and animals living at the extremes of their ranges, which creates a blend which is much more diverse, and is not present elsewhere, particularly in the more homogenous areas of each respective biome. Likewise, there are a number of possible outcomes with human cultures living near or within ecotones. As stated by Schirmer (Personal Communication, April 22, 2018), this effectively creates a “culturetone”, in which traits of human populations are also diverse, mixed, and not seen elsewhere.

Many archeologists have examined the Plains-Woodlands ecotone, and as with other boundaries, a number of cultural outcomes are possible. Archeologists have stated that many groups were drawn to the other side of the boundary to exploit resources (Boszhardt 2000), and others state that many groups will choose parts of the other side’s technology if it will work well with their own habits. According to Dennel (1985), it is rare for a group to completely adopt another group’s tool kit and move into the other group’s environment. Instead, it is far more

likely that groups will select technology that can easily be integrated into their current strategy, and possibly adapt some new strategies from these tools.

Resource gathering aside, many groups may perform ceremonies cooperatively; village and funerary sites between the Great Plains and Eastern Woodlands display a variety of coalesced traits between Mississippian, Effigy Mounds, and Plains Village cultures, which implies that the groups interacted, but were separate and distinct (Boyd et al, 2006; Whittaker 2005). Additionally, sites near Red Wing, MN are known to have been a meeting point for interacting groups (Fleming 2009; Schirmer 2002, 2016); villages in the area contain material cultures and raw material sources derived from considerable distances in opposite directions, evidence that the groups had different strategies for their core areas. Likewise, evidence from pottery analysis shows a local "blending" of different traditions, indicating the dynamic nature of interaction between the Late Woodland and Oneota traditions (Neumann 2017; Skinner 2018). While the Mississippi River is a relatively permeable boundary, it seems that these populations retained use of styles of their own respective ranges, which suggests that these groups were related and interacted regularly, but carried separate identities (Fleming 2009), a pattern which was also reflected in their subsistence practices (Schirmer 2002).

This project is an attempt to identify and observe the characteristics of the evidence of cross-boundary cultural interaction among Late Prehistoric groups, dating from about 1200 years BP to present within the Plains-Woodlands ecotone by examining collections recovered from archeological sites selected from a transect across southern Minnesota. Attributes of the artifacts and assemblages were compared to each other and to what is considered to be typical of Plains and Eastern Woodlands artifacts and assemblages on either side of this region. The goal was to observe similarities and differences among groups which utilized both sides of the ecotone,

determining what kind of environments groups settled in, and to what extent groups utilized both resources and technology from the other side of the boundary. More specifically, this thesis was an attempt to answer questions regarding the crossing of the ecotone by populations living in the vicinity of the ecotone, intensity of the use of resources such as bison or fleshy fruits and nuts, whether or not certain populations adopted other populations' tools, or created tools specifically for living either within or on the opposite side of the ecotone, and finally, the amount and intensity of use regarding lithic tools.

Background

The Great Plains and the Northeastern Plains contain a variety of wildlife and vegetation. The uplift of the Rocky Mountains, combined by repeated advances of glacial periods, have left the Plains relatively flat, with an arid, sub-humid climate, variable seasonal rainfall, and annual periods of drought. Due to the climate, vegetation communities are dominated by annuals and small perennials, such as the shortgrass prairies in the Great Plains and the tallgrass prairies of the Northeastern Plains, which are typically dominated by several species of wheatgrass and bluestem grass. While not considered significant in relation to the size of prairie vegetation communities, small patches of trees such as aspen, oak, and juniper are scattered throughout the Plains (Barker and Whitman 1988). However, trees and other plants generally associated with wetter environments are found in river bottom forests, typically found in river valleys and along creeks and streams. A number of rodents, predators, and ungulates inhabit the prairie, including antelope, elk, and bison. Both ecologically and culturally, bison are one of the most important fauna. Not only did bison consume the excess biomass of the prairies, it is argued that variation in herd size, from small groups in winter to large herds in summer, combined with migration

based on external factors, impacted the movement of aboriginal Plains populations (Bamforth 1987). Much like the ecology of this biome, human cultures inhabiting the Plains were far from uniform (Kay 1998). Relevant Plains cultures will be discussed below.

Figure 1. The Woodlands-Plains ecotone in the United States (Nuzzo 1994).

The eastern margin of the Great Plains borders the western margin of the Eastern Woodlands (Figure 1). Within the Great Lakes area and the Upper Mississippi Valley, the Eastern Woodlands contain a variety of biological communities, supported by the wetter climate. Prior to European settlement, the area was predominantly a mixture of deciduous forest and coniferous forest, as well as more open, grassy parkands and barrens. In general, the conifer forests, stands of birch and aspen, mixed forests of maple, basswood, and birch, and pine barrens are more common in northern areas, as well as in areas in which the soil has a relatively high sand content. In areas further south, the forests, barrens, and parklands are dominated by species such as oak, elm, and hickory (Stearns 1997). Small game such as upland birds tend to inhabit

transition zones between these various types of trees and vegetation, and a number of fruit and nut trees as well as berry-producing plants can be found in the understory of the forests. Lakes and rivers support a variety of resources such as cattails, wild rice, shellfish, freshwater fish, and waterfowl. Ungulates such as elk and white-tail deer are also present, as well as wild turkey (Theler and Boszhardt 2003). Relevant Woodland populations will be discussed below.

Much like the "core" areas two aforementioned environments, the ecotone between the Eastern Woodlands and the Northern Plains is by no means homogenous, nor is it static. The climate is subject to change due to changes in prominence from dry air from the west, dry air from the polar region, and humidity from the Gulf of Mexico to the south. As a result, the dominant vegetation has varied between trees and grasses since the end of the last glacial period, due to fluctuations in the climate (Schirmer et al 2014:24-28). As stated by Grimm (1985), there are a number of different vegetation communities, including prairie, bigwoods, oak-aspen scrub, and oak savanna. As stated by Cunfer (2016), prairie fires were often deliberately set by native populations to manage bison grazing. Accounts of the settlement of the Plains by Euro-Americans indicate that fires set deliberately to manage the bison herds outnumbered naturally occurring fires by a large margin. Periodic prairie fires resulted in young green sprouts regenerating after the fire, and these sprouts were favored by bison. This practice also led to the prominence of a variety of fire resistant resources such as oak, hawthorn, hazel, and prunus becoming abundant in wooded areas on the Plains (Nelson et al 2006). Multiple strategies were employed by prehistoric populations in order to survive in the aforementioned niches.

Eastern Woodland populations utilized a very wide resource base. Data regarding the Woodland stage in Minnesota are sparse. However, general data from adjacent areas of the Midwest may be referred to. According to Anfinson (1997), the Late Woodland people of

Minnesota were concentrated in the southeastern portion of the state. As with other areas of the Midwest, general cultural traits of this time period included burial of the dead in mounds, use of the bow and arrow rather than the atlatl dart, and settlements established in the Deciduous Broadleaf biome. Faunal remains at Late Woodland sites are generally dominated by whitetail deer and fish, and illustrate heavy utilization of both (Theler and Harris 1988). The remainder of faunal remains may include waterfowl, upland birds, and turtle (Styles 2000). Floral remains at Late Woodland sites in the Great Lakes area illustrate heavy reliance on wild foods such as nuts, tubers, wild rice, and various fleshy fruits. These resources were supplemented by cultivated plants such as chenopods, sunflowers, maize, and squash (Simon 2000). As stated by Arzigian (2008), the addition of gardening, increased emphasis on aquatic resources and wide breadth of sought-after foodstuffs in general reflects increasing population density in the Eastern Woodlands.

Late Woodland populations of the Mississippi River trench practiced mortuary rituals involving the construction of complex burial monuments, usually consisting mounds in conical, linear, and animal effigy shapes. West of the Mississippi Valley, mortuary features are generally smaller and less intricate, and are typically only conical in shape, although other shapes are present (Arzigian and Stevenson 2003). Pottery of this period includes Madison Ware and Grant Ware, which are more general, homogenous evolutions of earlier pottery in the area. In general, these vessels display combinations of cord impressions and bossing for decoration, as well as fine grit temper (Howell 2015).

The Oneota Tradition, which is actually a number of related populations who shared shell-tempered pottery traits, may actually be viewed as a “bridge culture” across the Plains and the Eastern Woodlands; many eastern Oneota artifacts reflect an influence from the Eastern

Woodlands (Boszhardt 2000). With these separate influences, the faunal remains at eastern Oneota sites reflect a heavy dependence on nuts and fleshy fruit, as well as aquatic resources such as aquatic tubers and marsh grasses, mussels and fish, and less focus on terrestrial animals (Overstreet 1995). It is apparent from evidence that early Oneota populations did not rely heavily on agriculture, but agriculture became more prominent in Oneota settlements over time, with western Oneota sites showing more reliance upon agriculture (Schirmer 2002:122-123). Many Oneota sites demonstrate cultivation of crops such as maize, beans, squash, and sunflowers. Western Oneota artifacts also illustrate a distinct Plains influence. Crops were supplemented by use of seasonally available wild plant resources, fish, and wild game. Bison bone tools such as scapula hoes are common, and it is inferred that bison hunting was particularly important at western Oneota villages by the presence of mauls, bison bones, and hide scrapers (Henning 1998).

Plains-focused cultures are also relevant to this study. In the western segment of the study area, several subsistence strategies were present. Like contemporary cultures to the east, Plains populations relied on wild plants such as fleshy fruits, tubers, and seeding plants. However, as mentioned previously, seasonal bison hunting played a vital role in subsistence practice, much more so than the hunting of small and medium game in the Woodlands. Such was the importance of bison hunting that many populations aggregated for communal hunts when the large herds of bison began to accumulate during the summer months. Horticultural village complexes began to appear on rivers around A.D. 900. By contrast, many inhabitants who lived near lakes on the prairies did not adapt horticulture to the same scale as Woodland cultures until much later, although horticulture in this area is still present and contemporary with the development of horticulture in the east. Generally speaking, the people of this area continued to rely more on

wild resources much longer than more Woodland-oriented peoples. However, the importance of bison hunting still prevailed regardless of whether the strategy was focused more upon wild resources or gardening (Anfinson 1997).

One potentially relevant complex present in the Prairie Lakes region of Southwestern Minnesota would be the Lake Benton Complex. Believed to have emerged from earlier Prairie Lakes peoples since Lake Benton pottery typically occurs in the same locations as earlier Fox Lake pottery. Lake Benton sites are generally located on lakeshores, and are distinguished by changes in ceramic production, projectile points suited to bow and arrow technology, and the construction of mortuary features. Little subsistence information is available, although it appears that the previous practices of utilization of bison, small game, and fish in addition to at least some horticulture was continued (Arzigian 2008).

The Middle Missouri tradition has a presence in prairie regions of Minnesota. The Middle Missouri Tradition has been grouped into "regions" depending on geographic location, and has been divided chronologically into three variants, Initial, Extended, and Terminal (Ahler 1993; Lehmer 1971; Toom 1996). Traits of Middle Missouri are considered to be semi-subterranean rectangular dwellings, large storage pits, pottery decorated with trailed lines, and, in some sites, fortifications. These sites appear contemporaneously in Minnesota, South Dakota, and Iowa (Winham and Calabrese 1998). Middle Missouri sites may be particularly relevant in determining what factors may have been most influential in terms of behavior; it is hypothesized by Toom (1992) that many changes in behavior on the Plains were brought on by climatic conditions. These conditions may have made it more feasible to focus on bison rather than a diversified resource base. Others such as Tiffany (1991) and Johnson et al (2007) suggest that the

decline of the Mississippian system and expansion of Oneota populations may have introduced selective pressures on Middle Missouri populations.

Another potentially relevant strategy would be that of the Plains Village. It is believed that aspects such as sedentary lifestyles, permanent housing, and agriculture on the Plains were adopted from contact with eastern and southern cultures (Holley and Michlovic 2013:11-29). The Plains Village Tradition is considered to be contemporary with the Middle Missouri Tradition, and as stated by Tiffany (2007), is part of a larger pattern of an increasingly sedentary strategy developing across the region. Plains Village sites generally indicate gardening of domesticated species such as maize and other crops. This horticulture was supplemented by a heavy focus on bison hunting. Distinctive artifacts at Plains Village sites also appear to have been adopted by eastern groups, and include elk antler scrapers, bison horn scoops, and serrated bone fleshers. Other Plains Village traits are artifacts made of catlinite, chipped Knife River Flint, earthen mortuary features, and distinct pottery (Wood 1974).

The differentiations between Plains Village and Middle Missouri have been the subject of debate, and have generally been based entirely upon pottery style. As stated by Holley and Michlovic (2013), these two traditions are present in Minnesota, with multiple phases represented. However, there are a number of issues that stem from a lack of quality excavation at sites with very short occupational periods. In general, the Middle Missouri Tradition is concentrated on the central corridor of the Missouri River, and extends into western Minnesota. The Initial Middle Missouri is represented by the Great Oasis and Cambria phases. Other variants of the Middle Missouri are scant in Minnesota, generally represented only by isolated pottery. However, there is disagreement among archeologists as to exactly which tradition to which Cambria belongs; Henning and Toom (2003) argue that Cambria centered on the

Minnesota River is actually part of the Big Stone phase of the Plains Village Tradition, Winham and Calabrese (1998) state that Cambria is a western expression of the Late Woodland tradition due to a lack of fortifications at many sites, while Gibbon (2012) argues that Cambria should remain categorized as Initial Middle Missouri.

Regardless of the categorization debate caused by expanding to traits beyond pottery style, Holley and Michlovic (2013) state that evidence of both Middle Missouri and Plains Village dissipate in Minnesota after about A.D. 1300. This coincides with an increasing prominence of the Oneota tradition. Available evidence suggests that violent interactions between the Oneota and other contemporary cultures may have eventually caused peoples practicing traditions such as the Middle Missouri and the Plains Village out of western Minnesota, save for those who ventured into the area for trading purposes.

Although it is not relevant to examine the entire ecotone from the north to the south, it is possible to examine the existing collections of one area, chiefly, southern Minnesota. As stated by Aaseng et al (2011), the ecotone is not consistent across the state; the western prairies give way to the eastern woodlands, a number of "patches" of each vegetation type are present in a transition zone, before each environment gradually becomes more homogenous as distance from the ecotone increases either to the west or the east. Given this, several counties, both ones which currently straddle the ecotone, as well as regarded as belonging to a sole plant community, have been chosen, and Late Prehistoric collections recovered from sites within each county were examined. According to the modern and relatively recent classifications of the vegetation communities dating back no more than 200 years, more western counties such as Nicollet County are generally labeled as prairie, but also contains oak savanna, as well as forests of oak, maple, basswood, and aspen (Aaseng et al 1993:Inside cover, 17a, 19a, 35a, 48a) The center

counties in the survey included counties such as LeSueur County, where a countywide survey has recently been completed by a Minnesota State University, Mankato crew. LeSueur is labeled almost entirely Deciduous Forest and Oak Savanna on a large scale, but also contain several types of prairie, including aspen-brush prairie, dry prairie, and wet prairie (Aaseng et al 1993:Inside cover, 35a 48a, 72a). The easternmost counties, such as Houston County, are labeled mostly Deciduous Woodland. However, other reported zones are forests of maple, basswood, and oak, oak savanna, brushland, dry prairie, and wet prairie (Aaseng et al 1993:Inside cover, 17a, 35s, 48a, 72a).

Questions

1. How heavily did groups utilizing environments within the Plains-Woodlands ecotone adopt technology from the other side of this boundary? As previously stated, it is most likely that populations did not entirely assimilate other populations' technology; it is much more probable that select tools were chosen to complement the contemporary strategy. In collections that contain artifacts that are almost decidedly Woodland or decidedly Plains, it should be relatively easy to identify "foreign" technology.
2. If a group from the Woodlands entered the ecotone, did they prefer to occupy a woodland-like environment? Likewise, when Plains-oriented groups entered the ecotone, did they prefer to occupy more prairie-like environments?
3. Did Woodland groups specialize in bison hunting when they entered the Plains, as Plains groups did, or did they retain their resource diversity? Boszhardt (2000) has argued that when Eastern groups moved into the Plains, the primary draw was to hunt

bison. As stated above, Plains cultures had generally specialized in bison, which was supplemented by other resources. Woodland strategies had a comparatively wider resource base, with many more types of resources utilized with less emphasis on individual resource types. Hypothetically, if Woodland groups were utilizing bison, then they would have left behind bison-specific tools, along with items that are related to their wider strategy if they still had a wide focus, while fewer Woodland-specific remains may be present if Woodland groups relied on bison more heavily.

4. When Plains groups entered the ecotone, did their strategies change, and if they did, was the change similar to the Woodland changes? As stated above, Plains groups are stated to have had a much more specialized tool kit in terms of hunting bison as their staple. By contrast, if Plains groups in the ecotone chose to broaden their resource base as Woodland populations did, Plains-like collections may display tools associated with a wider resource base.
5. Were there any specialized tools developed specifically for crossing the ecotone? Many groups, such as the White Rock Oneota in Nebraska, developed a tool known as the beveled knife, which was a rhombus-shaped tool with bevels on opposite sites. It has been argued that this tool was developed specifically for hunters crossing into Plains areas, and was purpose-made to butcher bison in preparation for transport back to the east (Padilla and Ritterbush 2005). Ideally, this study will be able to identify tools that are unique to a "crossing" tool kit, and hypothesize uses for these tools.
6. Was crossing the ecotone a regular part of some groups' 'seasonal round'? As stated by Theler and Boszhardt (2000), many groups worked cooperatively in scheduling their occupations of the same areas by occupying them at different times of the year,

and by exploiting different resources within the areas. For example, Schirmer (2002) has stated that Late Woodland population density led to settlement primarily in lowlands to utilize aquatic resources, with various groups using highlands for procurement of deer or fruits and nuts in different seasons. Schirmer has also argued that Late Prehistoric cultures in the region held their food resources in high regard, as a central part of their identity. As stated by Arzigian (1987), even contemporary groups inhabiting similar environments display different levels of utilization in terms of their subsistence base. If this did occur, then multicomponent sites might display exploitation of a variety of seasonal resources.

7. Is there a difference in the degree to which each strategy utilized and discarded tools? As stated by Frison (1991), Plains cultures took great care to ensure that the tips of their projectile points were cared for and sharpened consistently, for fear of inadequate penetration when hunting bison. Additionally, Binford (1976) has suggested that similar tools used for different resources in different areas have potential to be curated to different degrees. It may be possible that the resources of either strategy dictated more intense use or curation of particular tools, which may be reflected in their respective material remains.

CHAPTER 2

METHODS

Literature Review

Background research included a review of archeological documents such as site forms, inventories, and reports, which were housed in the Mankato State Anthropology Museum, as well as the Minnesota State Historic Preservation Office (SHPO), and the Minnesota Historical Society. Additionally, artifact catalogs and relevant publications for each site were located and reviewed.

Laboratory Methods

Artifacts made available from the collections relevant to the sites in question were examined, and recorded. In particular, this was limited to lithics and pottery, due to the unpredictable and fungible nature of floral and faunal materials. Relevant lithic and ceramic materials were analyzed by the author according to size, mass, raw material, type, diagnostic traits, and degree of use, and recorded in a Microsoft Xcel spreadsheet.

The raw material of lithics were determined by comparing them to reference collections available at both MNSU, which houses a regional collection, and at MHS, which houses a comprehensive collection of raw materials found across the country. Raw materials that could not be identified were listed as “Indeterminate”, with noteworthy traits such as fossil inclusions recorded. In collections which were formally catalogued, the quantities of lithic debitage were taken from the catalog, while collections with comingled artifacts were counted by the author. Measurements such as maximum length, width, and thickness of lithic tools were determined by

measurement with calipers, to the hundredth of a centimeter. Only the thickness of pottery was determined via calipers; the remaining measurements of pottery were determined by mesh. The mass of both pottery and lithics was determined by the use of an electronic balance, to the nearest hundredth of a gram.

Qualitative aspects of pottery and lithics were classified according to the 2016 version of the Minnesota State University (MNSU) Anthropology Department's Laboratory Manual (MNSU 2016). Although the lab manual has since been updated, all cataloging was performed according to the 2016 manual. All terms and definitions used in this study were extracted verbatim from them MNSU Laboratory Manual. The terms and definitions are listed below.

Lithic Analysis

In this study, lithic artifacts which were determined to be utilized as tools within human activities were selected for study. These tools were divided into categories based upon morphology and function. Artifacts were also grouped according to raw material, thermal alteration or burning, and measurements of size and mass were also recorded. The following is a list of terms utilized for items within the collections, as well as adaptations used to satisfy the unique requirements of this project.

Random Debitage Sample

For the majority of these collections, a formal inventory or catalog did not exist, and the scope of this project prohibited formally cataloging these collections. In most cases, the lithic debitage from each site lacking an inventory was comingled in three to four large artifact bags. Therefore, one of these bags of debitage was chosen at random to be identified and counted.

Celt

A groundstone or flaked and polished, elongate lithic implement, exhibiting a wedge or double bevel-shaped bit when viewed in profile. Celts may resemble adzes but can be differentiated based upon differences in bit morphology. Celts will generally exhibit a straight and centered bit while adzes have a curved and offset configuration.

Channeled Abrader

A tool fabricated from coarse stone such as sandstone, featuring one or more grooves or channels.

End Scraper

A tool that exhibits unifacial reduction restricted to the short axis of the implement. End scrapers tend to a lenticular, trapezoidal, or plano-convex profile, with an often steeply unifacial working edge.

Hammerstone

Billet or cobble-like lithics, which exhibit wear or damage associated with use as a striking tool. Hammerstones do not display deliberate working or shaping, thus distinguishing them from other striking implements.

Knife

A knapped implement used as either a hafted or unhafted cutting tool. Knives overlap in traits as bifaces and projectile points. However, Knives tend to be larger and wider than projectile points, and display more refined cutting edges than bifaces.

Perforator

A tool that exhibits a single retouched, pointed protrusion. Perforators may appear similar to drills, gravers, or burins, yet may be differentiated through careful observation of reduction patterns and use-wear. Perforators tend to exhibit minimal use-wear, with most dulling and

micro-burination appearing at the tip of the protrusion. In contrast, drills and gravers will exhibit heavier, patterned use-wear, while burins may in fact represent a type of perforator, but are differentiated due to their uniquely defined method of construction. Perforator-like implements exhibiting multiple, short, and closely spaced protrusions are classified as denticulates. Within this study, perforators are to be considered synonymous with awls.

Pick

A long, narrow tool exhibiting at least one pointed end. Picks may be similar to celts or adzes, however, celts and adzes do not illustrate the point as a pick does when viewed from a plan view.

Projectile Point

A tool that was hafted to the distal end of an arrow, spear, or dart. Spear points are generally associated with Paleo-Indian complexes, meaning this study will primarily focus on dart and arrow points. Arrow points are generally more gracile than dart points. However, size alone is not a reliable indicator of temporal context. Some points may be distinctly diminutive, or may have been retouched into atypical dimensions, while knives may appear synonymous with earlier point clusters.

Retouched Flake

A tool exhibiting the patterned removal of flakes from a piece of lithic debitage, yet lacking attributes associated with defined formal lithic tool types. Since these tools were crafted from debitage, they were sized according to lithic debitage size grades. G1 includes all flakes too large to fit through 1” mesh, G2 includes flakes too large to fit through ½” mesh but small enough to fit through 1” mesh, and G3 includes flakes too large to fit through ¼” mesh but small enough to fit through ½” mesh.

Side Scraper

A tool exhibiting a steeply retouched edge along one or more of its long axes, interpreted as a fleshing and/or butchering implement.

Spokeshave

A tool that exhibits a pronounced working edge concavity produced through utilization and/or retouching. Spokeshaves may be manufactured through intentional reduction to produce a concavity or through utilization alone.

Wear/Curation Analysis

Lithic tools were subjected to analysis by the author based upon the amount of retouching or resharpening evident upon their working edge. Tools exhibiting minimal amounts of wear were separated from those exhibiting more repeated incidences of wear and retouching, as well as those that exhibited the appearance of being expended by displaying working angles which may have been difficult to further retouch. Additionally, both bifacial and monofacial tools were examined to determine whether the retouching was conducted bifiacially or unifacially.

Minimal Use

The working edge of a tool has been utilized, but does not appear to have been sharpened or reworked significantly beyond the initial creation of the tool.

Moderately Retouched

The working edges of the tool display signs of having been modified, sharpened, or retouched, but the tool still retains most of its initial shape, and is still viable to be used as intended.

Heavily Retouched

The working edges of the tool in question display signs of having been reworked multiple times, and the morphology displays diminished usefulness for the intended purpose.

Expended

A tool which has been used until it has become too small or misshapen to be feasibly used, is broken, or the angles generated in the stone by sharpening or retouching would make further reworking or curation difficult.

Pottery Analysis

Pottery analysis was based on style and morphology. This meant examining traits such as temper, thickness, decoration, and surface treatment. An explanation of terms used to explain style and morphology is included below. Pottery which could be considered diagnostic, as well as pottery not formally catalogued, was examined by the author. Non-diagnostic pottery which was formally catalogued by surface treatment was only noted by quantity.

Temper

Temper refers to the presence of materials added to raw clay in order to prevent damage due to shrinking during the firing process.

Grit Temper

Temper composed of crushed stone. One common grit temper is granitic rock.

Sand Temper

Temper composed of sand grains. Deliberate sand temper is not easy to distinguish from natural sand inclusions within clay matrix, and is often included with other types of temper.

Shell Temper

Temper composed of crushed mollusk shell. Since soils may not be suitable for the preservation of shell, voids in the pottery interpreted to be left by leached-away shell were concluded to be shell tempered.

Morphological Element

Morphological elements refer to the original portion of a vessel from which a sherd was located during its lifespan as a container.

Body

The area below the lip or shoulder on a vessel.

Shoulder

The widest portion of the vessel below the neck; where the neck meets the body.

Vessel

A container that exhibits intact portion of the rim, neck, and shoulder elements, or 30 percent of an unshouldered container, including the rim.

Surface Treatment Placement

Surface treatment placement describes the location of a particular surface treatment type in relation to the overall interpreted configuration of a container.

Apex

The most superior portion of the vessel, considered to be where the interior and exterior of the vessel meet.

Exterior

The outside wall of a vessel.

Interior

The inside wall of a vessel.

Lip

The apex of the rim of a vessel.

Neck

The area between the neck and shoulder of the vessel.

Rim

The apex of the vessel, located immediately above the neck.

Surface Treatment Type

Surface treatment types are defined by one or more modifications of the raw surface of a wall of a container, resulting in the observed overall appearance and qualities of the container walls.

Burnished

A surface treatment exhibiting a smooth and polished differentiated from smooth surface treatments through the presence of a distinctive sheen or finely polished look. Burnishing produces a smoother, denser, and more regular surface than smoothing alone.

Smooth

A surface treatment exhibiting signs of smoothing or an otherwise lack of surface treatment which in effect, has left a plain surface on the exterior of a vessel. Within the contexts of this study, the identification process of this surface treatment was used more judiciously throughout the identification process, due to the fact that the interior and exterior of sherds were not always present and that by and large the majority of the potter from the upper Midwest (regardless of temporal period) display smooth interior walls. This necessitated the ability to differentiate between interior and exterior smoothed surfaces.

Fiber Marked

A surface treatment created through the application of unidentified botanical or faunal fiber to the surface of the container, which lacks additional detail necessary for more accurate identification.

Cordmarked

A surface treatment exhibiting impressions or markings resulting from cordage being applied to the vessel. This is in essence a catch-all term for any surface treatment involving cordage but lacking the morphological characteristics which allow for its orientation in relation to the vessel from which it is derived to be ascertained, directional descriptors such as oblique or vertical were used in conjunction with the term cordmarked.

Smoothed Over Cordmarked

A surface treatment exhibiting cordmarking that has been partially obscured or smeared during manufacture. The identification of this surface treatmenr may prove difficult due to a number of factors. First, the fact that exists as a gradation between cordmarked and smooth surface treatments leaves a large margin for error, especially when both surface treatments may be present within a given assemblage. Second, defining what constitutes a smoothing of a cordmarked surface is both variable and subjective, especially when dealing with often diminutive and fragmentary pottery sherds. Lastly, methods of surface treatment application, use-wear, and post-depositional wear may all result in the appearance of the smoothing of a cordmarked surface. However, it is important to recognize that this particular surface treatment likely reflects both intentional and unintentional modification of cordmarked vessels and that the differentiation between these cannot be reliably and consistently performed.

Rim Form

Rim Form is determined by the evidence for or against significant modification of the rim of a container with the interpreted intent to create a particular stylistic form.

Unmodified

Unmodified rims exhibit a morphology where the paste of a vessel is brought from the shoulder or neck area up to the lip area without doubling on itself or systematically adding material to thicken, brace, or otherwise enhance or change the form of the rim. Unmodified rims can be identified in cross section through a lack of observed changes in the orientation of the paste, and/or a lack a lack of observable systematic addition or removal of material. However, small additions of material do not constitute a systematic change observable in the vessel.

Modified

Modified rims exhibit a morphology where the paste of a vessel is brought up from the shoulder or neck to the lip and is doubled back on itself and/or excess material is systematically added or removed. Modification is visible in either distinct change in the orientation of the paste such that the interior surface below the lip becomes the exterior surface on the opposite side of the lip, or vice versa, or the addition of a separate section of material.

Rim Modifications

Rim modifications are identified as rims exhibiting the addition of clay matrix and/or the manipulation of the rim walls in a manner that modifies profile and overall appearance of the rim.

Thickened

A rim modification in which a thickening of the interior, exterior, or interior and exterior of the rim is observable in the cross-section. Thickened rims may occur as gradual tapering or a more defined thickening of the vessel. Tickening is distinguished from other modifications in that no

additional material is evident and the thickening due to compressive widening of the paste rather than doubling it on itself or the addition of a fillet.

Folded

A rim modification in which the superior margin of the vessel has been folded to the exterior or interior and conformed to the surface of the vessel. This produces a two-fold thickness to the rim, which can be differentiated from thickened rim modifications by the crease observable in both cross-section and along the inferior margin of the folded area. This modification may also but can be differentiated based on the continuous nature of the folded area in relation to the vessel. In comparison, fillets will display two seams along the inferior and superior margins.

Rolled

A rim modification which is characterized by an interior or exterior rolling or curling of the superior aspect of the rim. Although similar in form to a folded rim, rolled rims do not lie flat against the wall of the vessel, but rather extend away from the vessel. This produces a bulbous protrusion of the lip, which exhibits a rounded semicircular appearance when observed in profile.

Pollen Data Analysis

Studies of pollen cores from a number of water bodies within the area were utilized, both for the type of pollen observed and the quantity of each pollen type. Since annual plants and plants that compose the understory are most sensitive to environmental fluctuations (Aaseng et al, 2011), these types were given the highest level of scrutiny within the study. Higher levels of pollen of a certain plant type are generally considered a more favorable environment for those plants. In general, species which are considered to be shade intolerant and intolerant of poorly

drained or wet soils such as marshes, were considered indicative of a more plains-like or savanna-like environment. Conversely, species with poor drought tolerance, preference for moist soils, or shade tolerance were regarded as indicators for a more woodland-like environment. Likewise, “climax” species, which generally occur in mature stands of trees, are indicative of well-established woodland (Clements 1916). Information regarding each plant type was gathered from the US Forest Service Fire Effects Information System (FEIS, Online). The plant types listed in each pollen core taken from the Neotoma database and their respective preferred environments are listed below.

Acer

The genus Acer includes climax species such as boxelder (*Acer negundo*), which generally is restricted to areas with moist soil, such as rivers and floodplains. While it is considered shade tolerant, it cannot reproduce in shaded conditions. Also relevant within the genus are maples such as sugar maple (Acer saccharum), which is regarded as shade tolerant, and can survive under dense forest canopies.

Amaranth

The genus Amaranth contains species such as green amaranth (*Amaranthus hybridus*), Palmer amaranth (*Amaranthus palmeri*), tall waterhemp (*Amaranthus tuberculatus*), and mat amaranth (*Amaranthus blitoides*). With the exception of the aquatic varieties of amaranth, the varieties native to North America are regarded to favor well-drained soil. However, most varieties favor open, sunny areas, and can grow in sand or disturbed, gravelly soil.

Ambrosia

The genus Ambrosia includes species such as ragweed (*Ambrosia psilostachya*). Plants within the genus generally prefer well drained prairie or oak savanna, but may also occur in forests.

Amorpha

The genus Amorpha contains leadplant (*Amorpha canescens*). Amorpha prefers well drained prairies, oak savanna, and is less common in dense woodland. These plants are sensitive to wet conditions, and generally do not grow near shallow water tables, or in soils with high water retention.

Apiaceae

The family Apiaceae contains plants such as cow parsnip (*Heracleum maximum*) and sweet cicely (*Osmorhiza claytonia*). Cow parsnip prefers the understory of forests, and is sensitive to dry conditions. Sweet cicely is particularly successful in hardwood forests, and is sensitive to direct sunlight; it often grows in wet or well shaded areas.

Artemisia

The genus Artemisia includes silver sagebrush (*Artemisia cana*), which seems to prefer to grow in similar habitats as cottonwood, such as floodplains. However, it is also known to occur in prairies. Prairie sage (*Artemisia ludoviciana*) often occurs among grass in prairies, but may also occur in open stands of trees such as evergreens or oak; the species is sensitive to dryness and tends to grow only near water in arid regions.

Brassicaceae

Also known as the cabbage family, brassicaceae includes pinnate tansymustard (*Descurania pinnata*) which is shade intolerant and occurs in open, disturbed areas such as heavily grazed grasslands or after seral burns.

Cyperaceae

The sedge family includes species such as threadleaf sedge (*Carex filifolia*), and Pennsylvania sedge (*Carex penslyvanica*) which are a sod-forming, shade-intolerant plants. The family also

includes sheathed thread (*Carex vaginata*), which is a common boreal forest understory species, and green-keeled cottongrass (*Eriophorum viridicarinatum*), and hard bulrush (*Scoenoplectus acutus*), which are shade-intolerant marsh grasses.

Alnus

The alder native to the area in question, *Alnus incana*, is generally a low, wetland shrub that prefers to inhabit full sun to moderate shade.

Betula

The genus Betula includes species such as yellow birch (*Betula alleghanesis*), river birch (*Betula negra*), paper birch (*Betula papyrifera*), and dwarf birch (*Betula glandulosa*), which are sensitive to shade.

Carya

The genus Carya contains tree species such as bitternut hickory (*Carya cordiformis*), which is shade intolerant. Shagbark hickory (*Carya ovata*) is also within the genus, and has moderate shade tolerance.

Celtis

Common hackberry (*Celtis occindentalis*) is able to grow in a variety of conditions, but is sensitive to dry conditions, and generally inhabits well-established stands of mixed hardwoods.

Chenopodium

Chenopods are tolerant of a number of soil types. A number of species are present within the chenopod family, such as winterfat (*Krascheninnikovia lanata*). Several species within the genus Chenopodium were once domesticated by Native Americans. Generally, chenopods are regarded as climax species within mature grassland plant communities.

Corylus

American hazelnut (*Corylus americana*) and beaked hazelnut (*Corylus cornuta*) are dominant shrubs and are shade-tolerant. Both generally grow in well-drained soils, and are most commonly found in the understory of mature forests.

Cupressaceae

The Cypress family includes redwoods and junipers. Relevant to this study in particular are species such as common juniper (*Juniperus comminus*), eastern red cedar (*Juniperus virginiana*), and creeping juniper (*Juniperius horizontalis*), which generally grow in harsh, open environments, and are intolerant to shade and flooding. Northern white cedar (*Thuja occidentalis*) is regarded to have higher shade tolerance, but is still said to prefer full sunlight.

Dryopteris

Wood ferns in the genus Dryopteris tend to prefer mesic or wet habitat, cool climate, and are generally considered to be the most shade-tolerant forms of forest understory.

Equisetum

Horsetails in the Equisetum genus such as common horsetail (*Equisetum arvense*) and wood horsetail (*Equisetum sylvaticum*) are wetland species found in moist, shaded environments such as forests, swamps, meadows, and alongside rivers and lakes.

Fraxinus

Ash trees such as white ash (*Fraxinus americana*), black ash (*Fraxinus nigra*), and green ash (*Fraxinus pennsylvanica*) are sensitive to drastic fluctuations in climate, and generally grow best among other hardwoods.

Juglans

This genus contains nut-producing trees such as butternut (*Juglans cinerea*) and black walnut (*Juglans nigra*). These trees are intolerant to both shade and competition from other plants.

Larix

Trees such as tamarack (*Larix laricina*) form isolated stands in both open and forested bogs, and are sensitive to shade and dry conditions.

Ostrya

Ironwood, or hophornbeam (*Ostrya virginiana*) generally occurs in low and well drained areas. It is often found among other trees such as elm, as well as shrubs including dogwood and hazelnut.

Pinus

The Pinus genus contains pine trees such as jack pine (*Pinus banksiana*), white pine (*Pinus strobes*), and red pine (*Pinus resinosa*), which are sensitive to alkaline soil, warm climate, as well as excessive shade. Additionally, red pine is sensitive to swampy soil.

Poplus

Poplar trees (*Poplus balsamifera*), bigtooth aspen (*Poplus grandedintata*), and quaking aspen (*Poplus tremuloides*) commonly grow in boreal climates, in moist environments and near coniferous forests. Trees are very flood tolerant, and are able to regenerate, but are sensitive to shade, prolonged drought, and prolonged cold temperature. Cottonwood (*Poplus deltoides*) is generally found along rivers and lakes, and is sensitive to shade.

Quercus

Oak trees have a variety of tolerances and sensitivities by species. However, some species share general preferences, such as white oak (*Quercus alba*), Northern pin oak (*Quercus ellipsoidalis*), and Bur oak (*Quercus macrocarpa*), which are sensitive to shade and wet soil. Swamp white oak (*Quercus bicolor*) is sensitive to drought and heavy shade, and red oak (*Quercus rubra*) generally inhabits gaps in other hardwood stands and is sensitive to shade, flooding, and drought.

Likewise, black oak (*Quercus velutina*) is sensitive to wet, but can tolerate more shade than other oaks.

Salix

Willow trees such as black willow (*Salix nigra*), peachleaf willow (*Salix amygdaloides*), and pussy willow (*Salix discolor*) tend to inhabit only moist environments such as swamps and stream banks, and are very shade intolerant.

Tilia

Basswood (*Tilia americana*) trees are generally considered to be a climax species; they are moderately shade tolerant, but are sensitive to flooding and prairie fires.

Tsuga

Eastern hemlock (*Tsuga canadensis*) is a very shade tolerant species, but is sensitive to sunlight, heat, fire, and drought.

Vaccinium

Mountain cranberry (*Vaccinium vitis*) occurs in the understory of coniferous forests, and is a shade tolerant species.

Vitis

Summer grape (*Vitis aestivalis*) is a climbing vine, and generally grows in all types of forests, thickets, and woodlands. However, thick canopies may prevent growth, as the vine is shade intolerant.

Ulmus

Elm trees, including American elm (*Ulmus americana*) and slippery elm (*Umus rubra*) generally grow in wet or moist areas, and do not grow well in dry conditions, or among other hardwoods.

The Marschner map was compiled by F.J. Marschner (1930) in order to determine the extent and types of prehistoric vegetation communities within Minnesota. This map was used on a more general scale to determine the most probable environment types not only as a method to spot-check the results of the pollen data, but to predict the general areas within which vegetation types transition to other types, and to predict the general environment within the given area of the known archeological sites.

CHAPTER 3

RESULTS

A total of 24 site collections were examined. These sites spanned nine counties, including Blue Earth, Brown, Faribault, Houston, Le Sueur, Martin, Nicollet, Watonwan, and Winona (Appendix A, Figure 2). Although additional sites and counties were desired for study, several target collections were excluded from this study due to items recorded in their catalogs being missing from the current inventories. Patricia Emerson (personal communication, April 13, 2016), head of the archaeology division at the Minnesota Historical Society, where most of these collections are curated, stated that a number of tools and pottery sherds may have been stolen, lost, or misplaced from many of the relevant collections when they were housed at the University of Minnesota. Due to the small number of available, relevant collections, as well as the small sizes of the aforementioned collections, proper statistical analysis could not be performed. There are several "pitfalls" when attempting to use statistical methods on such a small sample size. The first is a very strong possibility to assume true a false premise. Second, the impact of variations is greatly and likely falsely inflated. Third, in most cases it is difficult to reproduce the results produced by the sample (Button et al 2013; Faber and Fonseca 2014). Finally, such a small sample size leads to limited statistics, such as a large effect size in a simple regression. Due to the number of variables involved, it is not appropriate to use a simple linear regression model (Anderson, Personal Communication, 2014). However, traits such as size, form, and style were used to make generalizations.

In terms of diagnostic artifacts observed, the lithic materials observed in this study generally followed the expected trend, as illustrated in Appendix B, Tables 5-31 and Appendix B, Figures 1-67. In the way of projectile points, the center of the ecotone displayed a mix of both eastern and western style projectile points. The more western counties contained more Plains-style projectiles, such as those belonging to the Plains Side Notch cluster. Likewise, the more eastern collections examined contained more eastern projectile styles. The exception to this trend is Madison-like triangular projectiles, which were found in the entire area of interest.

Pottery materials were generally reflected their previously established environmental regions and geographic ranges. Eastern sites generally contained variants of pottery generally recovered in Wisconsin, bearing stylistic similarities to pottery types such as variants of Grant Ware, Linn Ware, and Madison Ware. Likewise, pottery recovered from sites observed in the western counties fit within more western types such as Middle Missouri, Lake Benton, and an unnamed High Rim type associated with prairie populations. Oneota pottery was observed from sites throughout the area of interest. Of particular interest was an unnamed type of High Rim pottery related to other Late Prehistoric wares found in Wisconsin and Iowa, recovered from sites in the center and western portion of the ecotone.

Lithic raw materials were generally dominated by Prairie du Chien chert, with other locally available materials comprising the remainder of the lithics. Overall, eastern sites displayed a stronger reliance on silicified sandstone as a secondary material, while western sites displayed a greater prominence of exotic materials. Additionally, western sites displayed more intense use of lithics, as reflected by more intense retouching, often to the point where further retouching would be difficult.

21BE24

The Nelson site was excavated multiple times, with fieldwork having been conducted in 1973, 2011, 2013, and 2014. The majority of the artifacts recovered from these sites reflect a Terminal Late Woodland occupation similar to that found in western Wisconsin and northern Iowa, which had also adopted style and strategies practiced by Middle Missouri and Plains Village populations (Reichel 2015). Due to the size of the collection, however, only a representative sample of artifacts were chosen for analysis of style and evidence of reworking. Identification of raw materials, tools, and pottery types was based on catalogs created by Reichel (2015) and the master's thesis submitted by Reichel in 2015.

A total of 28 projectile points were reported to be housed in the collection. Of these, 19 were identified, as they were either unbroken or complete enough to be identified. 18 were triangular points (Appendix C, Figure 1); seven of these were crafted from heat treated Prairie du Chien chert (PDC), four from untreated PDC, one from Swan River chert (SRC), one was made out of Galena chert (GC), one from Grand Meadow chert (GMC), one was made from Burlington chert (BC), one was crafted from agatized wood, and two from indeterminate chert. Eight of the projectile points were located within the collections, and revealed a variety of curation on heat treated PDC points; two with heavy retouch, two with minimal retouch on the tip, two with moderate retouching on the tip, and one with no apparent reworking. An untreated point of PDC also had no reworking. An indeterminate leaf-shaped projectile point of PDC with no reworking was also present, as well as a Scallorn point of heat treated PDC, which had been repurposed into a graver.

Other tools including 22 scrapers were also present at the Nelson site. Of these, there are 12 end scrapers; five were made from GMC, three were mad from indeterminate chert, four were made from heat treated PDC, and two were made from untreated PDC. Two side scrapers of

GMC, two side scrapers of heat treated PDC, a side and end scraper of KRF, and a side and end scraper of GMC were also present. Multitool scrapers reported in the catalog consisted of a side scraper and perforator of GMC, and a side scraper with a spokeshave concavity of Wyandontte chert. From the scrapers which could be located, it was observed that four heat treated PDC scrapers, two scrapers of GMC, an indeterminate chert scraper, and a scraper of PDC were expended. Two scrapers of GMC and a heat treated PDC scraper were heavily retouched. A scraper of PDC and a scraper of GMC also exhibited moderate retouch.

A total of four unnotched knives were present within the collection. An ovate knife of GMC and an ovate knife of PDC displayed moderate retouch. A lanceolate knife of heat treated PDC also displayed moderate retouch. The most heavily retouched knife had a falcate shape, and was crafted from heat treated PDC. It displayed heavy retouching on the blade.

Six spokeshaves were located in the collection, and were subject to analysis of retouching. A heat treated PDC had heavy retouching on the concavity, while two others appeared to have been expended; the concavities had been retouched to the point that further retouching would be difficult. Another spokeshave of untreated PDC had a similarly expended concavity. One heat treated PDC spokeshave had also been minimally reworked along one edge for use as a cutting tool, along with minimal retouch on the concavity. Another spokeshave of heat treated PDC also been worked into a graver, and both tool surfaces were expended.

Six monofacial chert wedges were also examined, from a total of 11 claimed to have been recovered from the site. One wedge of heat treated PDC had been expended, while another of heat treated PDC had been heavily retouched. Two wedges of untreated PDC were moderately retouched. A wedge crafted from GMC had been expended due to both heavy battering on the

proximal end, and unworkable angles on the bit. Lastly, a second wedge of GMC had also been moderately retouched.

Miscellaneous tools included three channeled sandstone abraders, two with a single channel, and one with five channels. Three perforators of GMC were found within the collection, two of which showed moderate to heavy wear. The third was likely expended due to breakage. Also present were two diabase celt fragments, and a heat treated PDC biface that appears to have been used as a sawing tool. An andesite hammerstone had been heavily utilized on both longitudinal ends, while a basalt hammerstone had been moderately used on one end. Interestingly, two heat treated PDC cores exhibited percussive damage, suggesting they been repurposed as some sort of striking implement.

Of particular interest was a groundstone 'pick' crafted from diabase. Although it is difficult to argue definitively the formal designation and use of this tool, the tool's use can be inferred based on the shape and the form of damage displayed. The 'pick' is a long, curved implement with one wide, blunt end, and the other end tapers to a narrow, pointed end, with heavy percussive damage on the distal end.

Retouched flakes were more frequent than other tools, with a total of 170 present. Due to their numbers, retouched flakes were only analyzed on the level of a sample of flakes. Since this collection was formally catalogued, and the retouched flakes were catalogued in a sequential manner, it was relatively easy to choose a sample. A random number generator was used to select available flakes by their catalog number. Two G2 GMC flakes had minimal reworking, another G2 GMC flake had minimal bifacial retouching, three G3 flakes of GMC had minimal retouching, a G3 flake of GMC had moderate reworking, a G3 GMC was expended, a G2 flake of heat treated SRC displayed heavy bifacial retouch, a G2 PDC flake was expended, a G2 flake

of heat treated PDC had minimal bifacial retouching, three G2 flakes of heat treated PDC were expended, a G2 heat treated PDC flake showed moderate reworking, a G2 PDC flake had heavy bifacial retouching, a G1 heat treated PDC flake had moderate bifacial retouching, a G2 heat treated Galena had moderate reworking, and a G2 flake of indeterminate chert was expended.

Lithic debitage consisted of a wide variety of materials. As stated above, this collection had been catalogued, which eliminated the need for a random sample of debitage. In terms of cherts, there were 1612 flakes of PDC, 665 flakes of GMC, 104 flakes of indeterminate chert, 38 flakes of SRC, nine flakes of Bulington chert, seven flakes of Bijou Hills silicified Sandstone, 13 flakes of KRF, 11 flakes of TRS, six flakes of Selkirk chert, six flakes of Lake Vermillion chert, four flakes of Maynes Creek chert, three flakes of Cochrane chert, six flakes of HBLC, six flakes of Galena chert, four flakes of Hopkinton chert, two flakes of Cedar Valley Chert, two flakes of Croton Chalcedonic chert, a flake of Spring Branch chert, a flake of indeterminate fossiliferous chert. Other materials included 76 flakes of Jordan silicified sandstone, 17 flakes of Hixton Silicified Sandstone, 14 flakes of quartzite, two flakes of jasper, one flake of Lake Superior agate, a flake of Souris agate, three flakes of indeterminate silicate, three flakes of silicified wood, a flake of Gulseth silica, two flakes of agatized wood, one flake of chalcedony, a flake of Morrison silcrete, two flakes of quartz, and two flakes of silicified sandstone. Igneous debitage consisted of two flakes of basalt, 11 flakes of rhyolite, and two flakes of Lake of the Woods rhyolite.

Pottery present within the collections from all investigations totaled over 12,000 sherds. Grit temper was the most common temper type, with nearly the entire collection showing grit temper. However, the collection also contained eight untempered sherds, three sand tempered sherds, and one shell tempered sherd. Identifiable surface treatments were dominated by

cordmarking, with over 6,000 sherds exhibiting this trait. About 1,900 sherds displayed smoothed over cordmarking, and about 300 sherds had smooth exteriors.

In terms of diagnostic pottery sherds (Appendix C, Figures 2-4), 360 were decorated with cord impressions, tool or finger impressions on the lip, and punctates, stylistically linking them to High Rim pottery also found in western Wisconsin and northeastern Iowa. To a lesser extent, 55 vessels exhibited incised or trailed lines, and bore similarities to Mankato Incised and Linden Everted Rim; both of which belong to the Cambria wares.

21BW1

The Stynsby Mounds and Village site was first recorded in 1911, and was excavated in 1952, 1953, and again in the 1970's. Located within Lake Hanska County Park, the site consists of both a village and mound groups, which were deemed to be unrelated. Although the mounds were destroyed by farming and construction activities, the village was deemed to show relations to both Fox Lake and Cambria (Hudak 1975, Holley and Michlovic 2013).

The artifacts relevant to this study included 28 grit-temper pottery sherds, one shell-temper pottery sherd, 20 projectile points, one drill, one celt, one grooved maul, two hemispherical scrapers, 18 end scrapers, one side and end scraper, two side scrapers, one perforator, and 13 retouched flakes.

The lithic materials displayed a number of variations among style. Temporally relevant projectile points (Appendix C, Figures 5 and 6) included three triangular points of heat treated PDC. One had only minimal retouching on the tip; another had moderate reworking on the tip, and the third exhibited heavy reworking on the blades. Two points of heat treated PDC belonging to the Plains Side Notch cluster were also present; one with minimal retouching on the tip, and the final with minimal retouching on the blades. A third Plains Side Notch point of PDC had not

been heat treated or retouched. Two Samantha points of heat treated PDC were also observed within the collection; both displayed heavy retouching on the tip.

Aside from projectile points, abundant tools included 23 scrapers. Two scrapers which were worked in a radiating pattern on only one side, resulting in a hemispherical or hemifacial shape, were recovered; one of heat treated PDC which was heavily retouched, and one of KRF with moderate retouching. Two side scrapers were also present; a side scraper of silicified wood showed heavy reworking, while a quartz side scraper displayed moderate reworking. One scraper of heat treated SRC appeared to be both a side and end scraper, and was expended. The remaining scrapers were end scrapers. Four heat treated PDC scrapers, three PDC scrapers, a quartz scraper, a KRF scraper, and three scrapers of indeterminate chert were expended. Also present were two KRF end scrapers, a Galena chert scraper, two heat treated PDC scrapers, and a heat treated scraper of SRC were heavily retouched.

Miscellaneous tools were also present within the Stynsby Mounds collections. A drill of PDC exhibited heavy reworking. A GMC perforator was also present, and had been heavily retouched. A spokeshave made from heat treated PDC was also present, and displayed heavy retouch within the concavity.

Two groundstone artifacts were also present within the collections. The first was a celt of diabase (Appendix C, Figure 7) which displayed damage on the proximal end, indicating it may have also been used as a wedge or chisel. The second was a heavily worn polisher or abrader, also made of diabase.

Flake tools were present in the collection. A total of 19 retouched flakes were examined from the collections. All but one of the retouched flakes were sized G2. Three KRF flakes, three heat treated PDC flakes, a GMC flake, and four PDC flakes had moderate reworking. Two PDC

flakes and two heat treated PDC flakes had minimal retouching. A heat treated SRC flake and a PDC flake had heavy retouching, and a heat treated PDC flake was expended. The final flake was a moderately retouched G3 flake of GMC.

Since the collection was uncataloged and the lithic debitage was comingled in several large bags, a single bag was selected at random to be counted as a representative sample. It yielded 42 flakes of PDC, eight flakes of SRC, seven flakes of KRF, three flakes of Galena chert, two flakes of GMC, two flakes of agate, two flakes of TRS, one flake of CVC, and a flake of indeterminate chert, with fossil inclusions similar to those of the Pennsylvanian geologic epoch (Kazlev 2002).

A variety of distinct pottery types were observed within the collection. The shell-tempered pottery sherd in Appendix C, Figure 8 belonged to a very large, globular vessel. The decoration present consisted of punctuates and oblique incised lines, indicating the type as Blue Earth Oneota. A large, grit-tempered pottery sherd (Appendix C, Figure 9) from a globular vessel was also present within the collection; the decoration of trailed lines was comparable to the Linden Everted variety of Cambria pottery (Anfinson 1979). Other relevant pottery sherds (Appendix C, Figures 10-12) included Lake Benton vertical cordmarked with a flattened lip, four plain Late Prehistoric rims with rounded lips, a Late Prehistoric rim with a flat lip and wide, horizontal incised lines, three unmodified Late Woodland cordmarked rims, two Late Woodland sherds with cord impressions and cord-wrapped stick impressions, an unmodified rim with oblique cord impressions and punctuates, an oblique dentate stamped Late Prehistoric rim with a flared lip, a horizontal dentate stamped Late Prehistoric rim with a tool impressed lip, and a sherd resembling High Rim with a horizontal trailed line and punctuates. The majority of the

non-diagnostic pottery (about 70% of the estimated 200 sherds) was cordmarked, but smooth-surfaced pottery was also present.

21BW54

The Tesrow site was surface collected in 1978. The site is located on both banks of a creek situated directly across the Minnesota River to the south of Fort Ridgely. This site is located within the river valley itself, rather than the surrounding ridges as other, nearby sites were situated. While diagnostic lithic tools were lacking, non diagnostic tools (Appendix C, Figure 13) were examined regardless. A total of three scrapers were present in the collection. The first scraper was a side and end scraper of GMC, with two working edges expended and minimal retouching on a third side. The second was an expended end scraper of GMC. The final end scraper was made of PDC, and displayed heavy retouch.

A total of three utilized flakes were also observed. The first flake observed was a G2 flake of PDC, which was expended. Second, a G2 flake of PDC displayed moderate retouching. Finally, a G2 flake of SRC had been expended.

Waste flakes were sparse compared to other artifacts, but nonetheless present within the collection. The lithic debitage consisted of 12 flakes of PDC, four flakes of SRC, two flakes of quartz, one flake of silicified sandstone, one flake of siltstone, one flake of GMC, one flake of an indeterminate chert, and one flake of Iron Range silicate.

The original site records mention 44 pottery sherds, which were present in the collection. Two Late Woodland pottery sherds (Appendix C, Figure 14); one was decorated with cord horizontal cord impressions, tool impressions, and cord-wrapped stick impressions, and the other with horizontal dentate stamps. Fourteen shell tempered sherds were also present, which suggests an Oneota component in addition to the Woodland component (Trow 1980). Three non-

diagnostic pottery sherds were smoothed. The 25 remaining non-diagnostic pottery sherds in the collection were cordmarked with thin walls.

21FA95

This unnamed site was recorded by the Institute of Minnesota Archeology in 1984 and was left uncataloged at the Minnesota Historical Society. The nine shell tempered pottery sherds present in the collection suggest an Oneota occupation. The site is located near US Highway 169, to the south of South Creek (Dobbs 1984).

Lithic tools within the collection (Appendix C, Figure 15) consisted of three triangular projectile points. One point was made from heat treated PDC and exhibited minimal retouching on one blade. The second was also made from heat treated PDC, exhibited minimal retouching on one blade, and was broken. The final was crafted from heat treated Galena chert, and exhibited minimal retouching on both blades.

Aside from projectile points, other formal tools were limited. Two scrapers were observed within the collection. The first was an expended end scraper of heat treated PDC. The second was a broken side and end scraper of silicified sandstone, with heavy utilization on both working edges.

Informal tools were more prominent in this collection. Six utilized flakes were also recovered. A G2 flake of GMC was expended. A G2 flake of heat treated PDC exhibited minimal retouch. A G2 PDC flake exhibited moderate retouch. Two G2 flakes of GMC exhibited moderate retouch. Lastly, a partial G3 flake of heat treated PDC also exhibited moderate reworking. Lithic debitage consisted of 58 flakes of PDC, six flakes of GMC, seven flakes of indeterminate material, one flake of SRC, one flake of silicified sandstone, one flake of quartz, and one flake of Galena chert.

21FA97

The Rynearson site was recorded in 1985, and is reported as an Oneota habitation site. The artifacts were recovered from a trench excavated on a ridge separating Center Creek and the Blue Earth River (Anfinson 1985). Radiocarbon dates were also taken taken from remains recovered at the site, and the PaleoResearch Institute (2014) returned results at the 95.4% probability, a date of 660-550 calibrated years BP, or a date of AD 1290-1400.

Lithic materials observed within the collection (Appendix C, Figures 17 and 18) included a single PDC triangular projectile point, exhibiting no retouching on the tip or any edges. Also present was a channeled abrader of sandstone, which was broken, a utilized flake made of Grand Meadow chert with the working edge expended, a utilized flake of PDC exhibiting no evidence of resharpening, a PDC end scraper exhibiting moderate retouch, an expended spokeshave of PDC, and a moderately reworked knife of Tongue River Silica. Lithic debitage consisted of 26 flakes of Prairie du Chien chert, one flake of Galena chert, one flake of Burlington chert, three flakes of Swan River chert, and nine flakes of Grand Meadow chert.

In terms of pottery, three shell-tempered pottery sherds with smooth exteriors and incised lines with punctuates similar to Blue Earth Oneota decoration were recorded. One such sherd was a large rim and neck fragment (Appendix C, Figure 16), with thin impressions on both the interior and exterior of the lip. While the majority of the pottery was shell-tempered and most likely Oneota, a small fraction of the non-diagnostic pottery sherds (eight of the 73 observed) exhibited thin walls, grit temper, and cordmarking, indicating the location of the site could have been occupied by Lake Benton populations contemporary with the Oneota, as well as prior occupation by Initial Woodland and Middle Woodland groups.

21HU2

The Farley Village site was first investigated in 1942 by excavation, and was later surface collected in 1979 in an attempt to mitigate a highway expansion project. Reported to be an Orr phase Oneota habitation site, the site is located on a slope between Riceford Creek and a ridge, on a westward meander curve of the creek (Anfinson and Peterson 1988).

Lithic remains (Appendix C, Figure 19) included a broken triangular projectile point with no evidence of resharpening. Lithic debitage quantities were not recorded within the site catalog, and it appeared that artifacts were missing from the collection; a representative sample of the comingled debitage was taken. It contained 19 flakes of PDC, five flakes of Galena chert, and three GMC flakes. Although the site catalog claimed many more projectile points, the aforementioned point was the sole point observed. Other lithics included a heavily retouched heat-treated PDC knife, an expended end scraper of heat-treated PDC, a moderately retouched PDC scraper, and a minimally retouched flake of PDC.

While only one diagnositic pottery sherd was observed within the available collections, 14 sherds of non-diagnostic smooth shell-tempered pottery and seven cordmarked grit-tempered pottery were observed. The diagnostic sherd was a smooth rim sherd with a thickened lip, which had broad impressions and shell temper, and closely resembled globular Cambria or Oneota pottery in terms of morphology (Appendix C, Figure 20). The original site records, however, mentioned 27 sherds of Oneota pottery, which could not be located.

21HU26

The Yucatan Village site was first recorded in 1979, and was investigated again in 1991 in response to proposed construction. The site is a large, dense artifact scatter located on a flat rise directly west of Riceford Creek, with a steep valley wall further to the west. The presence of

shell tempered pottery and triangular projectile points indicate that the site is Oneota (Peterson et al 1992).

Relevant lithic artifacts (Appendix C, Figure 21) included projectile points, retouched flakes, a knife, and end scrapers. All three of the projectile points observed were triangular. One was made of heat treated PDC and exhibited moderate retouching on the tip, one of PDC which exhibited moderate retouching along both edges, and one of indeterminate fossiliferous chert which had moderate retouching on the tip.

End scrapers included one burnt, expended scraper of indeterminate chert, one heavily retouched heat treated PDC end scraper, and an end scraper of heat treated PDC with only minimal retouching. A total of nine retouched flakes were also observed. Two G2 PDC flake showed moderate retouching, a heat treated PDC G3 flake exhibited heavy retouching, a G2 PDC flake exhibited heavy retouching, a heat treated G2 PDC flake had heavy retouching, a heat treated G2 PDC flake showed moderate retouching, one G2 PDC and one heat treated PDC flake had minimal retouching, and a GMC G2 flake exhibited minimal retouching. The knife was crafted from PDC, and was expended. An expended, heat treated PDC perforator and an expended silicified sandstone spokeshave were also present.

As with many other sites, the collection was not catalogued, may have been incomplete, and the lithic debitage was comingled in several large bags, one bag was chosen to be counted. Observed flakes were 47 flakes of PDC, 11 flakes of Galena chert, eight flakes of GMC, two flakes of SRC, one flake of silicified sandstone, one flake of agate, two flakes of indeterminate chert, and one flake of indeterminate fosiliferous chert.

Pottery consisted of 21 smooth, shell tempered potsherds and six cordmarked grit tempered pottery. Diagnostic sherds (Appendix C, Figure 22) consisted of two shell tempered

rim sherds with very thin tool impressions on the apex of the lip. No other sherds within the collection displayed decoration of any sort.

21HU43

The Swope site was recorded by Trow (1979), and was surface collected within a cultivated field. Located on a small knoll west of Riceford Creek and to the south of the south fork of the Root River, this site had been reported as having both Late Woodland and Oneota cultural components.

Lithics recovered at this site (Appendix C, Figure 23) included a heat treated triangular PDC projectile point with moderate retouching on the tip, a heat treated PDC knife with heavy retouching, two moderately retouched end scrapers of PDC; one was heat treated. Another heat treated PDC end scraper exhibited heavy retouching. Three retouched flakes were also observed. One was sized at G3, made of heat treated PDC, and was expended. The largest was sized at G1, exhibited heavy retouching, and was crafted from silicified sandstone. The third was sized as G2, displayed moderate retouch, and was crafted from heat treated Galena chert. A representative sample of lithic debitage consisted of 58 flakes of PDC, one flake of silicified sandstone, three flakes of GMC, and five flakes of Galena chert.

In terms of pottery, no decorated fragments, rims, or necks which might be diagnostic were present in the collection. However, non-diagnostic pottery was recorded and present with the collection; it consisted of 19 thin-walled, grit tempered, cordmarked sherds. This would likely indicate that part of the collection is missing, as the reported Oneota components were not observed.

21HU52

The Cherry II site was originally identified in 1979 during a statewide survey, and was visited most recently in 2008. The site is located within a Forestry Management Area on a terrace above the Root River, and includes a post-contact earthwork, as well as pre-contact artifacts eroding from a cutbank. Other artifacts were located on the surface and below the surface when the site was formally investigated (Magner and Allan 2009).

The lithic materials (Appendix C, Figure 24) consisted of a triangular projectile point of silicified sandstone with moderate retouching on the tip, a triangular point of Galena chert with no evidence of retouching, and an indeterminate leaf-shaped point of silicified sandstone with moderate retouching on the tip. A large silicified sandstone chopper within the collection exhibited heavy damage and retouching. A minimally retouched PDC knife was also present. Two retouched flakes graded as size G1 were also observed. One was made from GMC and exhibited minimal retouch, while another made of Galena chert showed moderate retouch. A random sample of lithic debitage consisted of 77 flakes of PDC, 16 flakes of Galena chert, one flake of GMC, and one flake of SRC.

The collection was generally lacking in terms of diagnostic pottery sherds, but contained thin-walled, grit tempered sherds with both smooth exteriors, and, more commonly, cordmarked exteriors. A small rim sherd with oblique cord impressions was observed in the collection (Appendix C, Figure 24). The small size of the fragment prevented definite identification, but the patterns of cord impressions resemble a number of cord-impressed varieties of Madison Ware (Howell 1997:130). Other, non-diagnostic pottery sherds included grit tempered sherds, with smooth and cordmarked exteriors.

21HU152

The Strittmater Rockshelter site is located near La Crescent within a rock ledge bordering Pine Creek. The shelter itself measures about 7m wide and 2m deep. Previous landowners had reported excavating within the rockshelter prior to reporting the site. A 1989 investigation by the Mississippi Valley Archaeology Center recovered projectile points as well as pottery sherds diagnostic of both Woodland and Oneota traditions, and landowners donated the artifacts recovered by amateurs (Boszhardt 1989).

Lithic materials observed within the collection (Appendix C, Figure 25) included two silicified sandstone triangular projectile points with moderate retouching on the tips, a PDC triangular projectile point with minimal retouching on the tip, a minimally retouched PDC utilized flake, a moderately retouched flake of PDC, and two sandstone abraders (Appendix C, Figure 27). One showed very light use in a single groove, the other displayed three deep, heavily used grooves. A random sample of the lithic debitage yielded 41 flakes of silicified sandstone, two flakes of jasper, two flakes of Galena chert, one flake of petrified wood, and 56 flakes of PDC.

Late Woodland Pottery sherds within the collection included four rim sherds (Appendix C, Figure 26). One with cord-wrapped stick impressions and thin walls was identified as Grant Plain. The other three rim sherds were identifiable as forms of Madison ware, including one rim identified as Madison Plain, and another as Madison Cord Impressed. Two had been decorated with vertical cord impressions, and the third had oblique cord impressions. Non-diagnostic pottery consisted of 29 cordmarked sherds, while three sherds were smooth.

21HU156

The East Ice Haul Slough site was reported in 1994 by the Mississippi Valley Archaeology Center as part of the Pool 9 survey, which was part of a lock and dam project on the

Mississippi River. The site is located upon an island where Minnesota Slough and East Ice Haul Slough meet west of the Mississippi River. The site itself is on the east side of the island, with Early, Middle, and Late Woodland components reported (Boszhardt 1994).

Perhaps the most prominent artifact within the collection was a knife of quartzite similar to the Dakota Quartzite formation, which exhibited heavy retouching. Two triangular projectile points were also observed. One was crafted from silicified sandstone, while the other was made from Galena chert. Neither exhibited any sign of retouching (Appendix C, Figure 28).

Aside from the knife and projectile points, five utilized flakes were present. All were crafted from Galena chert. Three of the five flakes were size graded as G2, and exhibited moderate retouching. Two G1 flakes were also present. One displayed only minimal reworking, while the other displayed moderate retouching. Two scrapers were also present. One end scraper of PDC had been heavily reworked. A side scraper was also present, crafted from Galena chert, and had been expended (Appendix C, Figure 29).

Diagnostic pottery within this collection (Appendix C, Figure 30) showed a variety of decorative traits, including cord impressed, cord-wrapped stick impressed, trailed lines, and punctates. All non-diagnostic pottery sherds displayed cordmarking, save for two shell-temper sherds. 97 sherds of pottery present had grit temper. Diagnostic sherds consisted of two Madison rim sherds with cord impressions, a horizontal cord-impressed Madison Collared sherd with oblique impressions on the collar, an exfoliated sherd with a form similar to Linn ware, and two Grant Ware rim sherds; one was cord impressed, and the other was plain.

21LE106

The Dietz 1 site was surface collected in 2014 as part of the countywide survey in Le Sueur County conducted by Minnesota State University, Mankato. The site is located near Dietz

Lake, and the heaviest concentrations of lithic materials are found on or near ridges overlooking the lake. The collection is composed almost entirely of lithic materials, as the site is located within an agricultural field. However, a single nondiagnostic grit tempered, cordmarked sherd with a thickness of about 6mm was also recovered (Schirmer et al 2014). This site was formally catalogued at the Minnesota State University, Mankato Anthropology Museum, and the catalog reflected in this study is based upon that catalog.

Identifiable projectile points relevant to the study included a moderately retouched Late Woodland corner notched point of heat-treated PDC, a PDC St. Croix point with a moderately retouched tip, a triangular PDC point with the tip moderately retouched, a moderately retouched Samantha point of an indeterminate chert, and a moderately retouched triangular point of Hudson Bay Lowland chert (Appendix C, Figure 31).

Scrapers consisted of an expended quartzite end scraper, an expended PDC scraper, a moderately retouched PDC scraper, a minimally retouched PDC side scraper, an expended Burlington chert side scraper, and a moderately retouched side scraper of indeterminate, heat treated fossiliferous chert.

Five knives of PDC were recovered; two exhibited moderate retouching, one exhibited heat treatment and moderate retouch; one was heavily retouched, heat treated, and was reworked from a projectile point, and one was a large fragment with minimal retouching.

Two multitools were recovered in the survey. One was a combination of a spokeshave and a scraper, and both tool bits were expended. This tool was made of an indeterminate chert. The other multitool was crafted from an indeterminate, heat treated fossiliferous chert. It appears to have been a projectile point repurposed into an expended side scraper after the base snapped near the notching.

A total of two perforators were identified from the collected artifacts. One was created from heat treated Grand Meadow chert, and was expended. The other was created from Prairie du Chien chert, and exhibited minimal use. Other artifacts included a moderately retouched blade of heat treated PDC, a moderately retouched chopper of PDC, a basalt hammerstone with moderate damage to the working end, and an expended spokeshave of indeterminate, heat treated fossiliferous chert.

Utilized flakes included a GMC G2 flake with minimal retouching, an expended G1 flake of PDC, an expended G2 flake of heat-treated PDC, a moderately retouched G2 flake of PDC that may have also been used as a punch or awl, a minimally utilized G2 flake of indeterminate chert, an expended G2 flake of SRC, a moderately retouched G2 flake of indeterminate chert, a heavily retouched G2 flake of PDC, an expended G3 flake of PDC, an expended G2 flake of heat treated PDC, a heavily retouched G1 flake of indeterminate chert, a G3 flake of GMC with minimal retouching, a heavily retouched G2 flake of heat treated Swan River Chert, a G2 flake of Galena chert which displayed minimal retouching, a heavily retouched G2 flake of PDC, a minimally retouched G2 flake of SRC, a moderately retouched G2 flake of PDC, a minimally retouched G3 flake of PDC, a moderately retouched G1 flake of PDC, a minimally retouched G3 flake of heat treated PDC, and a moderately retouched G2 flake of Burlington chert.

Lithic debitage consisted of 58 flakes of PDC, eight flakes of Swan River chert, 27 flakes of indeterminate cherts, one flake of Hudson Bay Lowland chert, two flakes of quartz, one flake of Gunseth silica, two flakes of Grand Meadow chert, two flakes of Galena chert, one flake of Cochrane chert, one flake of chalcedony, and one flake of Cedar Valley chert.

21LE110

The Dietz 5 site was surface collected in 2014 as part of the countywide survey in Le Sueur County conducted by Minnesota State University, Mankato. In the same case as 21LE105, the site is concentrated on ridges overlooking Dietz Lake. The entirety of the materials recovered were lithic remains. Multiple components were observed within the recovered artifacts, from Late PaleoIndian to Woodland (Schirmer et al 2014). This site was formally catalogued at the Minnesota State University, Mankato Anthropology Museum, and the catalog reflected in this study is based upon that catalog.

Relevant projectile points (Appendix C, Figures 32, 34, and 35) were a minimally retouched Samantha point of an indeterminate, heat-treated chert, and a minimally retouched triangular point of PDC. End scrapers consisted of an expended Burlington chert scraper, three heavily retouched scrapers of indeterminate, heat treated, banded chert, and an expended scraper of PDC. Two side scrapers of PDC were also present. One had been expended, while the other displayed moderate use. Finally, a side and end scraper of PDC had been expended. Several other knapped tools were recovered. A projectile point repurposed into a drill or graver exhibited heavy retouch on the tip, and was made from heat treated PDC. A perforator of indeterminate chert had been expended. A single spokeshave of indeterminate chert was expended.

Aside from knapped tools, groundstone tools were present at the site. A celt of basalt (Appendix C, Figure 33) displayed only minimal use on the bit, but had a broken proximal end, indicating it also served as a wedge. A granite mano displayed heavy polish on the working face. A grooved maul of diabase exhibited heavy polish on the bit. A hammerstone of granite with moderate damage to two working surfaces was also recovered.

A total of five utilized flakes were also recovered from the field. All five flakes were size graded as G2. A heat treated PDC flake exhibited moderate use, a flake of non heat treated PDC

exhibited minimal retouch, a flake of indeterminate chert was expended, and two flakes of indeterminate chert exhibited minimal retouching.

Lithic debitage consisted of 58 flakes of PDC, 26 flakes of indeterminate chert, eight flakes of SRC, two flakes of Galena chert, three flakes of Cochrane chert, two flakes of GMC, two flakes of quartz, one flake of Cedar Valley chert, one flake of chalcedony, one flake of Gulseth silica, and one flake of Hudson Bay Lowland chert.

21LE118

The Pheasants Forever 5 site was surface collected in 2014 as part of the countywide survey in Le Sueur County conducted by Minnesota State University, Mankato. The site is the largest in a cluster of sites found on the Pheasants Forever property within the county, and is located on a hilltop about 50m west of the shore of Lake Sanborn (Schirmer et al, 2014:154). This site was formally catalogued at the Minnesota State University, Mankato Anthropology Museum, and the catalog reflected in this study is based upon that catalog.

A number of flaked tools were recovered from the field. One projectile point, a triangular point of indeterminate chert, displayed minimal retouching on the tip. Three side scrapers were present within the collection. One crafted from KRF was heavily retouched, while a heat treated PDC scraper had moderate retouch, and an untreated PDC scraper was expended. Also present were two end scrapers, both crafted from heat treated PDC. One was expended, and the other was retouched heavily.

Three knives were also recovered. One was made from heat treated silicified sandstone, and displayed moderate retouch. The second was made from an indeterminate chert, and was heavily retouched. The third was made from PDC, and also displayed heavy retouch.

Also present were two spokeshaves. Both were crafted from PDC, but only one had been heat treated. Regardless, the concavities in both had been heavily retouched. A perforator with heavy retouching was also present, also made from an indeterminate chert. In addition, an indeterminate, monofacially worked tool of PDC displayed heavy retouch.

Aside from formal tools, two utilized flakes were also recovered. One G2 GMC flake had only minimal retouching present. A second G2 flake of Kekabeka chert displayed moderate retouching.

Lithic debitage consisted of 94 flakes of PDC, 33 flakes of SRC, 18 flakes of indeterminate chert, seven flakes of GMC, seven flakes of quartz, six flakes of Hudson Bay Lowland chert, four flakes of silicified sandstone, three flakes of KRF, two flakes of Iron Formation chert, two flakes of Red River Chert, two flakes of Kekabeka chert, two flakes of TRS, two flakes of silicified wood, one flake of chalcedony, one flake of Galena chert, one flake of indeterminate fossiliferous chert, and one flake of Selkirk chert.

No diagnostic pottery was observed at this location. However, surface collections did recover five grit tempered body sherds resembling Fox Lake pottery. In terms of surface treatment, three were cordmarked, and the remaining two were smooth. All vessels would have relatively thin walls.

21MR13

The Lake Okampeedan site was recorded in 1978, after having been previously surface collected by artifact hunters. The site is located between Clayton Lake and Lake Okampeedan, and consists of an artifact scatter with three main concentrations in an agricultural field. Two mounds to the north of Lake Okampeedan were also reported (Anfinson 1986).

Lithic collections were relatively sparse at this site. A single Klunk projectile point was observed. Crafted from heat treated PDC, the point exhibited moderate retouching on the blades. The sole scraper present in the collection was an expended end scraper of KRF. Four utilized flakes were also present. Two G2 heat treated PDC flakes exhibited moderate retouch, a G2 flake of PDC also had moderate retouch, and a G2 flake of quartzite had only minimal retouching. Only a small amount of lithic debitage was present. It consisted of eight flakes of PDC, four flakes of KRF, four flakes of Tongue River Silica, two flakes of indeterminate chert, two flakes of chalcedony, one flake of silicified sandstone, and one flake of GMC.

All of the non-diagnostic pottery sherds observed within the collection showed smoothed exteriors, regardless of whether the temper was grit or shell. In terms of quantity, three shell tempered sherds were present, while the remainder of the observed pottery, 24 sherds, had grit temper. Diagnostic pottery (Appendix C, Figure 38) consisted of a Fox Lake rim sherd with vertical cordmarking and punctates, a Lake Benton rim sherd with cord impressions and dentate stamping, as well as a Lake Benton shoulder sherd with horizontal trailed lines and tool impressions.

21NL8

The Ft. Ridgely site is a large multicomponent site located within Fort Ridgely State Park, with the Late Prehistoric component located on a ridge overlooking the nearby creek to the northeast of the Minnesota River. While no decorated pottery sherds were recovered, four small, thin-walled shell tempered pottery sherds were present within the collection. Small burial mounds were located nearby, indicating an early Oneota presence (Radford et al 2004).

Two small triangular projectile points were also observed within the collection. Both were crafted from heat treated PDC, with the tip missing from one. However, neither displayed

any signs of retouching. A single expended end scraper of red river chert was also observed within the collection. Also present was a siltstone spokeshave, with minimal retouching on the concavity. Other tools present in the collection included a chopper knapped from basalt with heavy wear on the bit, and a basalt hammerstone with moderate damage on the working portion. Two wedges were also reported in the catalog, but could not be located within the collection. One was made of RRC, the other of KRF.

Four utilized flakes were present. One G2 flake of Burlington chert displayed only minimal retouching. A G3 flake of KRF and a G2 flake of chalcedony both displayed heavy retouching. A heat treated flake of PDC also displayed heavy retouch.

Lithic debitage consisted of 39 flakes of PDC, 21 flakes of TRS, 32 flakes of KRF, 807 flakes of SRC, 126 flakes of RRC, 68 flakes of GMC, nine flakes of silicified wood, six flakes of Galena chert, three flakes of agate, six flakes of chalcedony, six flakes of Knife Lake Siltstone, two flakes of CVC, and 24 flakes of indeterminate cherts.

21NL38

The Timber Lake site was one of many sites collected by Stemper in 1984. Like the other Timber Lake sites, this habitation site was located on an island within Timber Lake in Nicollet County. Although Stemper (1984) reported a number of components such as Mississippian, it is likely after further evaluation that such components are actually Middle Missouri or Plains Village.

Two projectile points are present in the collection (Appendix C, Figure 43). One KRF Avonlea point was present, with moderate retouch along both blades. It was likely expended due to a burination fracture on the tip. Also present was a Prairie Side Notch point, crafted from heat treated PDC. Both blades showed moderate retouching, while the tip showed heavy reworking.

Aside from projectile points, two scrapers were also identified. Both were crafted from heat treated PDC. One had been used as both a side scraper and an end scraper, but the end was only minimally retouched; the sides were heavily retouched. The other scraper was an end scraper, and exhibited heavy reworking.

Other tools present were not diagnostic, such as a single, expended knife of KRF. Other non-diagnostic tools (Appendix C, Figure 44), included a broken proximal fragment of a chisel or wedge of PDC. A multitool of basalt showed both heavy polish from use as an abrader on two sides, and heavy damage on the remaining sides from use as a hammerstone.

After the formal tools were identified, a total of four retouched flakes were also examined. A G2 flake of KRF displayed minimal retouch as did a G2 flake of PDC. Two flakes of heat treated PDC were present. One was sized as G1, while the other was graded G2. Both exhibited moderate retouch. Lithic debitage consisted of 31 flakes of PDC, five flakes of SRC, three flakes of indeterminate chert, one flake of KRF, and one flake of quartz.

Two diagnostic pottery sherds, a flared, undecorated rim and a Late Woodland rim sherd with oblique cord impressions, were present (Appendix C, Figure 45). Aside from the rims, a cordmarked neck sherd with punctates was present, as well as 11 undiagnostic pottery sherds, one with exterior cordmarking, one with an exfoliated exterior surface, and the remaining nine sherds had smoothed exterior surfaces. All pottery present had grit temper.

21NL42

This site also belonged to the Timber Lake cluster, and was also one of the sites collected by Stemper in 1984. Like the other Timber lake sites, this habitation site was located on an island within Timber Lake in Nicollet County, and reported multiple components, including Plains Village and Late Woodland (Stemper 1984).

Lithic tools (Appendix C, Figure 46) generally reflected Plains style. In terms of projectile points, three relevant points were found in the collection. A triangular point of PDC exhibited minimal retouching. Two Plains Side Notched points were also present. Both were crafted from heat treated PDC, and had fragments missing. However, the remaining portions of the blades exhibited minimal retouching on one example, and moderate retouching on the other. Miscellaneous tools in the collection included a knife of Maynes Creek chert with heavy retouching. Also present was a heavily retouched end scraper of PDC. A spokeshave of heat treated PDC which had been expended was also identified.

A total of eight utilized flakes were identified from the site. Three G2 flakes of heat treated PDC showed minimal retouch. An untreated G2 flake of PDC had moderate reworking. A G2 flake of Galena chert also had moderate retouch. A G2 of Horse Creek Chert had moderate retouch. A G1 flake of PDC had been heavily reworked. Unmodified lithic debitage was composed of 21 flakes of PDC, two flakes of SRC, two flakes of silicified sandstone, one flake of quartz, one flake of GMC, one flake of chalcedony, a flake of indeterminate silicate, and one flake of indeterminate chert.

A single recurvate rim sherd was present within the collection. The sherd had oblique impressions along the exterior of an outwards flared lip. In terms of being diagnostic, the sherd closely resembled a type identified by Johnson (2007) as Middle Missouri (Appendix C, Figure 47). Ten non-diagnostic pottery sherds were also present. Three had smooth exteriors, three had cordmarked exteriors, two had a smoothed-over cordmarked exterior, and one had an exfoliated surface. All pottery present had grit temper, save for a single shell tempered, undecorated neck sherd.

21NL64

The Heyman's Creek site is located east of New Ulm, near the junction of Highway 14 and Highway 15. Diagnostic artifacts present suggest either terminal Middle Woodland or Late Woodland occupation, although the disturbance caused by nearby stream activity of Heyman's Creek limits the integrity of this site. Pottery present was stated to be similar to Havana wares (Skaar 1991).

Lithic tools included a single Prairie Side Notched projectile point of PDC exhibiting minimal retouching, a Grand Meadow Chert scraper which was heavily retouched, as well as a heavily retouched knife made of silicified wood. Flake tools consisted of a G2 heat-treated retouched flake of PDC exhibiting heavy reworking, a G1 flake of heat-treated PDC with heavy retouching, a G1 flake of PDC with moderate retouching, a G2 flake of PDC with moderate retouching, an expended G2 flake of PDC, a moderately retouched G2 flake of KRF, a minimally retouched G2 flake of PDC, and an expended G1 flake of agate. Lithic debitage consisted of 14 chalcedony flakes, one Galena chert flake, three GMC flakes, five KRF flakes, two jasper flakes, 39 quartz flakes, three siltstone flakes, ten Red River chert flakes, six flakes of Tongue River silica, 22 flakes of indeterminate chert, one flake of granite, and 67 PDC flakes.

Ceramic remains observed within the collection itself consisted entirely of grit-tempered sherds. Nearly all of the sherds (21 observed) exhibited smooth exteriors with trailed lines and dentate stamping, however, three sherds also had cordmarking for their surface treatment. No diagnostic sherds relevant to the period of study were observed within the collection, but non-diagnostic thin-walled Late Prehistoric sherds were present.

21NL131

The Oshawa site is located near the St. Peter Regional Treatment Center, and was evaluated in 2004. The site is located on a lobe of land bordered by deep ravines to the south,

east, and west. A well-developed, relatively undisturbed soil profile was discovered, as well as multiple diagnosic artifacts. Among these were side-notched projectile points, and pottery reported to be Fox Lake (Terrell and Terrell 2004). However, the reported pottery could not be located in the collections.

The lithic remains consisted of two heat-treated PDC projectile points of the Plains Side Notched cluster (Appendix C, Figure 48). One showed no signs of retouching, while the other exhibited light retouching. Also present was a heavily damaged granite hammerstone, a retouched G2 flake of Knife River Flint exhibiting moderate retouching, a heavily retouched side scraper of Grand Meadow Chert, a G3 minimally retouched heat-treated PDC flake, a G2 minimally retouched PDC flake, a moderately bifacially retouched G2 heat-treated PDC flake, and a moderately retouched G3 flake of GMC.

The majority of the lithic debitage present consisted of PDC, with 169 flakes present. Other materials present were four flakes of KRF, three flakes of SRC, three flakes of silicified sandstone, and two flakes of Blanding chert. Three flakes of indeterminate chert were also present.

21NL140

The Falls Habitation site was investigated in 2006 by a construction survey conducted by the Mississippi Valley Archaeology Center, led by Constance Arzigian. The survey discovered substantial amounts of Late Woodland materials near Minnemishinona Falls on the Minnesota River. The majority of the artifacts were located along terraces above the river, with more found on slopes surrounding the gorge (Arzigian 2007).

Lithic tool remains were limited to a single triangular projectile point perform of heat-treated PDC. Lithic debitage consisted of 47 PDC flakes, 13 indeterminate chert flakes, three Knife River Flint flakes, five GMC flakes, one Cedar Valley chert flake, and one quartz flake.

Three pottery rim sherds were also recovered. All were cord impressed (Appendix C, figure 49). Two of the rim sherds resemble Late Woodland High Rim, with only horizontal cord impressions on the exterior rim. The largest of the three bears a vague resemblance to Madison Cord Impressed found in Wisconsin, with a flared rim, oblique cord impressions on a collared lip, and stick impressions on the inner lip. Over 200 undecorated grit-tempered cordmarked sherds were also present; no other surface treatments were observed.

21WN1

The La Moille Rockshelter is the namesake for one of the earliest known varieties of pottery in the region, La Moille Thick. The rockshelter is located near Trout Creek, to the south of La Moille Cave. Diagnostic remains from the rockshelter date from Archaic to Late Woodland, but no Oneota component has been reported. It has been speculated that this location was used as a fishing camp by those who visited, due to the large amounts of fish remains present in all levels of the excavation (Wilford 1954).

A total of 11 projectile points were observed within the collection (Appendix C, Figure 50). Relevant to the study was a heat treated PDC Madison-like triangular point with heavy retouching on the tip, as well as a Klunk point of silicified sandstone with moderate retouching on the tip. An expended PDC end scraper was also present. A G1 sized flake of silicified sandstone and a G2 sized heat treated Galena chert flake had been heavily retouched, while a heat treated PDC flake was moderately retouched. A piece of raw, unworked copper was also present within the collection.

Lithic debitage was lacking in the collection, aside from three retouched flakes, which could indicate that the collection process of this site has led to considerable bias within the collection. Aside from the La Moille vessel, no diagnostic pottery was present, with the exception of 17 thin Late Woodland grit-temper sherds with cordmarked exteriors.

21WW8

The Kunz site is located near Madelia on a point of land on the southwest side of Fedje Lake which once extended out into Hopkins Lake, which is now drained. The site was surface collected in 1973 as part of a highway survey. Additionally, it has been reported that the landowners collected hundreds of projectile points and scrapers, as well as pottery including Marion Thick, Cambria, and Fox Lake (Peterson 1973).

A variety of lithic tools were observed within the collection (Appendix C, Figures 51 and 52). In terms of projectile points, two Samantha points were observed within the collection. One had been crafted from heat treated TRS and displayed moderate reworking. The other was made from PDC, and displayed only minimal retouching.

Two knives were present at the site. One appeared to have been crafted bifacially from a flake of GMC, and displayed moderate retouching. The second was bifacially worked from heat treated PDC, and also displayed moderate retouching. A large, grooved maul of granite with heavy damage on the bit was also observed in the collection. The bit was ground flat, and showed signs of heavy use.

Two drills were observed within the collection. One was crafted from heat treated SRC and was broken; the intact portion showed heavy reworking. A second drill was made from heat treated PDC, appeared to have doubled as a perforator, and also appeared to have been heavily reworked.

Retouched flakes within the collection showed a variety of wear. A heat treated G2 PDC minimal reworking, two G1 heat treated PDC flakes had minimal retouch, Two G2 heat treated PDC flakes were expended, a single G2 KRF flake was expended on one edge with moderate retouch on another edge, three G2 KRF flakes had minimal reworking, a G2 KRF flake exhibited moderate retouching, and a G1 Burlington chert showed minimal retouching.

A random sample of the lithic debitage yielded 36 PDC flakes, three flakes of indeterminate chert, two flakes of Swan River chert, two flakes of Knife River Flint, one flake of siltstone, one flake of silicified sandstone, and one flake of Galena chert.

About 50 pottery sherds, both decorated and undecorated, were observed within the collection. Generally, grit tempered pottery sherds, which comprised the majority of the pottery, were observed to have either cordmarked exteriors or smooth exteriors with trailed lines, while shell tempered pottery, which was less numerous, had only smooth exteriors with trailed lines. The majority of the grit-temper pottery sherds were smooth. However, the only diagnostic pottery observed consisted of five grit tempered rim sherds (Appendix C, Figures 53 and 54). Two cordmarked Late Woodland rims with unmodified lips were present; both had cord impressions. A High Rim pottery sherd with a flattened lip, tool impressions, and oblique dentate stamping was also present. A smooth Late Prehistoric rim with an unmodified lip also had oblique dentate stamping. The final decorated pottery sherd had a smooth exterior, unmodified lip, and horizontal trailed lines.

21WW9

The Halvorsen/Lau Lake site is located near Madelia on what was once a peninsula in a drained lake known as Lau Lake, near the Blue Earth County line. The site was surface collected by MHS in 1973 as part of a highway survey project. Prior to the survey, both the landowner as

well as tenants who rented the property had collected substantial amounts of artifacts from the point (Peterson 1973). The collections are housed at both MHS and within the museum at Minnesota State University, Mankato, since the site was studied in two separate instances. However, only the MHS collection was examined.

A number of lithic tools (Appendix C, Figure 55) were observed within the collection. Two broken PDC projectile points which belonged to the Plains Small Side Notched cluster had minimal retouching, with one exhibiting only retouching on the tip. A Late Prehistoric or Honey Creek Corner Notched point of SRC had been heavily retouched. One triangular point of GMC displayed no signs of retouching. A second GMC triangular showed minimal retouching on the tip. The third and final triangular point of Hixton silicified sandstone also showed minimal retouching on the tip.

Several types of scrapers were examined from this site as well. A single hemifacial scraper crafted from SRC exhibited heavy retouching. Two GMC side scrapers were also present. The tools present, however, were dominated by end scrapers. A single end scraper of indeterminate chert was expended. One PDC end scraper was expended, one of GMC was expended, one of PDC was heavy retouched, two heat treated PDC end scrapers were expended, one of GMC had moderate reworking, one jasper end scraper had moderate reworking, and one of KRF had moderate retouch.

Three knives were observed in the collection. One broken knife was made of quartzite and exhibited heavy wear and retouching. Another was made from PDC, and also showed heavy wear and retouching. The third knife was made from GMC, and only exhibited minimal retouching.

A variety of retouched flakes were also observed within the collection. A G2 Heat treated SRC flake had minimal retouching. For PDC, a G2 heat treated PDC flake had minimal retouching, a G2 PDC flake had minimal retouching, two G2 heat treated PDC flakes had moderate retouching, a G1 PDC flake had minimal retouching, four G2 heat treated PDC showed moderate reworking, a G3 GMC flake exhibited moderate retouching, a G2 GMC flake showed minimal resharpening, a G1 GMC had moderate retouching, two G2 GMC flakes had been heavily resharpened, two G2 GMC flakes had moderate retouching, a G2 KRF flake showed minimal retouching, and a G2 Scenic Chalcedony flake showed heavy retouching.

A random sample of lithic debitage was composed of 33 flakes of PDC, eight flakes of GMC, seven flakes of SRC, three flakes of KRF, three flakes of silicified sandstone, one flake of silicified wood, one flake of agate, one flake of jasper, and one flake of indeterminate chert. Diagnostic pottery was also present within the collection; twelve rim sherds relevant to the study were located (Appendix C, figure 56). Six were identified as Terminal Middle Missouri plain rims, two sherds of High Rim with oblique cord-wrapped stick impressions, a Lake Benton neck with horizontal cord-wrapped stick impressions, a Lake Benton rim with both horizontal and vertical trailed lines, a Lake Benton rim with vertical cord-wrapped stick impressions, a Lake Benton rim with dentate stamping, and an indeterminate rim with horizontal tool impressions and an unmodified lip. The majority of the non-diagnostic pottery sherds present (roughly 60 sherds) were smooth, but cordmarked sherds were also present.

Marschner Map

After plotting the recorded site locations on Marschner's (1930) map, each site was referenced against the map (Appendix A, Figure 2). Eastern sites such as 21HU2, 21HU26, 21HU43, 21HU52, 21HU152, 21HU156, and 21WN1 were located in a more woodland-type

environment as expected; all were located in areas dominated by Big Woods and River Bottom Forest.

Following this trend, western sites were located in a more plains-like environment; sites 21BW1, 21FA95, 29FA97, 21MR15, 21NL8, and 21NL64 were all located in areas reported as Prairie. Exceptions included 21WW8 and 21WW9, which were located in a small pocket of Big Woods within a large section of Prairie, and 21BW54 was located in a narrow patch of mixed Big Woods and River Bottom Forest.

Sites located near or within the ecotone itself displayed a wider variety of environments. 21NL38 and 21NL42 were located in a mix of Prairie and Oak openings and Barrens, while 21NL131 was located in a mix of Big Woods and Oak openings and Barrens. 21NL140 and 21BE24 were located in a small area where multiple environments, including Prairie, Big Woods, River Bottom Forest converged near the Minnesota River. Finally, 21LE106, 21LE110, and 21LE118 were located within a large area of Big Woods, pockmarked by small islands of Prairie. However, caution must be taken when interpreting these results, as the data are fairly broad approximations taken from surveys performed in the 1850's, a period of time which marks the end of a climatic anomaly known as the Little Ice Age. This period is characterized by periods of cooler, arid conditions, which would have had a direct impact upon vegetation (Grove 2004). Hence, the pollen cores reported below are a much more reliable source than the results from the Marschner map.

Pollen Core Results

A total of four pollen cores were downloaded from the Neotoma Paleoecology Database (2016). Their characteristics are listed below, and displayed in Appendix B, Tables 1-4.

Amber Lake

Amber Lake is located near Fairmont in Martin County, and the sample dates range from 933 calendar years before present (CYBP) and 72 CYBP. The number of identifiable specimens present (NISP) of shade intolerant grasses and forbs remains relatively consistent through the majority of these dates, with Ambrosia overtaking Poaceae in terms of prominence as the samples become more recent. Quercus also became more prominent beginning around 437CYBP.

George Lake

The George Lake pollen core was taken from southern Le Sueur County, and lists samples from 1500 radiocarbon years before present (RCYBP) to 12 RCYBP. Initially, the sample is dominated by Poaceae and Quercus. Betula, Quercus, and Ambrosia steadily became more prominent as the samples progress chronologically. Given that Le Sueur County is regarded as being in the center of the ecotone, it is not surprising to see the samples fluctuate between both woodland and prairie species.

Kelly-Dudley Lake

Kelly-Dudley Lake is located in Rice County, near the town of Faribault. The pollen data extends from 17 calibrated radiocarbon years before present (CRCYBP) as far back as 6543 CRCYBP. The samples dating back about 1500 CRCYBP reflect relatively stable dominance by Quercus as time progresses, with more prairie-oriented plants such as Artemesia and chenopods remaining low in frequency throughout.

Tamarack Creek

Tamarack Creek is located in southern Trempeleau County, Wisconsin. The pollen core from Tamarack Creek contained samples dating back to 4500 RCYBP, and as recent as 76RCYBP. Beginning with samples dating about 1500RCYBP, the samples were dominated by

Quercus, Cyperaceae, and Pinus. However, these species begin to decline in samples dating to around 1000 RCYBP, with Betula, Larix, and Dryopteris increasing.

CHAPTER 4

ANALYSIS

As stated previously, the pollen cores utilized illustrate a mostly open, prairie-like environment throughout the selected period of time in the western portion of the study area, with trees only becoming more numerous after about 400 years BP. Conversely, the center of the ecotone appeared to initially have a higher amount of prairie vegetation, with plant communities such as parklands, barrens, and woodlands beginning to become more well-established and numerous after about 1500 years BP. In contrast, the eastern portion of the study area appears to have been dominated by tree species for the entirety of the period of interest, and presumably became more favorable to trees which favored a wetter environment around 1000 BP.

In order to contrast these dates with the dates of chronologically relevant diagnostic artifacts within the collections, dates from each diagnostic artifact were determined. Projectile points were compared to the online projectile point guide, http://www.projectilepoints.net (Electronic Document, Accessed December 15, 2016), with the dates from this source used for all points. In a similar manner, dates for identifiable pottery were taken from pottery handbooks. For the eastern portion of the area, a guide to ceramics common to Western Wisconsin compiled by Howell (1995) was used. For the more western counties, a handbook for ceramics common to Minnesota by Anfinson (1979) was used in addition to a Smithsonian guide to Plains Village pottery by Johnson (2007).

Comparing artifacts to environmental data, the pottery and projectile points in the collection from 21BW1 lend the site an occupation date range from about 1700 B.P. to about 300

B.P. Diagnostics from 21MR13 and 21NL64 suggest a possible date range from about 1500 B.P. to about 500 B.P. Artifacts at 21WW8 potentially date from 1700 BP until 1200 BP, while diagnostics from 21WW9 potentially date from 1700 BP to 300 BP. Artifacts from 21FA95, 21NL8, 21NL140, indicate an occupation between 1100 B.P. to around 400 or 300 B.P., with 21FA97 having been radiocarbon dated to 660 to 550 B.P.

As previously discussed, the pollen core most relevant to these sites, Amber Lake, illustrates a prairie environment composed mainly of shade intolerant grasses and forbs, with a shift showing oak becoming more prominent towards the end of the occupation, which could indicate that the environment may have shifted towards an oak savannah. Given these results, it was expected that these collections be dominated mainly by Plains-oriented artifacts such as projectiles of the Plains Side Notched cluster, as well as Samantha points. Plains pottery such as Lake Benton and Middle Missouri Plain reinforces this.

Moving east, the diagnostics from 21NL38 indicate occupations ranging from about 1800 B.P. to roughly 500 B.P. Possible dates of occupation at 21NL42 range between 1300 B.P. to 300 B.P., and artifacts from 21NL131 indicated possible dates of occupation between 1500 B.P to 700 B.P. Finally, the dates from diagnostic artifacts in the collection of 21NL140 range between 1100 B.P. and 300 B.P. Environmental data nearest these locations comes from the pollen core taken from George Lake, which illustrated fluctuating vegetation communities, with trees becoming more prominent towards the end of these dates. Artifacts present at these sites demonstrate that both Woodland and Plains groups were present within the ecotone, as illustrated by projectiles such as Madison-like triangular, in addition to points belonging to the Plains Side Notch cluster. Pottery diagnostic to Middle Missouri and unnamed Prairie Lakes High Rim pottery also indicate the presence of Plains influence in the ecotone.

Continuing this eastward trend, the diagnostics examined at the sites within Le Sueur County suggest dates between about 1700 B.P. to about 300 B.P., as indicated by the projectile points deemed relevant to the study. With the pollen core taken from Kelley-Dudley Lake illustrating a general dominance of woodland species over prairie species, it is not surprising to have observed Eastern projectiles such as St. Croix style, however, the presence of Samantha projectiles indicates that Plains populations did indeed venture into the eastern portion of the ecotone.

All artifacts examined from the sites located within Houston County dated from between 1100 B.P. to 300 B.P., while the artifacts examined from 21WN1 dated from 1500 B.P. to about 300 B.P. Other artifacts present in the 21WN1 collection dated much earlier, but did not fall within the dates of concern. As discussed previously, the pollen core for this area, Tamarack Creek, displayed dominance of tree pollen such as oak and pine throughout these dates, with trees favoring a wetter, more marsh-like environment, such as willow, becoming more prominent as time progressed. Projectile styles such as Madison-like unnotched and Klunk, both common to the Woodlands and the upper Mississippi Valley, suggest that these areas were primarily inhabited by Eastern Woodland groups. However, the presence of a Besant projectile indicated Plains groups may have crossed deep into the Woodlands. Pottery consisting of exclusively Woodland wares, such as Grant, Linn, and Madison, however, reinforces the dominance of Woodland style.

DISCUSSION

While the artifacts present within the collections did not vary significantly in terms of form, both projectile points and pottery did vary in terms of form and style. The evidence available to this study did indicate that distinctly Plains and Woodland peoples did possess adaptations for entering or crossing the ecotone, as illustrated by their projectiles and pottery. It is clear that multiple, individual populations were present within the area of study, and that styles regarded as centered on both the Plains and the Woodlands are present not only within the transition zone itself, but on both sides of the area in question.

In regards to the original research questions, a number of conclusions can be drawn.

1. By way of informal tools versus formal tools, it may be argued that the Woodland strategy employed more improvised or informal tools, while the Plains strategy relied more upon formal tools. With few exceptions, such as 21WW8, formal tools were generally more common than informal tools such as retouched flakes in collections from the western counties, while retouched flakes were much more common in eastern counties (Appendix B, Tables 5-31).
2. Style indicates that both Woodland and Plains peoples did enter the ecotone and cross over to the other environment regularly, as evidenced by aforementioned Plains style projectile points (Appendix B, Tables 19, 29) and pottery such as Middle Missouri components (Appendix C, Figure 47) in areas not only recorded as having more woodland or forest pollen (Appendix B, Tables 3-4), but recorded as having a more woodland or forest style within the Marschner data. The opposite is also the case, as Woodland style pottery and projectile points considered to be more eastern-oriented were recovered in areas in which grasses and forbs were best supported by the environment

(Appendix B, Tables 9-12). It is apparent that Plains peoples may have selected woodland environments as part of their seasonal round within the ecotone, however, it is important to note that this may be coincidental, as woodland "patches" on the prairies are generally located near perennial bodies of water, a vital resource to any prehistoric population (Appendix A, Figure 2). Regardless, it is clear not only that both Woodland and Plains groups did indeed enter the Plains-Woodlands ecotone regularly, but were fully capable of settling on the other side of the boundary, within and utilizing the areas in which environmental conditions were dissimilar to their core areas.

3. As previously discussed, it is apparent that both Woodland-oriented and Plains-oriented groups did readily cross into the "opposite" environment. However, with the evidence available, it is unclear exactly to what extent Woodland groups adapted Plains technology. It is entirely possible that "transitional" cultures such as the Oneota favored tools such as smaller projectiles for bison hunting, however, this remains indeterminate.
4. As discussed previously in Question 3, it remains indeterminate exactly to what degree Plains groups adapted technology of the "opposite side". While it is possible that tools more common in the east, such as side scrapers, were more favorable in processing Woodland game, this remains uncertain.
5. No specialized tools created specifically for entering the ecotone, or crossing into the 'opposite' environment, were observed. While this does not mean that such tools were not created and utilized, it would be difficult to argue that such tools are present in the area given the available evidence.
6. Identifying groups based solely on pottery style and projectile form, it is apparent by the presence of pottery styles such as Lake Benton, High Rim, and Middle Missouri sherds

near the ecotone that both Woodland and Plains populations were capable of crossing the ecotone, and did so regularly (Appendix C, Figures 2-6, 10, 14, 31, 32, 43, 45, 47, 51). In the way of exterior treatments, all areas had a prominence of cordmarking. However, the west displayed higher proportions of smooth surfaced pottery. Additionally, western pottery generally displayed more trailed or incised lines and punctates, while eastern pottery displayed more cord impression. The exception to this, of course, is the Oneota components, which displayed smooth surface and trailed lines with punctates throughout the area of interest (Appendix C, Figures 8, 16).

Projectile point styles reflect varying degrees of form within each environment type. Unnotched triangular projectile points are found prominently throughout the study area (Appendix B, Tables 5-31). However, more Western point styles were more limited. Points belonging to the more Plains-oriented clusters, such as Prairie Side Notched, Plains Side Notched, and Samantha, were most prominent within the ecotone and the western extent of the study area. Only one chronologically relevant Plains style projectile point was observed within the collections from the Woodland counties of Winona or Houston (Appendix B, Tables 13-18, 29). Within the ecotone itself in counties such as the eastern portion of Nicollet and Blue Earth, sites such as 21NL131, 21NL38 and 21NL42 displayed favoring towards Plains style projectiles, while 21BE24 favored more Eastern styles of projectiles. However, sites within Le Sueur County displayed relatively equal proportions of Plains style and Eastern style projectiles, suggesting that both Prairie and Woodland peoples were not only capable of using the ecotone and the opposite environment, but consistently entered the ecotone as at least part of their respective seasonal rounds (Appendix B, Tables 19-21, 24-28).

7. Overall, it is apparent from this study of sites with limited sample sizes that although Woodland and Plains tool kits did not vary dramatically in terms of function, style and emphasis on curation did vary between these peoples. The disparities between the amount of reworking between the two shows a western emphasis on utilizing tools more intensely in their service life, if not keeping possession of and reworking tools longer than their perceived usefulness to Woodland populations.

   In terms of lithic raw materials, differences among the less prominently used materials tended to have the most variation. The dependence of the Late Prehistoric people who lived within the study area on Prairie du Chien chert as a raw material cannot be overstated, as all of the sites examined indicate this chert as the predominant material save for the debitage collection from 21NL8. Beyond this, other locally utilized materials varied by geographic location. Eastern sites tended to have a heavier emphasis on silicified sandstone as a secondary material, and western sites had more prominent use of SRC and siltstone. Nearly all sites selected GMC as a secondary material. Exotic materials such as KRF and Burlington Chert were generally limited to western sites, and sites within the ecotone (Appendix B, Figures 1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 44, 45, 47, 48, 50, 51, 53, 54, 56, 57, 59, 60, 62, 63, 65, and 66).

   Degrees of retouching and expenditure showed definite variations in curation strategy (Appendix B, Figures 3, 6, 9, 12, 15, 17, 20, 23 26, 29, 32, 35, 38, 41, 43, 46, 49, 52, 55, 58, 61, 64, and 67). For example, in the collections at 21BW1, over half of the tools examined were regarded as either heavily retouched or expended. Over two thirds of the artifacts at 21BW54 were expended. Exceptions to this trend occur at 21FA95 and

21FA97, however, the limited size of these collections could be the culprit for this finding. With the exception of 21HU43, eastern sites did not exhibit such degrees of intensity in terms of tool curation. It is important to note however, that this also may not indicate entirely different subsistence strategies, or cultural presence, as stated by Binford and Binford (1969). Thus, it is entirely possible that the prominence of exotic raw materials and intense retouching may indicate that Plains-oriented groups of the time simply experienced stress in terms of raw lithic material.

CONCLUSION

Given the results of this project, it is reasonable to assert several inferences in regards to ecotones and how humans adapt to such zones. In this case, eastern style projectiles and pottery located at the same sites as western style points and pottery demonstrates that both Plains and Woodlands peoples not only entered the ecotone, but possessed the tools and knowledge to occupy the "opposite" environment. While faunal and botanical remains were not examined as part of this study, future research may reveal to what degree both Plains and Woodlands groups utilized specific floral and faunal food resources while "crossing".

Additionally, stress for resources may not immediately lead to use of resources from the "other side", as illustrated by sites dominated by Plains technology intensely utilizing mostly western and locally available raw lithic materials rather than the use of eastern stone, or the use of more informal tools such as the utilized flakes more prominent at Woodland sites. However, it remains unclear whether this observation was genuinely due to material stress, or if Plains populations expended their tools of western stone, only to create tools of eastern materials while in the ecotone, to expend them elsewhere. An answer to this question may come should expended tools of eastern materials be found at excavations to the west, or in counties with sparse records, such as Steele, Waseca, Rice, and Dodge.

One lingering issue is the pottery which falls within the High Rim horizon, found in the central and western portions of the area examined. As stated by Benn and Green (2000), these unnamed pottery styles fit within the High Rim horizon in terms of thin walls, flared rims, grit temper, cordmarking, tool impressed lips, and horizontal cord impressions, and generally date between 1200 B.P to 1000 B.P. While these Late Prehistoric pottery sherds bear a resemblance to Lake Benton pottery found to the west, and the Grant Wares and Madison Wares found in Iowa

and Wisconsin, the pottery sherds in question are decidedly more prairie-oriented than woodland-oriented. This is illustrated by the style in question being recovered in the Prairie Lakes region. Currently, it is unknown as to exactly how these different wares are related, and what implications they have on the region (Schirmer, Personal Communication, February 22, 2018). Further study of this High Rim may reveal more information regarding how people who lived in the Prairie Lakes region related to people further east, particularly those in the Woodlands who created similar Madison and Grant wares.

BIBLIOGRAPHY

Aaseng, Norman E., John C Almendinger, Robert P. Dana, Erika R. Rowe, Kurt A. Rusterholz, and Daniel S. Wovcha

2011 Minnesota's Native Plant Community Classification: A Statewide Classification of Terrestrial and Wetland Vegetation Based on Numerical Analysis of Plot Data. St. Paul, MN: Minnesota Department of Natural Resources.

Aaseng, Norman E., John C. Almendinger, Robert P. Dana, Barbara C. Delaney, Hannah L. Dunevitz, Kurt a Rusterholz, Nancy P. Sather, and Daniel S. Wovcha

1993 Minnesota's Native Vegetation: A Key to Natural Communities, Version 1.5. St. Paul, MN: Minnesota Department of Natural Resources.

Ahler, S.A.

1993 Plains Village Cultural Taxonomy for the Upper Knife-Heart Region. *In* The Phase I Archeological Research Program for the Knife River Indian Villages National Historic Site, Part IV: Interpretation of the Archeological Record. T.D. Thiessen, ed. Occasional Studies in Anthropology 27:27-46.

Anderson, J. Heath

2014 Personal Communication, April 15, 2014.

Anfinson, Scott F.

1979 Handbook of Minnesota Prehistoric Ceramics. St. Paul, MN: Minnesota Archaeological Society.

1986 Annual Report: Minnesota Municipal and County Highway Archaeological Reconnaissance Study. St. Paul, MN: Minnesota Historical Society.

1997 Southwestern Minnesota Archaeology: 12,000 Years In the Prairie Lake Region. St. Paul, MN: Minnesota Historical Society.

Anfinson, Scott F. and Randy J. Peterson

1985 Annual Report: Minnesota Municipal and County Highway Archeological Reconnaissance Study. St. Paul, MN: Minnesota Historical Society.

1988 Annual Report: Minnesota Municipal and County Highway Archeological Reconnaissance Study. St. Paul, MN: Minnesota Historical Society.

Arzigian, Constance M.

1987 The Emergence of Horticultural Economies in Southwestern Wisconsin. *In* Emergent Horticultural Economies of the Eastern Woodlands. William F. Keegan, ed. Pp. 217-242.

2007 Phase I Investigations at Minnemishinona Falls, Nicollet County, Minnesota. *In* Report of Investigations Number 654. La Crosse, WI: Mississippi Valley Archaeology Center.

2008 Minnesota Statewide Multiple Property Documentation Form for the Woodland Tradition. La Crosse, WI: Mississippi Valley Archaeology Center.

Arzigian, Constance and Katherine Stevenson

2008 Minnesota's Indian Mounds and Burial Sites: A Synthesis of Prehistoric and Early Historic Archaeological Data. Publication 1, St. Paul, MN: Office of the State Archaeologist.

Bamforth, Douglas B.

1987 Historical Documents and Bison Ecology on the Great Plains. Plains Anthropologist 32(115):1-16.

Barker, William T. and Warren C. Whitman

1988 Vegetation of the Northern Great Plains. Rangelands 10(6):266-272.

Benn, David W. and William Green

2000 Late Woodland Cultures in Iowa. *In* Late Woodland Societies. Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, eds. Pp. 429-496. University of Nebraska Press.

Binford, Lewis R.

1976 Forty-seven Trips: A Case Study of the Character of Some Formation Processes of the Archaeological Record. Musée nationaux du Canada.

Binford, Lewis R. and Sally R. Binford

1969 Stone Tools and Human Behavior. Scientific American 220:70-84.

Boszhardt, Robert F.

1989 Strittmater Rockshelter. Recorded on a Minnesota State Site File form. St. Paul, MN: Minnesota Historical Society.

1994 East Ice Haul Slough Site. Strittmater Rockshelter. Recorded on a Minnesota State Site File form. St. Paul, MN: Minnesota Historical Society.

2000 Turquoise, Rasps, and Heartlines: The Oneota Bison Pull. *In* Mounds, Modoc, and Mesoamerica: Papers in Honor of Melvin L. Fowler. Stephen Asher, ed. Pp. 361-374. Illinois State Museum Scientific Papers Series Vol. XXVIII. Springfield, IL: Illinois State Museum.

Burghardt, Andrew F.

1959 The Location of River Towns in the Central Lowland of the United States. Annals of the Association of American Geographers 49(3):305-323.

Button, K.S., J.P. Ioannidis, C. Mokrysz, B.A. Nosek, J. Flint, E.S. Robinson, and M.R. Munafo

2013 Power failure: why small sample size undermines the reliability of neuroscience. Nature Reviews. Neuroscience 14:365-376.

Clements, Frederic E.

1916 Plant Succession: An Analysis of the Development of Vegetation. Washington, D.C.:Carnegie Institution of Washington.

Cunfer, Geoff

2016 Overview: The Decline of the Bison Empire. *In* Bison and People on the North American Great Plains: A Deep Environmental History. Geoff Cunfer and Bill Waiser, eds. Pp. 1-29. Texas A&M University Press.

Dennell, Robin

1985 The Hunter-Gatherer/Agricultural Frontier in Prehistoric Temperate Europe. *In* The Archaeology of Frontiers and Boundaries. Stanton Green and Stephen Perlman, eds. Pp. 113-140. Orlando, FL: Academic Press, Inc.

Dobbs, Clark

1984 Minnesota State Archeological Site Form, submitted as part of the 1984 Blue Earth Survey. St. Paul, MN: Minnesota Office of the State Archeologist.

Emerson, Patricia

2016 Personal communication, 4/13/16.

Emerson, Thomas E.

1999 The Langford Tradition and the Process of Tribalization on the Middle Mississippian Borders. Midcontinental Journal of Archaeology 24(1):3-56.

Faber, Jorge and Lilian Martins Fonseca
2014 How sample size influences research outcomes. Dental Press Journal of Orthodontics 19(4):9-27.

Frison, George C.
1991 Prehistoric Hunters of the High Plains, 2nd Edition. San Diego, CA: Academic Press, Inc.

Gibbon, G.E.
2012 Archaeology of Minnesota: The Prehistory of the Upper Mississippi River Region. Minneapolis, MN: University of Minnesota Press.

Green, Stanton, and Stephen Perlman
1985 An Approach to the Archaeological Study of Frontiers and Boundaries. *In* The Archaeology of Frontiers and Boundaries. Stanton Green and Stephen Perlman, eds. Pp. 3-14. Orlando, FL: Academic Press, Inc.

Grimm, Eric C.
1985 Vegetation along the Prairie-Forest Border in Minnesota. *In* Reprints in Anthropology, Volume 31. Lincoln, NE: J & L Reprint Company.

Grove, Jean M.
2004 Little Ice Ages: Ancient and Modern, Volume 2. Oxford: Taylor and Francis.

Henning, Dale R.
1998 The Oneota Tradition. *In* Archaeology on the Great Plains. W. Raymond Wood, ed. Pp. 345-414. University of Kansas Press.

Henning, D.R. and D.L. Toom
2003 Cambria and the Initial Middle Missouri Tradition. Wisconsin Archeologist 84(1 and 2):197-217.

Holley, George R. and Michael G. Michlovic
2013 The Prehistoric Village Cultures of Southern Minnesota. Minnesota Historical Society Contract Report. Department of Earth Sciences, Minnesota State University Moorhead.

Howell, Ryan J.
1995 Common Woodland Period Ceramics of Western Wisconsin. Fort McCoy, WI: United States Army Reserve Command Archaeology Laboratory.

2015 Common Woodland Period Prehistoric Ceramics of Western Wisconsin. Electronic Document, https://www.academia.edu/4427132/A_Field_Guide_to_Western_Wisconsin_Woodland_Ceramics, accessed April 21, 2018.

Hudak, G.J.
1975 Lake Hanska County Park. St. Paul, MN: Science Museum of Minnesota.

Johnson, Craig M., Stanley A. Ahler, Herbert Haas, and Georges Bonani
2007 A Chronology of Middle Missouri Plains Village Sites. Washington, D.C., Smithsonian Institution Scholarly Press.

Johnson, Craig M.
2007 Plains Village Pottery. *In* Smithsonian Contributions to Anthropology 47:247-274. Washington, D.C., Smithsonian Institution Scholarly Press.

Magner, Michael and Stacy Allan
2009 Minnesota Department of Natural Resources Division of Forestry Heritage Resources Program, Annual Report – 2008. St. Paul, MN: Archeology Department, Minnesota Historical Society.

Minnesota Department of Natural Resources
n.d. Presettlement Vegetation, Shapefile, from the recompiled version of the arschner Map, https://gisdata.mn.gov/dataset/biota-marschner-presettle-veg, accessed March 5, 2016.

Minnesota State University, Mankato (MNSU)
2016 Archeology Wiki. Electronic Document, http://wiki.mnsu.edu/archeology/index.php/Main_Page, accessed May 5, 2016.

Nelson, David N., Feng Sheng Hu, Eric C. Grimm, B. Brandon Curry and Jennifer E. Slate
2006 The Influence of Aridity and Fire on Holocene Prairie Communities in the Eastern Prairie Peninsula. Ecology 87(10):2523-2536.

Neotoma
2016 Paleoecology Database. Electronic Document, https://www.neotomadb.org/ accessed April 18, 2016.

Neumann, Michelle
2017 A Stylistic Analysis Using Multivariate Statistics of Oneota Pottery from the Upper Mississippi, Blue Earth, and St. Croix River Valleys. Master's Thesis, Department of Anthropology, Minnesota State University, Mankato.

Nuzzo, Victoria A.
1994 Extent and Status of Midwest Oak Savanna: Presettlement and 1985. Electronic document, https://archive.epa.gov/ecopage/web/html/nuzzo.html/ accessed October 1, 2018

Lehmer, D.J.
1971 Introduction to Middle Missouri Archeology. Washington, D.C.:Department of the Interior, National Park Service, Anthropological Papers 1.

Overstreet, Robert M.
2003 Identification and Price Guide to Indian Arrowheads, Eighth Edition. New York, NY: House of Collectables.

Padilla, Matthew J. and Lauren W. Ritterbush
2005 White Rock Oneota Chipped Stone Tools. Midcontinental Journal of Archaeology 30(2):259-297.

Peterson, Les
1973 Halvorsen Site. Archaeology Laboratory Survey Sheet. St. Paul, MN: University of Minnesota.

1973 Kunz Site. Archaeology Laboratory Survey Sheet. St. Paul, MN: University of Minnesota.

Peterson, Randy J., Michael A. Magner, and Bruce A. Koenen
1992 Minnesota Municipal andCounty Highway Archaeological Reconnaissance Study, 1991 Annual Report.

Radford, David S., Leroy Gonsior, Douglas C. George, and Stacy Allan

2004 Cultural Resource Reconnaissance Survey of the Amphitheater Rehabilitation Project, Fort Ridgely State Park, Nicollet County, Minnesota. *In* Minnesota State Park Cultural Resource Management Program: 2004 Annual Report. St. Paul, MN: Minnesota Department of Natural Resources, Division of Parks and Recreation.

Reichel, Jason A.

2015 Revisiting the Nelson Site: Archeological Investigations and Material Analysis. Master's Thesis, Department of Anthropology, Minnesota State University, Mankato.

Sagor, Eli

2007 Minnesota's Four Biomes. Electronic Document, http://www.myminnesotawoods.umn.edu/2007/04/minnesotas-four-biomes/ Accessed 2/18/2018.

Schirmer, Ronald Clark

2002 Plant-use Systems and Late Prehistoric Culture Change in the Red Wing Locality. PhD Dissertation, Department of Anthropology, University of Minnesota.

2018 Personal Communication, 4/22/2018.

Schirmer, Ronald C., Chad A. Wittkop, Joshua B. Anderson, Joshua C. Anderson, Andrew A. Brown, Emily B. Evenson, Cory P. Nowak, Kevin M. Reinhardt, and Jason A. Reichel

2014 Archeological Survey of Le Sueur County. Department of Anthropology, Minnesota State University, Mankato.

Simon, Mary L.

2000 Regional Variations in Plant Use Strategies in the Midwest during the Late Woodland. *In* Late Woodland Societies. Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, eds. Pp. 37-76. University of Nebraska Press.

Skaar, Kent

1991 Archaeological Data Recovery Report for the Heyman's Creek Site. Proposed MnDOT S.P. 5202-37 for Upgrading of the T.H. 14 from the Junction of the T.H. 15 at New Ulm to the Junction of the T.H. 99 at Nicollet, Nicollet County. St. Paul, MN: Minnesota Department of Transportation and the Minnesota Historical Society.

Skinner, Jaclyn

2018 Understanding Complex Late and Terminal Woodland Sites in the Red Wing, Minnesota, Area. Master's Thesis, Department of Anthropology, Minnesota State University, Mankato.

Stearns, Forest W.

1997 History of the Lake States Forests: Natural and human impacts. *In* Lakes States Regional Forest Resources Assessment. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. Michael J. Vasievich, Henry H. Webster, eds. Pp 8-29.

Stemper, Clifford A.

1984 A preliminary archaeological study of Timber Lake, Nicollet County, Minnesota. Master's Thesis, Department of Anthropology, Minnesota State University, Mankato.

Styles, Bonnie M.

2000 Late Woodland Faunal Exploitation in the Midwestern United States. *In* Late Woodland Societies. Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, eds. Pp. 77-96. University of Nebraska Press.

Terell, Michelle M. and E.B. Terrell

2004 Phase II Archaeological Resources Investigation of Sites 21NL130 and 21NL131 Located at the St. Peter Regional Treatment Center, Oshawa Township, Nicollet County, Minnesota. Shafer, MN: Two Pines Resource Group, LLC.

Theler, James L., and Suzanne M. Harris

1988 Faunal Remains from the Turpin Site (33Ha19), Hamilton County, Ohio. West Virginia Archeologist 40(2):1-23.

Theler, James L. and Robert F. Boszhardt

2000 The End of the Effigy Mound Culture: The Late Woodland to Oneota Transition in Southwestern Wisconsin. Midcontinental Journal of Archaeology 25(2):289-312.

2003 Twelve Millennia: Archaeology of the Upper Mississippi River Valley. Iowa City: University of Iowa Press.

Tiffany, J. A.

1991 Modeling Mill Creek-Mississippian Interaction. *In* New Perspectives on Cahokia, views from the Periphery. J. B. Stoltman, ed. Pp. 319-347. Madison, WI: Prehistory Press.

2007 The Swanson Site Reexamined: The Middle Missouri Tradition in Central South Dakota. Special Publication No. 12, South Dakota Archaeological Society.

Toom, D. L.

1992 Climate and Sedentism in the Middle Missouri Subarea of the Plains. PhD Dissertation, University of Nebraska, Lincoln, Department of Anthropology.

1996 Archeology of the Middle Missouri. *In* Archological and Bioarcheological Resources of the Northern Plains. G.C. Frison and R.C. Mainfort, eds. Arkansas Archeological Survey Research Series, 47:56-76.

Trow, Thomas

1979 Swope Site, Minnesota Statewide Archaeological Survey form. St. Paul, MN: Minnesota Historical Society.

1979 Yucatan Village. Recorded on a Minnesota Statewide Archaeological Survey form. St. Paul, MN: Minnesota Historical Society.

1980 Minnesota Historical Society Tesrow site report. St. Paul, MN: Minnesota Historical Society.

1980 Report to the State Archaeologist's Office, License #L79-30. St Paul, MN: Minnesota Historical Society.

Whittaker, William E.

2005 Eastern and Plains Late Woodland Transitions as Seen at the Lafayette Mound, Northwest Missouri. Plains Anthropologist 50(194):121-142.

Wilford, Lloyd A.

1954 The La Moille Rock Shelter. The Minnesota Archaeologist 19(2):17-24.

Winham, R. Peter and F. A. Calabrese

1998 The Middle Missouri Tradition. *In* Archaeology on the Great Plains. W. Raymond Wood, ed. Pp. 235-307. Lawrence, KS: University Press of Kansas.

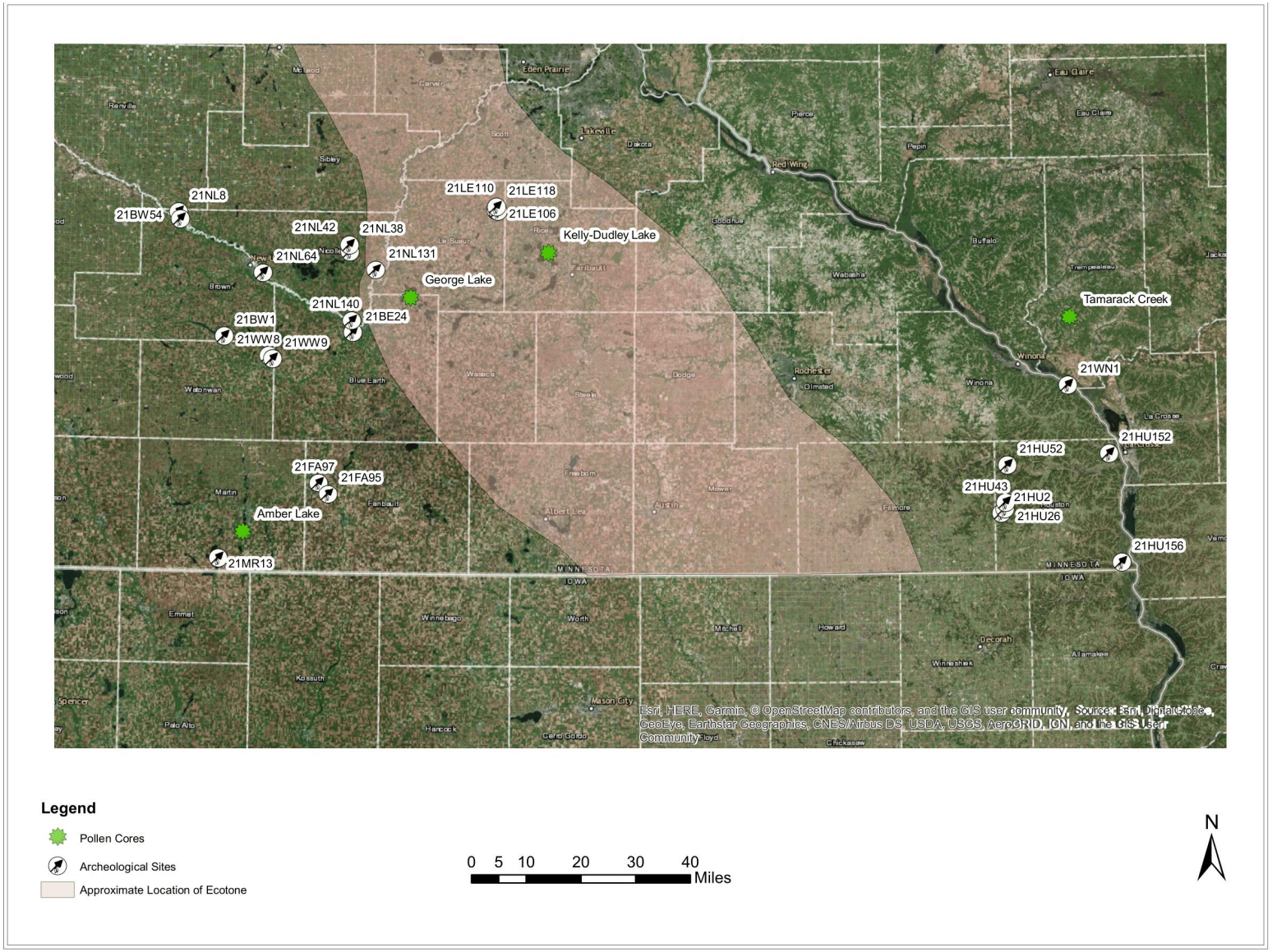
Wood, W. Raymond

1974 Northern Plains Village Cultures: Internal Stability and External Relationships. Journal of Anthropological Research 30(1):1-16.

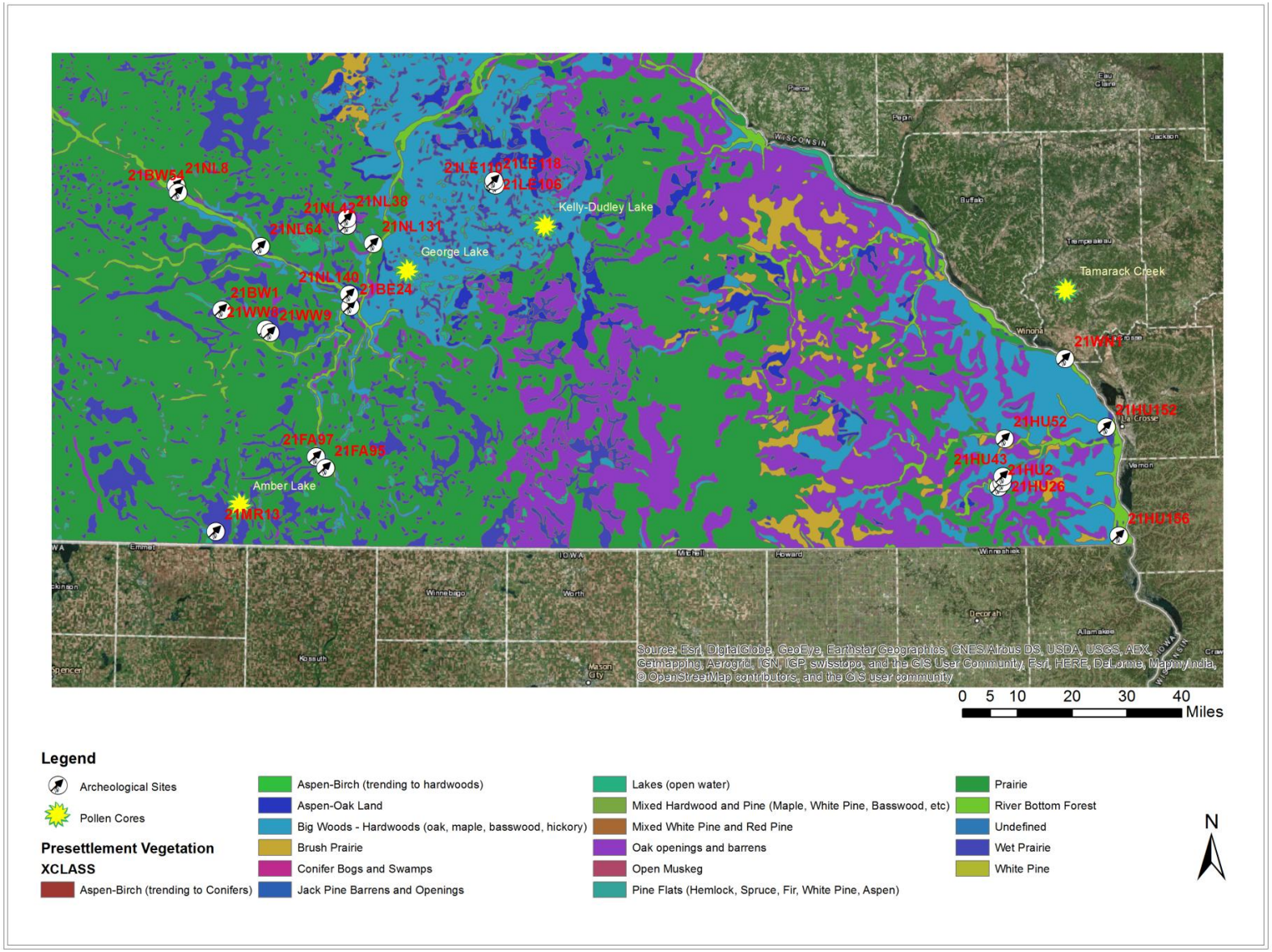
Yesner, David R.

1985 Cultural Boundaries and Ecological Frontiers in Coastal Regions: An Example from the Alaska Peninsula. *In* The Archaeology of Frontiers and Boundaries. Stanton Green and Stephen Perlman, eds. Pp. 51-92. Orlando, FL: Academic Press, Inc.

Appendix A, Maps



Appendix A, Figure 1. Generalized location of the ecotone with pollen core and archeological site locations.



Appendix A, Figure 2. Location of examined collections and pollen cores against the Marschner Map.

Appendix B, Graphs and Tables

Amber Lake Pollen Data

Calendar Years BP	--/72/--	--/81/--	--/90/--	--/118/--	--/182/--	--/224/--	--/324/--	--/437/--	--/485/--	--/531/--	--/623/--	--/715/--	--/807/--	--/898/--	--/933/--
Ambrosia	55	57	23	11	22	19	28	28	29	27	30	30	23	27	16
Artemisia	11	6	11	18	9	12	6	11	9	12	14	10	9	19	11
Asteraceae subf. Asteroideae undiff.	3			2	4	4	3	5	10	4	6	3	5	6	5
Chenopodium-type	5	6	7	5	6	5	4	7	9	3	5	3	2	1	1
Plantago	1	4													
Poaceae	26	31	34	28	40	22	26	22	39	25	17	38	57	49	57
Acer	2		1					1	1						
Betula	2	3	4	2	1	3	5	3	2	1	4	3	2	2	3
Ostrya	5	3	8	3	6	4	2	4	7	9	13	6	3	6	4
Pinus/Picea	14	10	13	16	23	17	24	14	22	29	24	24	23	17	20
Quercus	32	38	46	62	57	59	51	67	41	42	44	31	39	37	34
Tilia	2	1	1	1	1		2	2	3	4	5	3	3	2	4
Ulmus	4	1	5	11	4	5	12	3	3	8	8	3	4	2	5
Other plants	38	45	50	41	27	48	45	30	25	31	38	54	27	33	41

Appendix B, Table 1. Pollen samples from Amber Lake, Martin County, MN.

Kelly-Dudley Lake Pollen Data

CRCYBP	--/53/--	--/72/--	--/85/--	--/135/--	--/226/--	--/317/--	--/408/--	--/499/--	--/590/--	--/675/--	--/760/--	--/846/--	--/1016/--	--/1186/--	--/1442/--	--/1527/--
Artemisia	3	5	5	11	4	9	6	3	3	9	8	3	7	8	10	8
Chenopodium-type	3	2	1	2	4	2	6	2	2	3		3	2	2	5	1
Poaceae	9	9	4	10	12	10	13	3	11	13	16	8	11	16	18	14
Acer		1						1	1			1	1		1	1
Ambrosia	6	14	7	5	7	12	5	8	14	16	4	9	8	13	11	5
Betula	10	8	10	1	4	5		8	5	3	11	8	3	5	6	10
Ostrya	19	11	22	9	16	9	4	10	4	7	5	4	2	4	4	8
Picea/Pinus undiff.	13	10	16	24	13	23	21	24	26	24	27	40	36	34	19	32
Quercus	106	89	93	114	108	110	114	115	108	102	106	99	107	95	99	98
Tilia	3	9	2	1	4	1	1	5	2	2	3	1	1	3	4	2
Ulmus	8	5	6	4	9	4	1	6	5	5	4	7	7	6	7	5
Asteraceae subf. Asteroideae	4	2	3	3	3	5	4	2	3	2	4	3	4	4	5	2
Other plants	16	35	27	25	20	14	24	13	16	14	12	14	11	10	19	14

Appendix B, Table 2. Pollen core samples from Kelly-Dudley Lake, Rice County, MN.

Tamarack Creek Pollen Data

RCYBP	--/76/--	--/156/--	--/248/--	--/341/--	--/433/--	--/526/--	--/619/--	--/711/--	--/912/--	--/1066/--	--/1174/--	--/1341/--	--/1531/--	--/1665/--
Asteraceae undiff.	6	3	3	3	4	2	2	1	2	2	3	4		2
Amaranthaceae	14		1		1	2	2	3	2	2	2	1	5	2
Poaceae	8	8	8	9	8	6	7	11	6	8	9	7	13	10
Ambrosia-type	75	5	3	3	4	3	4	4	5	3	9	4	5	2
Artemisia	1	1				1		2			2	1	1	1
Cyperaceae	25	89	101	94	34	54	56	91	47	50	160	115	230	202
Alnus	4	2	2	3	4	3	2	2			3	5		1
Fraxinus	2		1	1				2	1				1	
Tilia	1						1				2	1		1
Betula	5	1	8	13	13	6	6	4	1	1	5	5	3	4
Ostrya/Carpinus	1			1			1				1			1
Typha latifolia	2	1				1		3		1				2
Ulmus	2	1	2	1			1		1	1	1	1		
Abies	1	1		2				1		1	1	1	1	
Corylus	1	1	3	1	2			1					1	
Carya	3	2	3	1	1		3	1	1	2	1	1	2	1
Larix	77	85	43	61	51	56	60	33	9	33	4	1	3	
Acer	1	1	1		1		1	4	1	1	2	6	1	2
Quercus	33	26	40	20	19	18	14	31	22	25	48	45	48	38
Pinus	16	90	95	67	73	94	86	121	82	118	137	114	186	167
Sparganium-type	1													
Picea	1	1	1	7	4	4	4	6	3	5	2	3	3	7
Juglans	1	1	1		1					1	1	1		2
Salix		1	1		1	1		3	1		1	1	2	3
Dryopteris-type	19	30	28	76	65	20	11	8	8	3	5	40	9	9

Appendix B, Table 3. Pollen core samples from Tamarack Creek, Trempealeau County, WI.

George Lake Pollen Data

RCYBP	--/-12/--	--/18/--	--/51/--	--/84/--	--/200/--	--/400/--	--/600/--	--/1000/--	--/1200/--	--/1500/--
Amaranthaceae undiff.	13	11	17	16	3	4	5	4	13	38
Ambrosia	87	68	74	90	32	33	32	46	35	35
Amorpha	1		1		1	1		1	3	
Apiaceae						2	1			
Artemisia	33	25	27	8	17	22	18	25	34	29
Asteraceae subf. Asteroideae undiff.	13	11	13	7	10	24	13	14	14	9
Brassicaceae		1								
Cyclachaena xanthiifolia			2	1	3		1	1	1	
Cyperaceae	20	14	9	16	17	29	28	35	21	34
Dalea candida-type		1								
Dalea purpurea								1		
Humulus			1	2	1				1	
Impatiens			1							
Iva annua	1	1	2	1		1		1	1	2
Persicaria maculosa-type				1						
Poaceae undiff.	87	37	43	52	32	59	55	76	60	150
Thalictrum	1	1				3	1		3	2
Xanthium	1							1		1
Abies							1			
Acer negundo				2						2
Acer saccharum	1	4	5	7	4	2	1	3	1	2
Alnus	5	1	3	4	3	3	4	7	11	4
Betula	13	15	15	13	13	11	17	24	16	9
Carya	13	5	11	13	18	5	5	4	6	4
Celtis	4							1	2	2
Corylus	1	5	5	7	4	6	1	1	2	2
Cupressaceae		1	1				1	1		2
Dryopteris-type		1	1	3	2	1	2	1	1	1
Ephedra torreyana-type		1			1					
Fagus		1		1						
Fraxinus americana-type		4	2	6	1	2		1	4	2
Fraxinus nigra		3	2	3		2	3	3	3	2
Juglans cinerea	3	2	5	3	1	5	2		1	7
Juglans nigra	1			2	3				2	
Larix						1		1		
Myrica			1							
Ostrya/Carpinus	26	29	24	21	31	12	13	20	27	11
Picea		1		3	4		2		2	1
Pinus	71	27	48	29	31	44	64	99	61	72
Platanus				1	2		1	1	2	
Populus					2					
Quercus	185	186	164	151	187	192	172	151	209	152
Salix	5	5		3	2	6	2	5	7	5
Sarcobatus vermiculatus		1			2			1	1	1
Tilia	6	15	25	12	22	10	2	3	4	3
Tsuga		1	1	1	1	1		3		2
Ulmus	38	33	44	27	45	16	10	16	23	17
Vitis	2	2		1		1				1
Equisetum		1		1	1		1			1
Indeterminable	9	12	9	11	7	12	9	10	12	8
Myriophyllum										3
Nuphar		2	1	1			1	1	2	1
Nymphaea	2		3		1		2			
Potamogetonaceae	1	3		2	2	4	1			3
Ruppia maritima		1								
Sagittaria	3		1		2		1	1	1	
Sparganium-type	2			1						
Sphagnum			1				1			
Typha latifolia	1		2	2	2		1	1		12
Unknown	8	5	8	3	10	2	5	9	4	6
Zea mays			4	1						

Appendix B, Table 4. Pollen core samples from George Lake, Le Sueur County, MN

Lithics from the Nelson Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Denticulate		37.67	2.68	9.98	PDC		7.818	HT	Appears to have been used like a saw.	Serrated edges
Spokeshave		28.45	15.7	4.22	PDC		1.926	HT		
Abrader		29.5	23.8	11.6	Sandstone		13.591			
Celt		97.17	54.9	36.57	Diabase		296.679			
End Scraper		30.63	23.05	9.88	GMC		6.637		Moderate Retouching	
End Scraper		20.45	17	8.68	GMC		3.309		Heavily Retouched	
End Scraper		20.02	17.88	5.13	GMC		2.341		Heavily Retouched	
End Scraper		17.93	14.95	6.73	GMC		1.996		Expended	
End Scraper		20.48	17.77	5.92	GMC		2.149		Expended	
End Scraper		31.84	15.3	6.57	PDC		3.941		Expended	
End Scraper		27.85	21.19	6.93	PDC		5.96		Moderate Retouching	
End Scraper		30.53	20.51	8.71	Unidentified Chert		5.07		Expended	
End Scraper		34.86	22.12	11.61	Unidentified Chert		8.229			
End Scraper		17.71	19.45	5.79	Unidentified Chert		2.021			
End Scraper		25.56	25.68	9.27	PDC		6.455	HT	Expended	
End Scraper		28.54	32.07	6.78	PDC		5.845	HT	Expended	
Knife		48.42	24.59	8.15	GMC		9.894		Moderate Retouching	
Knife		61.55	29.57	11.08	PDC		24.643	HT	Heavily Retouched	
Knife		57.72	39.91	11.83	PDC		26.07		Moderate Retouching	
Knife		49.47	15.86	5.97	PDC		4.967	HT	Moderate Retouching	
Perforator		9.06	5.91	2.8	GMC		0.142			
Perforator		28.97	11.4	2.3	GMC		0.832			
Pick		137.53	42.11	21.66	Olivine Diabase		130.753			
Projectile Point		21.42	13.23	3.96	Agatized Wood	Madison-like Unntoched Triangular	1.089			
Projectile Point		27.27	15.5	3.53	Burlington Chert	Madison-like Unntoched Triangular	1.05			
Projectile Point		20.58	14.09	3.32	Galena Chert	Madison-like Unntoched Triangular	0.773			
Projectile Point		20.77	16.49	2.82	GMC	Indeterminate	0.777			
Projectile Point		19.22	12.82	2.35	GMC	Madison-like Unntoched Triangular	0.724			
Projectile Point		21	14.87	4.24	PDC	Madison-like Unntoched Triangular	1.315	HT	Heavily Retouched	
Projectile Point		19.26	13.79	4.3	PDC	Madison-like Unntoched Triangular	1.129	HT	Minimal Retouching	
Projectile Point		19.71	12.99	3.93	PDC	Madison-like Unntoched Triangular	0.896	HT	Heavily Retouched	
Projectile Point		23.23	15.19	4.74	PDC	Indeterminate	1.539	HT		
Projectile Point		20.01	14.97	2.71	PDC	Madison-like Unntoched Triangular	0.789		None	
Projectile Point		20.42	20.95	4.87	PDC	Madison-like Unntoched Triangular	2.309		Moderate Retouching	
Projectile Point		13.18	13.46	3.35	PDC	Madison-like Unntoched Triangular	0.7	HT	Minimal Retouching	
Projectile Point		18.06	14.71	3.81	PDC	Madison-like Unntoched Triangular	1.059	HT	Moderate Retouching	
Projectile Point		26.03	13.89	3.82	PDC	Madison-like Unntoched Triangular	1.281	HT	None	
Projectile Point		18.65	12.03	3.59	PDC	Indeterminate	0.925	HT		
Projectile Point		16.13	20.11	4.16	PDC	Indeterminate	1.254	HT		
Projectile Point		20.5	16.09	3.76	PDC	Indeterminate	0.997	HT		
Projectile Point		12.97	11.51	2.67	PDC	Madison-like Unntoched Triangular	0.398			
Projectile Point		21.52	12.57	3.84	PDC	Indeterminate	1.172	HT		
Projectile Point		17.47	12.61	2.81	PDC	Madison-like Unntoched Triangular	0.645			
Projectile Point		31.53	18.7	5.16	PDC	Indeterminate Leaf-Shaped	3.182			
Projectile Point		24.4	21.46	3.51	SRC	Madison-like Unntoched Triangular	1.728	HT		
Projectile Point		19.22	11.85	2.72	Unidentified Chert	Madison-like Unntoched Triangular	0.716			
Projectile Point		9.58	7.13	1.87	Unidentified Chert	Indeterminate	0.101			
Projectile Point		18.72	14	2.86	Unidentified Chert	Indeterminate	0.743	HT		
Retouched Flake	G2	42.38	16.36	6.56	SRC		4.731	HT		
Scraper		15.16	13.42	3.17	GMC		0.946			
Side and End Scraper		17.85	15.4	4.85	GMC		1.478			
Side and End Scraper		37.4	23.73	7.45	KRF		7.312			
Side Scraper		29.6	18.14	6.61	GMC		3.52			
Side Scraper		26.99	12.65	3.29	GMC		1.006			
Side Scraper		23.38	13.79	5.68	PDC		2.29	HT	Expended	
Side Scraper		18.81	7.96	5.84	PDC		1.041	HT	Expended	
Spokeshave		46.93	31.92	9.69	PDC		13.202			

Appendix B, Table 5. Lithic Artifacts from 21BE24.

Lithics from the Nelson Site (Continued)

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Spokeshave		60.24	42.42	15.61	PDC		34			
Spokeshave		26.2	23.32	3.46	PDC		2.469	HT		
Spokeshave		32.44	18.4	6.74	PDC		3.37	HT		
Utilized core		19.24	12.83	1.83	PDC		0.603	HT		Appears to have been used as a striking implement
Utilized Core		50.36	31.87	21.56	PDC		31.742	HT		Appears to have been used as a striking implement
Retouched Flake		49.56	33.32	13.77	Croton Chalcedonic Chert		19.66			
Retouched Flake	G2	21.33	18.56	4.26	GMC		1.301			
Retouched Flake	G3	24.84	12.48	3.59	GMC		1.058			
Retouched Flake	G2	24.53	20.34	5.52	GMC		1.892			
Retouched Flake	G3	17.11	9.8	1.47	GMC		0.317			
Retouched Flake	G3	21.28	10.41	3.16	GMC		0.633			
Retouched Flake	G2	35.63	26.27	4.64	GMC		2.824			
Retouched Flake	G3	22.3	12.86	2.48	GMC		0.838			
Retouched Flake	G3	18.59	13.19	3.838	GMC		1.052			
Retouched Flake	G2	24.46	19.54	4.18	GMC		1.68			
Retouched Flake	G3	20.87	15.25	1.61	GMC		0.563	HT		
Retouched Flake	G3	18.05	11.22	3.29	GMC		0.801	HT		
Retouched Flake	G3	19.12	17.66	6.25	GMC		1.288			
Retouched Flake	G3	25.53	11.5	2.1	GMC		0.698			
Retouched Flake	G3	28.17	12.49	6.49	GMC		2.135			
Retouched Flake	G2	26.26	19.33	4.57	GMC		2.15			
Retouched Flake	G3	19.13	13.2	2.96	GMC		0.788			
Retouched Flake	G3	27.88	12.26	4.8	GMC		1.309			
Retouched Flake	G2	31.45	14.64	4.63	GMC		1.863			
Retouched Flake	G3	15.2	11.38	2.5	GMC		0.507			
Retouched Flake	G3	21.35	16.35	2.32	GMC		0.784			
Retouched Flake	G2	23.14	16.98	3.37	GMC		0.961			
Retouched Flake	G2	20.35	19.12	2.86	GMC		1.07			
Retouched Flake	G2	24.11	19.27	3.75	GMC		1.16			
Retouched Flake	G3	20	7.3	2.56	GMC		0.352			
Retouched Flake	G2	24.55	16.02	4.06	GMC		1.073			
Retouched Flake	G2	22.01	20.15	4.98	GMC		1.893	HT		
Retouched Flake	G3	15.52	12.51	2.53	GMC		0.399			
Retouched Flake	G3	23.18	11.16	3.29	GMC		0.771			
Retouched Flake	G2	31.27	19.5	6.21	GMC		3.972		Minimal Retouching	
Retouched Flake	G3	20.73	17.94	2.74	GMC		0.811			
Retouched Flake	G2	32.3	16.77	3.21	GMC		1.58		Minimal Bifacial Retouching	
Retouched Flake	G3	14.45	9.75	3.21	GMC		0.397			
Retouched Flake	G3	27.02	8.83	2.68	GMC		0.605			
Retouched Flake	G3	17.42	8.02	2.77	GMC		0.409			
Retouched Flake	G2	25.82	20.35	8.11	GMC		3.36		Minimal Retouching	
Retouched Flake	G3	28.67	13.21	3.35	GMC		0.829		Minimal Retouching	
Retouched Flake	G3	21.52	13.84	4.11	GMC		0.803	HT		
Retouched Flake	G3	22.04	17.48	3.13	GMC		0.765			
Retouched Flake	G3	17.14	10.9	1.58	GMC		0.285			
Retouched Flake	G3	17.77	13.16	3.22	GMC		0.458			
Retouched Flake	G3	20.06	12.75	2.13	GMC		0.418			
Retouched Flake	G3	15.71	11.74	3.27	GMC		0.584			
Retouched Flake	G2	24.99	21.86	6.45	GMC		2.397			
Retouched Flake	G2	22.87	19.01	3.82	GMC		1.554			
Retouched Flake	G3	19.55	14.45	4.46	GMC		1.162	HT		
Retouched Flake	G3	29.27	10.91	3.83	GMC		1.032			
Retouched Flake	G3	18.15	15.97	2.36	GMC		0.82			
Retouched Flake	G3	17.04	11.84	7.2	GMC		1.442			
Retouched Flake	G3	23.5	16.77	2.19	GMC		0.886			
Retouched Flake	G3	17.82	13.58	2.79	GMC		0.548	HT		
Retouched Flake	G2	26.65	22.82	1.94	GMC		0.872			

Appendix B, Table 6. Lithic artifacts from 21BE24.

Lithics from the Nelson Site (Continued)

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Retouched Flake	G3	19.36	10.35	2.32	GMC		0.386			
Retouched Flake	G2	24.23	23.49	7.81	GMC		3.394			
Retouched Flake	G3	20.07	14.06	2.97	GMC		0.889			
Retouched Flake	G3	24.24	14.18	6.86	GMC		1.642			
Retouched Flake	G3	20.65	9.95	4.34	GMC		0.906		Minimal Retouching	
Retouched Flake	G2	31.1	19.18	3.48	GMC		2.05			
Retouched Flake	G3	17.25	9.88	3.13	GMC		0.535			
Retouched Flake	G3	16.04	12.05	5.43	GMC		0.614			
Retouched Flake	G3	21.53	8.86	3.37	GMC		0.633			
Retouched Flake	G3	23.76	9.34	5.63	GMC		1.016			
Retouched Flake	G3	23.2	14.34	3.5	GMC		1.235			
Retouched Flake	G3	21.89	14.65	4.96	GMC		1.501			
Retouched Flake	G3	17.84	8.37	1.75	GMC		0.299		Expended	
Retouched Flake	G3	22.11	17.23	5.33	GMC		1.771			
Retouched Flake	G3	17.64	13.13	4.98	GMC		1.29		Moderate Retouching	
Retouched Flake	G3	29.51	12.25	3.97	GMC		1.404			
Retouched Flake	G2	34.3	14.44	3.54	GMC		1.475			
Retouched Flake	G3	18.26	14.16	2.3	GMC		0.767			
Retouched Flake	G3	13.87	13.27	2.36	GMC		0.447			
Retouched Flake	G3	34.22	11.96	2.2	GMC		0.748			
Retouched Flake	G2	18.72	17.03	4.45	GMC		1.521			
Retouched Flake	G3	23.66	14.16	2.09	GMC		0.813		Minimal Retouching	
Retouched Flake	G3	16.43	12.49	3.24	GMC		0.692			
Retouched Flake	G2	23.22	18.74	4.04	GMC		1.934			
Retouched Flake	G4	13.8	7.44	1.63	GMC		0.144			
Retouched Flake	G3	13.64	9.59	4.11	GMC		0.443			
Retouched Flake	G3	20.04	12.79	3.36	GMC		0.569			
Retouched Flake	G3	14.87	9.22	2.64	GMC		0.302			
Retouched Flake	G2	18.31	17.47	3.33	GMC		0.851			
Retouched Flake	G3	21.02	11.53	7.69	GMC		1.192			
Retouched Flake	G3	25.73	16.04	3.39	GMC		0.837	HT		
Retouched Flake	G2	26.94	17.19	3.78	KRF		2.018			
Retouched Flake	G2	41.18	14.6	5.33	PDC		2.665	HT		
Retouched Flake	G3	21.37	12.49	2.08	PDC		0.546	HT		
Retouched Flake	G3	21.55	10.98	2.74	PDC		0.507	HT		
Retouched Flake	G2	46.12	19.7	8.09	PDC		6.541	HT	Expended	
Retouched Flake	G2	27.36	20.5	5.49	PDC		3.254			
Retouched Flake	G2	46.92	22.64	9.32	PDC		6.861	HT		
Retouched Flake	G2	34.3	18.4	7.52	PDC		4.312	HT		
Retouched Flake	G2	33.06	12.4	8.74	PDC		2.134	HT		
Retouched Flake	G3	29.55	13.93	4.09	PDC		1.209	HT		
Retouched Flake	G2	27.51	15.39	4.1	PDC		1.483			
Retouched Flake	G3	18.91	14.26	2.7	PDC		0.73			
Retouched Flake	G2	32.33	26.93	4.74	PDC		4.616	HT		
Retouched Flake	G2	27.71	22.6	6.32	PDC		3.068	HT		
Retouched Flake	G1	57.53	27.92	11.66	PDC		13.511	HT		
Retouched Flake	G1	56.03	24.01	14.25	PDC		17.289	HT		
Retouched Flake	G2	42.4	17.26	7.49	PDC		5.972	HT		
Retouched Flake	G2	51.24	32.03	11.06	PDC		16.032			
Retouched Flake	G2	23.77	20.45	7.15	PDC		4.096	HT		
Retouched Flake	G2	41.36	17.77	6.91	PDC		4.508			
Retouched Flake	G2	48.88	25.27	8.09	PDC		13.57	HT		
Retouched Flake	G3	20.41	16.33	2.5	PDC		0.982	HT		
Retouched Flake	G3	24.44	12.83	4.77	PDC		1.33	HT		
Retouched Flake	G3	21.54	16.5	6.72	PDC		2.783	HT		
Retouched Flake	G3	23.68	10.33	2.12	PDC		0.534	HT		
Retouched Flake	G2	32.44	27.93	8.52	PDC		5.948			
Retouched Flake	G2	35.66	16.67	8.16	PDC		4.326	HT		

Appendix B, Table 7. Lithic artifacts from 21BE24.

Lithics from the Nelson Site (Continued)

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Retouched Flake	G3	13.63	11.13	2.19	Unidentified Chert		0.362			
Retouched Flake	G2	22.88	17.76	3.76	Unidentified Chert		1.499		Expended	
Retouched Flake	G2	30.17	22.02	8.43	Unidentified Chert		5.138			
Retouched Flake	G3	10.67	9.26	3.18	Unidentified Chert		0.383			
Retouched Flake	G2	39.56	21.09	5.48	PDC		5.739		Expended	
Retouched Flake	G1	60.55	43.44	10.86	PDC		16.4	HT	Moderate Retouchingerate Bifacial Retouching	
Retouched Flake	G2	28.75	20.67	4.6	PDC		2.318	HT		
Retouched Flake	G2	55.75	27.3	11.35	PDC		15.88	HT		
Retouched Flake	G2	48.91	22.39	9.79	PDC		10.15			
Retouched Flake	G2	36.64	30.15	7.24	PDC		6.532	HT		
Retouched Flake	G2	47.04	31.76	5.25	PDC		8.09	HT		
Retouched Flake	G2	38.26	19.61	4.98	Galena Chert		3.372	HT	Moderate Retouching	
Retouched Flake	G2	36.28	19.85	4.2	PDC		2.404	HT		
Retouched Flake	G2	30.89	26.4	6.2	PDC		3.607	HT		
Retouched Flake	G2	26.57	17.15	6.63	PDC		3.522	HT		
Retouched Flake	G2	36.42	20.39	5.68	PDC		3.168	HT		
Retouched Flake	G2	31.37	15.76	7.64	SRC		4.34			
Retouched Flake	G2	31.95	17.79	7.87	Unidentified Chert		4.039			
Retouched Flake	G2	25.42	17.66	2.89	PDC		1.33	HT		
Retouched Flake	G3	26.85	15.31	3.45	PDC		1.551	HT		
Retouched Flake	G2	29.02	17.14	7.77	PDC		3.122	HT		
Retouched Flake	G2	27.53	19.77	6.41	PDC		3.657			
Retouched Flake	G2	23.65	18.19	6.41	PDC		2.925	HT		
Retouched Flake	G3	22.44	18.53	5.28	PDC		1.86			
Retouched Flake	G2	26.87	15.72	7.9	PDC		3.058	HT	Expended	
Retouched Flake	G3	26.96	13.49	7.22	PDC		2.101	HT		
Retouched Flake	G2	24.04	18.22	3.65	PDC		1.482	HT		
Retouched Flake	G2	20.4	17.25	4.29	PDC		1.855	HT		
Retouched Flake	G2	22.52	16.22	10.89	PDC		3.22	HT	Moderate Retouching	
Retouched Flake	G2	32.82	24.93	11.77	PDC		5.504	HT	Heavy Bifacial Retouching	
Retouched Flake	G2	30.09	22.3	6.76	SRC		5.206	HT	Heavy Bifacial Retouching	
Retouched Flake	G2	27.16	19.03	7.76	PDC		4.572	HT		
Retouched Flake	G1	52.97	46.18	15.02	PDC		49.198			
Retouched Flake	G2	52.68	28.76	10.17	PDC		15.464	HT	Minimal Bifacial Retouching	
Retouched Flake	G2	25.96	19.32	6	PDC		2.969	HT		
Retouched Flake	G3	21.44	11.66	2.7	PDC		0.575	HT		
Retouched Flake	G3	23.27	12.16	4.25	PDC		1.222	HT		
Retouched Flake	G3	22.97	17.63	4.67	PDC		1.909	HT		
Retouched Flake	G3	24.76	15.48	5.03	PDC		1.143	HT		
Retouched Flake	G2	21.53	15.4	5.22	PDC		1.617	HT		
Retouched Flake	G3	21.17	13.7	3.23	PDC		1.04	HT		
Retouched Flake	G3	15.24	12.68	2.57	PDC		0.432	HT		
Retouched Flake	G2	33.47	15.78	6.39	PDC		3.638	HT		
Retouched Flake	G3	20.26	16.18	3.22	PDC		0.869	HT		
Retouched Flake	G2	24.97	17.02	6.36	PDC		2.54	HT	Expended	
Retouched Flake	G2	34.34	17.36	4.35	PDC		2.217	HT		
Retouched Flake	G3	35.79	12.33	4.17	PDC		1.608	HT		
Retouched Flake	G3	18.99	11.73	4.71	GMC		0.745			
Wedge		23.71	15.06	5.38	GMC		2.098			
Wedge		16.41	16.25	5.78	GMC		1.695			
Wedge		32.52	15.92	5.22	GMC		2.928			
Wedge		22.29	19.72	10.06	GMC		3.802			
Wedge		21.45	19.78	5.21	GMC		2.79			
Wedge		20.35	11.56	6.9	PDC		2.081			
Wedge		33.5	34.27	17.49	PDC		15.933	HT		
Wedge		16.43	14.86	4.83	PDC		1.309	HT		
Wedge		35.28	29.14	99.22	PDC		10.583	HT		
Wedge		37.54	38.21	12.46	PDC		23.506			

Appendix B, Table 8. Lithic artifacts from 21BE24.

Lithics from the Stynsby Mounds and Village

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Celt		130.46	60.19	29.27	Diabase		333.61			
Grooved maul		154.74	110.13	50.2	Diabase		1404.41			
Side Scraper		15.5	26.43	6.22	Silicified Wood		2.96		Heavily Retouched	
Retouched Flake	G2				KRF		2.59		Moderate Retouching	
Perforator		33.86	20.38	5.56	GMC		2.84		Heavily Retouched	
Retouched Flake	G2				PDC		8.85		Moderate Retouching	
End Scraper		23.48	23.61	7.89	KRF		3.41		Expended	
Retouched Flake	G2				KRF		3.88		Moderate Retouching	
End Scraper		17.63	19.26	7.2	Indeterminate		2.68		Expended	
Side and End Scraper		25.99	18.84	6.96	SRC		3.76	HT	Expended	
Retouched Flake	G2				PDC		11.76		Moderate Retouching	
Retouched Flake	G2				PDC		8.24		Minimal Retouching	
End Scraper		15.26	18.05	3.75	Indeterminate		0.99		Expended	
End Scraper		19.9	22.83	7.67	PDC		3.32		Expended	
Spokeshave		19.69	30.42	4.42	PDC		3.48	Ht	Heavily Retouched	
Side Scraper		31.9	36.24	10.64	Quartz		13.78		Moderate Retouching	
End Scraper		29.09	23	9.79	Quartz		6.19		Expended	
Drill		39.18	18.35	7.69	PDC		3.25		Heavily Retouched	
End Scraper		16.8	14.23	5.44	KRF		1.2		Heavily Retouched	
Retouched Flake	G2				SRC		11.09	HT	Heavily Retouched	
Retouched Flake	G2				GMC		5.96		Moderate Retouching	
Retouched Flake	G2				PDC		3.52	HT	Moderate Retouching	
End Scraper		32.19	23.82	10.31	GC		6.76		Heavily Retouched	
End Scraper		25.3	17.19	5.85	KRF		3.93		Heavily Retouched	
Retouched Flake	G2				PDC		4.46		Minimal Retouching	
End Scraper		37.95	18.59	8.63	SRC		5.63	HT	Heavily Retouched	
End Scraper		16.06	16.65	4.67	GMC		1.24		Expended	
End Scraper		21.07	21.4	5.57	PDC		2.72	HT	Expended	
End Scraper		24.38	21.96	6.47	Indeterminate		3.21		Expended	
Retouched Flake	G2				PDC		6.11		Moderate Retouching	
End Scraper		31.49	21.03	9.92	PDC		6.76	HT	Expended	
End Scraper		25.2	23.81	6.31	PDC		4.6	HT	Heavily Retouched	
Retouched Flake	G2				PDC		3.81		Heavily Retouched	
Retouched Flake	G2				KRF		6.71		Moderate Retouching	
Retouched Flake	G2				PDC		3.57		Heavily Retouched	
Retouched Flake	G2				PDC		4.75	HT	Moderate Retouching	
End Scraper		29.89	22.41	11.22	PDC		6.7	HT	Expended	
End Scraper		18.15	18.09	6.68	PDC		2.03	HT	Expended	
Retouched Flake	G2				PDC		2.38	HT	Minimal Retouching	
Retouched Flake	G2				PDC		2.82	HT	Expended	
Retouched Flake	G2				PDC		3.61	HT	Minimal Retouching	
End Scraper		21.41	22	7.77	PDC		3.61	HT	Heavily Retouched	
Retouched Flake	G2				PDC		2.54	HT	Moderate Retouching	
hemi scraper		27.96	23.04	7.66	PDC		5.68	HT	Heavily Retouched	
hemi scraper		22.17	24.85	6.19	KRF		3.78		Moderate Retouching	
Retouched Flake	G3				GMC		3.08		Moderate Retouching	
End Scraper		63.81	43.28	17.56	PDC		31.01		Expended	
Projectile Point		17.34	12.54	3.05	PDC	Plains sm. Side Notch	0.59	HT	Tip Minimally Retouched	
Projectile Point		26.93	16.97	4.92	PDC	Plains side notch	2.22	HT	Blades Minimally Retouched	
Projectile Point		26.37	15.19	4.06	PDC	Plains side notch	1.41			
Projectile Point		34.74	16.32	5.1	PDC	Madison-like	2.46	HT	Minimal Retouching on tip	
Projectile Point		33.18	22.12	7.4	PDC	Madison-like	3.56	HT	Heavily Retouched	
Projectile Point		32.52	17.84	5.53	PDC	Madison-like Triangular	2.87	HT	Tip Moderate Retouching	
Projectile Point		40.12	19.65	6.19	PDC	Samantha	5.06	HT	Tip Heavily Retouched	
Projectile Point		45.54	22.01	8.82	PDC	Samantha	7.35	HT	Tip Heavily Retouched	

Appendix B, Table 9. Lithic artifacts from 21BW1.

Lithics from the Tesrow Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Side and End Scraper		28.17	15.08	6.77	GMC		2.69		Expended	
End Scraper		15.73	17.07	5.31	GMC		1.23		Expended	
End Scraper		16.71	13.52	5.81	PDC		1.32		Heavily Retouched	
Retouched Flake	G2				PDC		3.29		Expended	
Retouched Flake	G2				PDC		2.09		Moderate Retouching	
Retouched Flake	G2				SRC		2.1		Expended	

Appendix B, Table 10. Lithic artifacts from 21BW54.

Lithics from 21FA95

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Retouched Flake	G2				GMC		9.4		Expended	
Retouched Flake	G2				PDC		4.9	HT	Minimal Retouching	
Retouched Flake	G2				PDC		7.73		Moderate Retouching	
Retouched Flake	G2				GMC		2.83		Moderate Retouching	
Retouched Flake	G2				MCC		5.62		Moderate Retouching	
Retouched Flake	G3				PDC		0.39	HT	Moderate Retouching	
Projectile Point		21.71	15.3	2.94	PDC	Madison-like Triangular	0.83	HT	Moderate Retouching	
Projectile Point		15.79	14.9	3.05	PDC	Madison-like Triangular	0.79	HT	Moderate Retouching	
Projectile Point		21.92	13.31	3.15	Galena Chert	Madison-like Triangular	0.75	HT	Moderate Retouching	
End Scraper		27.53	18.7	8.01	PDC		4.46	HT	Expended	
End Scraper		22.54	24.6	5.07	SS		3.61		Heavily Retouched	

Appendix B, Table 11. Lithic artifacts from 21FA95.

Lithics from 21FA97

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Abrader		34.92	22.95	18.53	Sandstone		19.13			
End Scraper		21.85	19.46	4.04	PDC		1.96		Moderate Retouching	
Retouched Flake	G2				GMC		2.31	HT	Expended	
Projectile Point		15.81	13.83	3.36	PDC	Madison-like Triangular	0.63	HT	None	
Retouched Flake	G2				PDC		3.41	HT	Minimal Retouching	
Spokeshave		35.53	59.23	14.51	PDC		32.89	HT	Concavity Expended	
Knife		66.77	50.32	11.86	TRS		36.84		Moderate Retouching	

Appendix B, Table 12. Lithic artifacts from 21FA97.

Lithics from Farley Village

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Projectile Point		26.05	15.69	3.94	PDC	Madison-like Triangular	1.52		None	
End Scraper		23.79	24.73	8.99	PDC		6.67	HT	Expended	
scraper		27.51	22.98	5.06	PDC		4.87		Moderate Retouching	
Retouched Flake	G2				PDC		4.46		Minimal Retouching	

Appendix B, Table 13. Lithic Artifacts from 21HU2.

Lithics from the Yucatan Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Retouched Flake	G2				PDC		2.95		Moderate Retouching	
Retouched Flake	G3				PDC		0.71	HT	Heavily Retouched	
End Scraper		40.53	26.52	7.56	Ind		7.83	burnt?	Expended	
End Scraper		42.88	21.52	10.06	PDC		7.58		Moderate Retouching	
Retouched Flake	G2				PDC		4.88		Heavily Retouched	
Retouched Flake	G2				PDC		4.69	HT	Heavily Retouched	
Retouched Flake	G2				PDC		4.34	HT	Moderate Retouching	
Projectile Point		13.67	17.36	4.34	PDC	Madison-like Triangular	1.1	HT	Moderate Retouching near tip	
Knife		36.3	15.38	7.46	PDC		4.07		Expended	
Perforator		23.58	13.69	6.61	PDC		1.57	HT	Expended	
Spokeshave		19.47	27.15	7.32	SS		3.16		Moderate Retouching	
Retouched Flake	G2				PDC		4.09		Minimal Retouching	
Retouched Flake	G2				PDC		1.81	HT	Minimal Retouching	
Retouched Flake	G2				PDC		1.93		Moderate Retouching	
Projectile Point		19.88	17.56	4.36	PDC	Madison-like Triangular	1.75		Moderate Retouching	
End Scraper		24.18	25.99	7.47	PDC		5.95	HT	Expended	
Projectile Point		18.44	12.2	2.82	Ind. Fossiliferous	Madison-like Triangular	0.53		Moderate Retouching on tip	
End Scraper		19.88	22.43	4.17	PDC		2.13	HT	Minimal Retouching	
Retouched Flake	G2				GMC		5.03		Minimal Retouching	

Appendix B, Table 14. Lithic artifacts from 21HU26.

Lithics from the Swope Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Projectile Point		16.81	13.3	3.72	PDC	Madison-like Triangular	0.81	HT	Moderate Retouching near tip	
Knife		73.77	46.91	17.39	PDC		54.55	HT	Heavily Retouched	
End Scraper		30.78	22.49	9.24	PDC		7.23	HT	Moderate Retouching	
End Scraper		18.31	30.42	10.83	PDC		5.68		Moderate Retouching	
Retouched Flake	G2				GAL		4.9	HT	Moderate Retouching	
Retouched Flake	G1				SS		4.63		Heavily Retouched	
End Scraper		30.22	25.65	6.04	PDC		4.8	HT	Heavily Retouched	
Retouched Flake	G3				PDC		0.99	HT	Expended	

Appendix B, Table 15. Lithic artifacts from 21HU43.

Lithics from the Cherry II Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Projectile Point		17.32	13.17	3.4	SS	Madison-like Triangular	0.76		Moderate Retouchingerate on Tip	
Projectile Point		21.21	14.43	3.22	GAL	Madison-like Triangular	0.91		None	
Projectile Point		39	21.79	7.14	SS	leaf	5.94		Moderate Retouchingerate on Tip	
Knife		66.2	37.8	13.8	PDC		40.92		Minimal Retouching	
Chopper		91.18	75.29	26.56	QZT		110.97		Heavily Retouched	
Retouched Flake	G1				GMC		8.47		Minimal Retouching	
Retouched Flake	G1				GAL		13.25		Moderate Retouching	

Appendix B, Table 16. Lithic artifacts from 21HU52.

Lithics from Strittmater Rockshelter

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Projectile Point		19.27	16.66	4.84	SS	Madison-like Triangular	1.26		Moderate Retouching; mostly tip	
Projectile Point		27.52	14.21	3.91	PDC	Madison-like Triangular	1.49	HT	Minimal Retouching; tip only	
Projectile Point		15.27	16.48	3.67	SS	Madison-like Triangular	0.95		None	
Retouched Flake	G2				PDC		2.14	HT	Minimal Retouching	
Retouched Flake	G1				PDC		9.7		Moderate Retouching	
Abrader		60.14	34.27	19	Sandstone		52.19		Minimal Retouching	
Abrader		77.47	66.13	24.41	Sandstone		108.11			

Appendix B, Table 17. Lithic artifacts from 21HU152.

Lithics from the Pool 9 Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Knife		86.9	35.69	16.53	Quartzite (Dak?)		5.28		Heavily Retouched	
Projectile Point		22.43	15.38	3.62	SS	Madison-like Triangular	1.18		Minimal Retouching	
Projectile Point		21.88	16.03	3.43	Galena Chert	Madison-like Triangular	1.23		None	
Utilized Flake	G1				Galena Chert		25.05		Minimal Retouching	
Retouched Flake	G1				Galena Chert		33.36		Moderate Retouching	
Retouched Flake	G2				Galena Chert		4.63		Moderate Retouching	
Utilized Flake	G2				Galena Chert		1.6		Moderate Retouching	
Utilized Flake	G2				Galena Chert		1.22		Moderate Retouching	
End Scraper		31.93	24.9	8.03	PDC		5.71		Heavily Retouched	
Scraper		16.86	16.86	4.14	Galena Chert		1.1		Expended	

Appendix B, Table 18. Lithic artifacts from 21HU156.

Lithics from the Dietz 1 Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Retouched Flake	G2	26.11	22.9	7.19	Grand Meadow Chert		0.972		Moderate Retouching	
Retouched Flake	G1	40.08	32.86	12.25	Prairie du Chien Chert		15.352		Expended	
Perforator		41	26.3	7.43	Grand Meadow Chert		2.069		Moderate Retouching	
Retouched Flake	G2	25.11	21.18	3.83	Prairie du Chien Chert		2.396	HT	Expended	
Side Scraper		52.15	36.9	6.87	Prairie du Chien Chert		14.368		Minimal Retouching	
Retouched Flake	G2	41.02	21.21	8.26	Prairie du Chien Chert		6.824		Moderate Retouching use	
Knife		53.65	30.32	10.1	Prairie du Chien Chert		20.237		Heavily Retouched	
Multitool		33.92	19.72	5.47	Indeterminate Chert		3.983		Spokeshave/Scraper; Expended	
Retouched Flake	G2	27.05	22.12	6.41	Indeterminate Chert		5.563		Minimal Retouching	
Retouched Flake	G2	26.36	19.42	6.04	Swan River Chert		5.051		Expended	
Perforator		25.05	15.71	6.66	Prairie du Chien Chert		1.552			
Retouched Flake	G2	16.73	10.09	5.5	Prairie du Chien Chert		4.193	HT		
Retouched Flake	G2	29.89	25.39	4.67	Indeterminate Chert		4.365		Moderate Retouching	
Retouched Flake	G2	37.08	27.64	8	Prairie du Chien Chert		7.273		Heavily Retouched	
Retouched Flake	G3	24.34	15.73	5.63	Prairie du Chien Chert		0.866		Expended	
Retouched Flake	G2	33.51	28.9	12.6	Prairie du Chien Chert		10.41	HT	Expended	
Projectile Point		29.88	17.9	4.68	Prairie du Chien Chert	St. Croix	2.422		Tip Minimally Retouched	
Retouched Flake	G1	52.15	36.9	6.87	Indeterminate Chert		4.891		Heavily Retouched	
Retouched Flake	G3	25.57	13.98	5.23	Grand Meadow Chert		1.686		Minimal Retouching	
Retouched Flake	G2	24	17.61	6.34	Swan River Chert		2.686	HT	Heavily Retouched	
Retouched Flake	G2	23	15.87	3.59	Galena Chert		2.219		Minimal Retouching	
Chopper	G2				Prairie du Chien Chert		11.489		slight edge polishing	
Retouched Flake	G1	56.79	34.65	5.01	Prairie du Chien Chert		9.753		Heavily Retouched	
Retouched Flake	G2	41.05	32.72	7.26	Swan River Chert		1.785		Minimal Retouching	
End Scraper					Quartzite		6.842		Expended	
Retouched Flake	G2	30.43	22.3	5.09	Prairie du Chien Chert		6.744		Moderate Retouching	
Retouched Flake	G3	21.95	14.66	4.2	Prairie du Chien Chert		1.299		Minimal Retouching	
Retouched Flake	G1	40.75	33.3	8.89	Prairie du Chien Chert		16.778		Moderate Retouching	
Retouched Flake	G3	20.48	19.49	5.12	Prairie du Chien Chert		1.68	HT	Minimal Retouching	
Projectile Point		23.13	15.49	4.96	Prairie du Chien Chert	Madison-like Traiangular	1.819		Tip Minimally Retouched	
Knife		55.01	37.25	10.75	Prairie du Chien Chert		24.303		Heavily Retouched	
Retouched Flake	G2	28.43	21.15	3.83	Prairie du Chien Chert		2.358	HT	Moderate Retouching	
Knife		51.38	31.52	9.55	Prairie du Chien Chert		14.285	HT		
Knife		58.65	32.25	11.44	Prairie du Chien Chert		22.249		Large Knife Fragment; Minimal Retouching	
Knife		30.52	16.18	5.58	Prairie du Chien Chert		17.647	HT	Moderate Retouching	
Knife		35.86	49.47	10.02	Prairie du Chien Chert		2.64		Heavily Retouched	
Side Scraper		23	15.87	3.59	Burlington Chert		1.678		Edges Expended	
Hammerstone		98.22	73.89	60.81	Basalt		632			
Grooved Axe		106.93	94.98	33.83	Diorite		585			
Scraper	G2				Prairie du Chien Chert		19.393		Moderate Retouching	
Scraper	G2				Prairie du Chien Chert		19.393		Expended	
Side Scraper		41.05	32.72	7.26	Indeterminate Fossiliferous Chert		9.575	HT	Moderate Retouching	
Projectile Point		29.59	21.21	5.61	Hudson Bay Lowland Chert	Madison-like Traiangular	2.67		Edges slightly Retouched	
Multitool		23.9	21.43	6.99	Indeterminate Fossiliferous Chert		4.113	HT	Repurposed Projectile Point/Side Scraper, one edge Expended	
Perforator		36.5	24.42	7.84	Grand Meadow Chert		6.516	HT	Edges Expended	
Retouched Flake	G2	37.36	17.8	6.68	Burlington Chert		1.225		Moderate Retouching	
Spokeshave		37.36	17.8	6.68	Indeterminate Fossiliferous Chert		4.778	HT	Expended	
Projectile Point		36.5	24.42	7.84	Indeterminate Chert	Samantha	5.069	HT	Moderately Retouched	
Projectile Point		24.39	17.46	5.67	Prairie du Chien Chert	Late Woodland Notched	2.281	HT	Moderately Retouched	

Appendix B, Table 19. Lithic artifacts from 21LE106.

Lithics from the Dietz 5 Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Celt		89.9	46.73	28.57	Basalt		177.74		back edge broken; used as a wedge	
Retouched Flake		21.54	10.86	5.36	Indeterminate Chert		1.03		Moderate Retouching	
End Scraper		16.73	10.09	5.5	Indeterminate Chert		0.829	HT	Heavily Retouched	
Side Scraper		29.89	25.39	4.67	Prairie du Chien Chert		3.597	HT	Moderate Retouching	
Retouched Flake		25.36	22.72	10.99	Prairie du Chien Chert		5.432	HT	Expended	
Multitool		96.15	93.74	68.94	Granite		928		Heavily Retouched	Damage or polish on all sides
Retouched Flake		18.91	20.65	5.96	Prairie du Chien Chert		2.147		Minimal Retouching	
Retouched Flake		36.38	15.43	5.03	Prairie du Chien Chert		2.373		Moderate Retouching	
End Scraper		21.58	13.08	4.6	Burlington Chert		1.368	HT	Expended	
Retouched Flake		25.91	14.96	8.41	Prairie du Chien Chert		3.469	HT	Moderate bifacial retouching	
Perforator		42.72	14.09	5.84	Indeterminate Chert		3.497		Expended	
Multitool		37.36	17.51	5.35	Prairie du Chien Chert		4.805	HT	Heavily Retouched on tip, Moderate Retouching on sides	
Projectile Point		34	18.36	4.43	Prairie du Chien Chert	Madison Madison-like Triangular	2.462		Moderate Retouching	
Grooved Maul		124.97	74.29	61.9	Diabase		956			
End Scraper		19.56	19.53	6.34	Indeterminate Chert		3.024	HT	Heavily Retouched	
Retouched Flake	G2				Indeterminate Chert		9.292		Expended	
Hammerstone		87.88	70.51	62.76	Granite		559		Moderate Retouching damage on ends	
End Scraper		28.05	20.36	6.2	Prairie du Chien Chert		3.348		Expended	
Retouched Flake		24.97	21.43	5.15	Prairie du Chien Chert		3.825	HT	Expended	
Side & End Scraper		30.26	18.04	5.86	Prairie du Chien Chert		3.248		Expended	
Spokeshave		30.43	22.3	5.09	Indeterminate Chert		3.02		Expended	
End Scraper		21.2	23.39	4.94	Indeterminate Chert		3.226	HT	Heavily Retouched	
Mano		102.21	80.19	66.19	Granite		776		Moderate Retouching, polish on bit	
Projectile Point		29.26	17.54	4.58	Prairie du Chien Chert	Samantha	2.155		Minimal Retouching	
Side Scraper		24.34	15.73	5.63	Prairie du Chien Chert		2.462	HT	Expended	
Retouched Flake	G2				Prairie du Chien Chert		3.26	HT	Moderate Retouching	
Retouched Flake	G2				Indeterminate Chert		1.781	HT	Expended	

Appendix B, Table 20. Lithic artifacts from 21LE110.

Lithics from the Pheasants Forever 5 Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Retouched Flake	G2				Grand Meadow Chert		0.936		Minimal Retouching	
Scraper		32.66	29.51	10.12	Prairie du Chien Chert		8.952		Heavily Retouched	
End Scraper		39.62	26.09	6.03	Prairie du Chien Chert		7.67	HT	Edge Expended	
End Scraper		36.67	34.58	13.71	Prairie du Chien Chert		2.525	HT	Heavily Retouched	
Knife		61.84	35.95	12.02	OrthoQuartzite		24.02	HT	Moderate Retouching	
Knife		44.66	23.9	8.21	Indeterminate Chert		10.471		Heavily Retouched	
Spokeshave		29.56	26.97	6.39	Prairie du Chien Chert		3.554	HT	Heavily Retouched	
Side Scraper		34.2	24.05	5	Prairie du Chien Chert		3.972	HT	Moderate Retouching	
Unifacial Tool		24.61	17.59	6.69	Indeterminate Chert		2.656		Heavily Retouched	
Spokeshave		19.32	15.08	6.13	Prairie du Chien Chert		2.113		Heavily Retouched	
Knife		67.47	36.44	9.14	Prairie du Chien Chert		29.43		Heavily Retouched	
Scraper		28.55	18	8.25	Knife River Flint		5.648		Heavily Retouched	
Retouched Flake	G2				Kekabeka Chert		4.127		Moderate Retouching	
Perforator		23.08	14.66	3.77	Indeterminate Chert		1.072		Heavily Retouched	
Projectile Point		16.36	12.45	3.77	Indeterminate Chert	Madison Madison-like Triangular	0.749		Minimal Retouching on tip	

Appendix B, Table 21. Lithic artifacts from 21LE118.

Lithics from the Lake Okamanpeedan Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Projectile Point		37.14	16.58	6.18	PDC	Klunk	4.56	HT	Moderate Retouching	
End Scraper		22.79	24.01	6.62	KRF		4.05		Expended	
Retouched Flake	G2				PDC		1.12	HT	Moderate Retouching	
Retouched Flake	G2				PDC		5.59		Moderate Retouching	
Retouched Flake	G2				PDC		2.87	HT	Moderate Retouching	
Retouched Flake	G2				Quartzite		2.45		Minimal Retouching	

Appendix B, Table 22. Lithic artifacts from 21MR13.

Lithics from the Late Prehistoric component of Ft. Ridgely

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Projectile Point		15.14	9.45	2.61	PDC	Madison-like Triangular	0.39	HT	No	
Projectile Point		8.07	12.07	2.34	PDC	Madison-like Triangular	0.28	HT	No	
End Scraper		16.81	14.73	5.62	Red River Chert		1.18		Expended	
Spokeshave		54.97	27.13	9.69	Siltstone		17.77		Minimal Retouching use	
Retouched Flake	G2				Burlington Chert		1.64	HT	Minimal Retouching use	
Retouched Flake	G3				KRF		0.83		Heavily Retouched	
Retouched Flake	G2				Chalcedony		2.62		Heavily Retouched	
Retouched Flake	G3				PDC		0.7	HT	Heavily Retouched	
Hammerstone		67.92	56.15	33.06	Basalt		175.31		Moderate Retouchingly used	
Chopper		76.67	119.08	34.51	Basalt		330.39		distal edge worn	

Appendix B, Table 23. Lithic artifacts from 21NL8.

Lithics from one of the Timber Lake Cluster sites

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Multitool		63.75	64.69	49.22	Basalt		306.496		significant damage from hammering; some surfaces well-polished	
Knife		74.09	50.43	11.58	Knife River Flint		45.892		Heavily Retouched; almost Expended	
Retouched Flake	G1				Prairie du Chien Chert		24.78	HT	Moderate Retouching	
Projectile Point		28.42	19.5	4.91	Knife River Flint	Avonlea	2.44		sides Moderate Retouching; likely Expended due to burination of tip	
Projectile Point		24.78	16.61	4.76	Prairie du Chien Chert	Prairie Side Notch	2.028	HT	sides Moderate Retouching; tip Heavily Retouched	
Retouched Flake	G2				Prairie du Chien Chert		9.329		Minimal Retouching	
Retouched Flake	G2				Knife River Flint		2.624		Minimal Retouching	
Scraper		32.36	26.29	12.28	Prairie du Chien Chert		10.652	HT	Heavily Retouched	
Scraper		29.88	25.08	5.8	Prairie du Chien Chert		4.315	HT	sides heavily retouch; Minimal Retouching on end	
Retouched Flake	G2				Prairie du Chien Chert		5.465	HT	Moderate Retouching	
Chisel		27.46	28.24	8.36	Prairie du Chien Chert		8.102		Broken	

Appendix B, Table 24. Lithic artifacts from 21NL38.

Lithics from one of the Timber Lake Cluster sites

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Knife		54.49	32.31	8.07	Maynes Creek Gray Chert		13.213		Heavily Retouched	
Projectile Point		39.9	20.93	6.77	Prairie du Chien Chert	Madison Madison-like Triangular	4.518		Minimal Retouching	
Projectile Point		25.03	17.41	5.89	Prairie du Chien Chert	Plains Side Notched	2.526	HT	Minimal Retouching	
Projectile Point		20.28	13.02	4.22	Prairie du Chien Chert	Plains Side Notched	1.083	HT	Moderate Retouching	
End Scraper		32.24	50.45	12.86	Prairie du Chien Chert		20.446		Heavily Retouched	
Spokeshave		38.05	28.2	25.31	Prairie du Chien Chert		13.857	HT	Expended	
Retouched Flake	G2				Prairie du Chien Chert		11.325		Moderate Retouching	
Retouched Flake	G2				Prairie du Chien Chert		2.251	HT	Minimal Retouching	
Retouched Flake	G2				Quartzite		17.141		Minimal Retouching	
Retouched Flake	G2				Prairie du Chien Chert		2.463	HT	Minimal Retouching	
Retouched Flake	G2				Horse Creek Chert		7.944		Moderate Retouching	
Retouched Flake	G2				Galena Chert		3.412		Minimal Retouching	
Retouched Flake	G2				Prairie du Chien Chert		2.338	HT	Minimal Retouching	
Retouched Flake	G1				Prairie du Chien Chert		49.121		Expended	

Appendix B, Table 25. Lithic artifacts from 21NL42.

Lithics from the Heyman's Creek Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Retouched Flake	G2				PDC		5.67	HT	Heavily Retouched	
Retouched Flake	G1				PDC		9.81	HT	Heavily Retouched	
Retouched Flake	G1				PDC		12.51		Moderate Retouching	
Retouched Flake	G2				PDC		3.52		Moderate Retouching	
Scraper		23.87	32.69	14.67	GMC		10.15		Heavily Retouched	
Retouched Flake	G2				PDC		9.02		Expended	
Retouched Flake	G2				KRF		1.71		Moderate Retouching	
Retouched Flake	G2				PDC		1.53		Minimal Retouching	
Retouched Flake	G1				Agate		28.27		Expended	
Knife		73.95	28.78	7.6	SW		16.5		Heavily Retouched	
Projectile Point		14.79	9.54	2.98	PDC	Prairie Side Notched	0.42		Minimal Retouching	

Appendix B, Table 26. Lithic artifacts from 21NL64.

Lithics from the Oshawa Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Projectile Point		27.98	16.69	5.19	PDC	Plains Side Notched Cluster	2.27	HT	None	
Projectile Point		36.91	17.89	7.24	PDC	Plains Side Notched Cluster	4.77	HT	Minimal Retouching	
Hammerstone		78.62	73.82	48.69	Granite		379.59		Heavily Retoched	
Retouched Flake	G2				KRF		2.55		Moderate Retouching	
Side Scraper		16.1	46.56	6.05	GMC		4.44		Heavily Retoched	
Retouched Flake	G3				PDC		4.4	HT	Minimal Retouching	
Retouched Flake	G2				PDC		3.3		Minimal Retouching	
Retouched Flake	G2				PDC		1.83	HT	Moderate Retouching	
Retouched Flake	G3				GMC		0.82		Moderate Retouching	

Appendix B, Table 27. Lithic artifacts from 21NL131.

Lithics from the Falls Habitation Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Point Preform		21.9	15.67	4.98	PDC	Madison-like Triangular	1.55	HT	None	

Appendix B, Table 28. Lithic artifact from 21NL140.

Lithics from the La Moille Rockshelter

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Retouched Flake	G1				SS		12.41		Heavily Retouched	
Retouched Flake	G2				GAL		3.95	HT	Heavily Retouched	
Retouched Flake	G2				PDC		6.06	HT	Moderate Retouching	
End Scraper		39.17	31.23	10.27	PDC		12.64		Expended	
Projectile Point		27.61	19.08	3.99	PDC	Madison-like Triangular	1.92	HT	Heavily Retouched on tip	
Projectile Point		27.4	15.38	6.55	SS	Klunk	2.1		Moderate Retouching on tip	
Projectile Point		31.06	20.52	5.09	PDC	Besant	3.33	HT	Heavily Retouched on tip	
Grooved Maul		161.19	126.05	104.8	Granite		3170			

Appendix B, Table 29. Lithic artifacts from 21WN1.

Lithics from the Kunz Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
grooved Maul		151.19	101.72	74.27	Granite		1620		Heavily Retouched	
Knife/flake tool		68.31	22.85	5.69	GMC		8.4		Moderate Retouching	
Retouched Flake	G2				PDC		8.46	HT	Minimal Retouching	
Retouched Flake	G2				KRF		4.65		One edge Expended, other showed Moderate Retouching	
Scraper		24.12	35.92	7.14	PDC		5.35	HT	Expended	
Retouched Flake	G2				PDC		2.63	HT	Expended	
Retouched Flake	G2				PDC		1.75	HT	Expended	
Retouched Flake	G1				BC		19.56	HT	Minimal Retouching	
Retouched Flake	G2				KRF		3.42		Minimal Retouching	
Retouched Flake	G2				KRF		2.93		Minimal Retouching	
Retouched Flake	G1				PDC		6.95	HT	Minimal Retouching	
Retouched Flake	G1				PDC		9.43	HT	Minimal Retouching	
Scraper		30.34	30.24	10.14	PDC		9.71		Expended	
Retouched Flake	G2				KRF		0.99		Minimal Retouching	
Retouched Flake	G2				KRF		3.37		Moderate Retouching	
Knife		38.72	21.28	7.8	PDC		5.49	HT	Moderate Retouching	
Projectile Point		34.83	19.97	6.03	PDC	Samantha	2.82		Minimal Retouching	
Projectile Point		24.27	18.76	5.7	TRS	Samantha	2.48	HT	Moderate Retouching	
Drill		23.71	38.84	8.12	SRC		7.02	HT	Heavily Retouched	
Drill/Perforator		32.7	13.84	6.06	PDC		2.44	HT	Heavily Retouched	
Knife		49.58	22.76	6.26	PDC		6.79	HT	Moderate Retouching	

Appendix B, Table 30. Lithic artifacts from 21WW8.

Lithics from the Halverson/Lau Lake Site

Artifact Morphology	Size Grade	Length (mm)	Width (mm)	Thickness (mm)	Raw Material	Diagnostic/Classification	Mass (g)	Heat Treated?	Modified or Reworked?	Other Notes
Projectile Point		35.04	17.16	4.35	PDC		2.01	HT	Moderate Retouching on Tip	
Retouched Flake	G2				SRC		2.85	HT	Minimal Retouching	
End Scraper		21.41	19.78	6.48	Indeterminate		2.77		Expended	
Knife		69.83	41.95	12.02	Quartzite		41.97		Heavily Retouched; Broken	
Projectile Point		23.07	13.73	2.99	PDC	Prairie Side Notched	0.79		Minimal Retouching	
Projectile Point		29.06	14.4	4.08	PDC	Prairie Side Notched	1.618		Minimal Retouching on tip	
Projectile Point		20.22	15.49	2.69	GMC	Madison-like Triangular	1.08		None	
End Scraper		33.26	17.96	7.46	PDC		4.29		Expended	
Knife		61.54	36.17	8.77	PDC		23.13		Heavily Retouched	
Side Scraper		21.68	28.41	4.95	GMC		4.02		Expended	
Retouched Flake	G2				PDC		4.2		Minimal Retouching	
Retouched Flake	G2				Scenic Chal.		6.47		Heavily Retouched	
Retouched Flake	G2				GMC		0.89		Minimal Retouching	
Retouched Flake	G2				PDC		1.64	HT	Minimal Retouching	
Projectile Point		21.06	15.4	4.09	SS (Possibly Hixton)	Madison-like Triangular	0.92		Minimal Retouching on tip	
Projectile Point		21.59	14.92	2.81	GMC	Madison-like Triangular	0.89		Minimal Retouching on tip	
Projectile Point		27.51	15.82	4.35	SRC	Late Prehistoric Corner Notched	1.91		Heavily Retouched	
End Scraper		58.49	22.46	9.4	GMC		14.72		Expended	
Hemi Scraper		45.08	37.85	17.51	SRC		30.1		Heavily Retouched	
End Scraper		42.2	31.35	16.22	PDC		2.75		Heavily Retouched	
End Scraper		23.74	18.44	6.19	PDC		3.04	HT	Expended	
End Scraper		28.58	20.94	6.32	GMC		3.79		Moderate Retouching	
End Scraper		31.75	25.56	7.97	JAS		7.13		Moderate Retouching	
End Scraper		27.81	23.3	5.41	PDC		4.15	HT	Expended	
End Scraper		26.41	14.93	5.25	KRF		2.45		Moderate Retouching	
Knife		48.41	21.6	7.12	GMC		7.512		Minimal Retouching	
Side Scraper		44.61	18.59	7.39	GMC		6.2		Expended	
Retouched Flake	G2				GMC		6.89		Moderate Retouching	
Retouched Flake	G1				GMC		9.99		Moderate Retouching	
Retouched Flake	G2				PDC		8.14	HT	Moderate Retouching	
Retouched Flake	G1				PDC		4.55		Minimal Retouching	
Retouched Flake	G2				PDC		3.82	HT	Moderate Retouching	
Retouched Flake	G2				PDC		5.07	HT	Minimal Retouching	
Retouched Flake	G2				GMC		3.21		Heavily Retouched	
Retouched Flake	G2				GMC		4.66		Heavily Retouched	
Retouched Flake	G2				PDC		1.68	HT	Moderate Retouching	
Retouched Flake	G2				PDC		1.78	HT	Moderate Retouching	
Retouched Flake	G2				PDC		1.48		Moderate Retouching	
Retouched Flake	G3				GMC		1.29		Moderate Retouching	
Retouched Flake	G2				KRF		2		Minimal Retouching	
Retouched Flake	G2				PDC		2.72	HT	Moderate Retouching	

Appendix B, Table 31. Lithic artifacts from 21WW9, in the MHS collection.

Sites Categorized According to Artifacts and Pollen Data

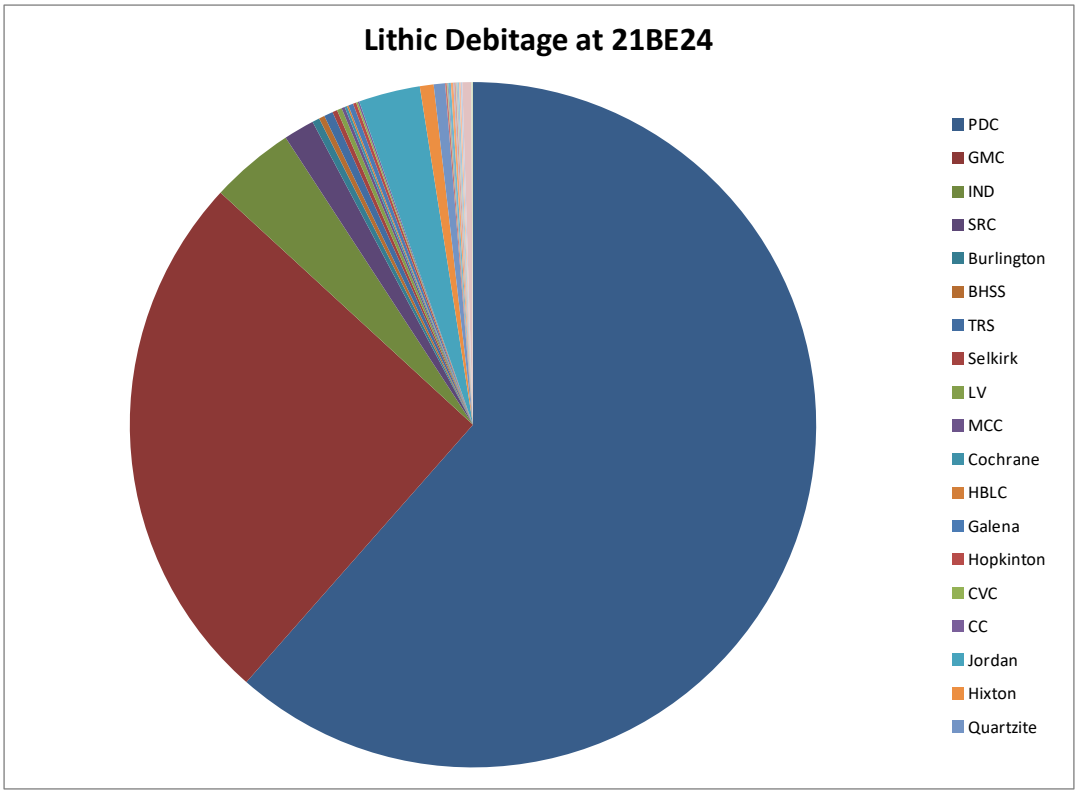
Site	County	Dates	Cultural Affiliation	Likely Subsistence Strategy	Probable Environmental Conditions
21BE24	Blue Earth	1100-300 B.P.	Mixed	Mixed	Mixed
21BW1	Brown	1700-300 B.P.	Plains	Prairie-oriented	Prairie
21BW54	Brown	Indeterminate	Indeterminate	Indeterminate	Prairie
21FA95	Faribault	1100-300 B.P.	Oneota	Mixed	Prairie, Oak Savannah
21FA97	Faribault	660-550 B.P.	Oneota	Mixed	Prairie, Oak Savannah
21HU2	Houston	1100-300 B.P.	Eastern Woodlands	Woodland-oriented	Woodland
21HU26	Houston	1100-300 B.P.	Eastern Woodlands	Woodland-oriented	Woodland
21HU43	Houston	1100-300 B.P.	Eastern Woodlands	Woodland-oriented	Woodland
21HU52	Houston	1100-300 B.P.	Eastern Woodlands	Woodland-oriented	Woodland
21HU152	Houston	1100-300 B.P.	Eastern Woodlands	Woodland-oriented	Woodland
21HU156	Houston	1100-300 B.P.	Eastern Woodlands	Woodland-oriented	Woodland
21LE106	Le Sueur	1700-300 B.P.	Eastern Woodlands	Mixed	Woodland
21LE110	Le Sueur	1700-300 B.P.	Eastern Woodlands	Mixed	Woodland
21LE118	Le Sueur	1700-300 B.P.	Eastern Woodlands	Mixed	Woodland
21MR13	Martin	1500-500 B.P.	Plains	Prairie-oriented	Prairie, Oak Savannah
21NL8	Nicollet	1100-300 B.P.	Oneota	Mixed	Prairie, Oak Savannah
21NL38	Nicollet	1800-500 B.P.	Mixed	Mixed	Mixed
21NL42	Nicollet	1300-300 B.P.	Mixed	Mixed	Mixed
21NL64	Nicollet	1500-500 B.P.	Mixed	Mixed	Mixed
21NL131	Nicollet	1500-700 B.P.	Mixed	Mixed	Mixed
21NL140	Nicollet	1100-300 B.P.	Mixed	Mixed	Prairie, Oak Savannah
21WN1	Winona	1500-300 B.P.	Eastern Woodlands	Woodland-oriented	Woodland
21WW8	Watonwan	1700-1200 B.P.	Plains	Prairie-oriented	Prairie
21WW9	Watonwan	1700-300 B.P.	Plains	Prairie-oriented	Prairie

Appendix B, Table 32. Overall traits of all sites examined.

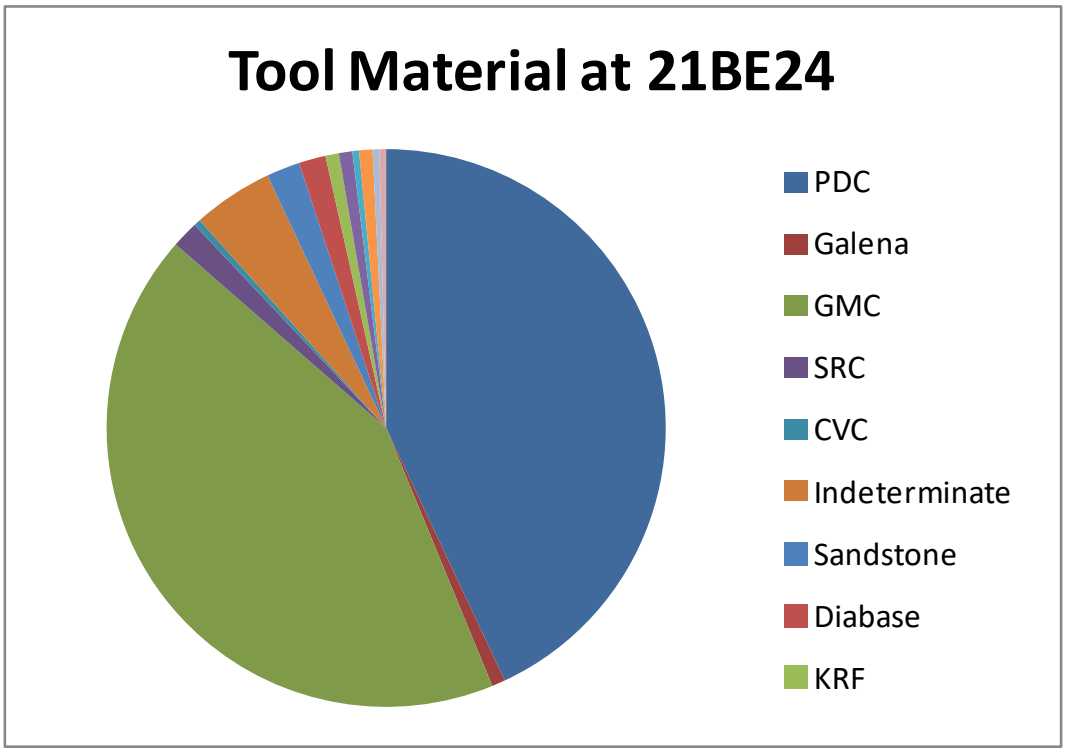
Overall Pottery Traits

Site	Cordmarked	Smooth	SOCM	Dentate Stamped	Cord Impressed	Incised or Trailed Line	Tool Impressed	CWSI	Punctates	Grit Temper	Shell Temper	Sand Temper	Untempered
21BE24	6,000	300	1,900	1	335	59	86	9	32	12,600	1	3	8
21BW1	145	68		2	3	5		2	4	213	1		
21BW54	25	19		1	1		1	1		30	14		
21FA95		9									9		
21FA97	8	65				3			3	8	65		
21HU2	7									7	15		
21HU26	6	21					2			6	21		
21HU43	19									19			
21HU52					1								
21HU152	33	5			3			1		36			
21HU156	96	3			3	1	1	2		97	2		
21LE106													
21LE110													
21LE118	3	2								5			
21MR13	3	27		1	1	1	1		1	24	3		
21NL8		4									4		
21NL38	2	10			1				1	14			
21NL42	3	4	2				1			10	1		
21NL64	3	19		19		19				21			
21NL131													
21NL140	200				3					203			
21WN1	17									17			
21WW8	29	31		1		31	1			37	13		
21WW9	19	39				1	1	4		72			

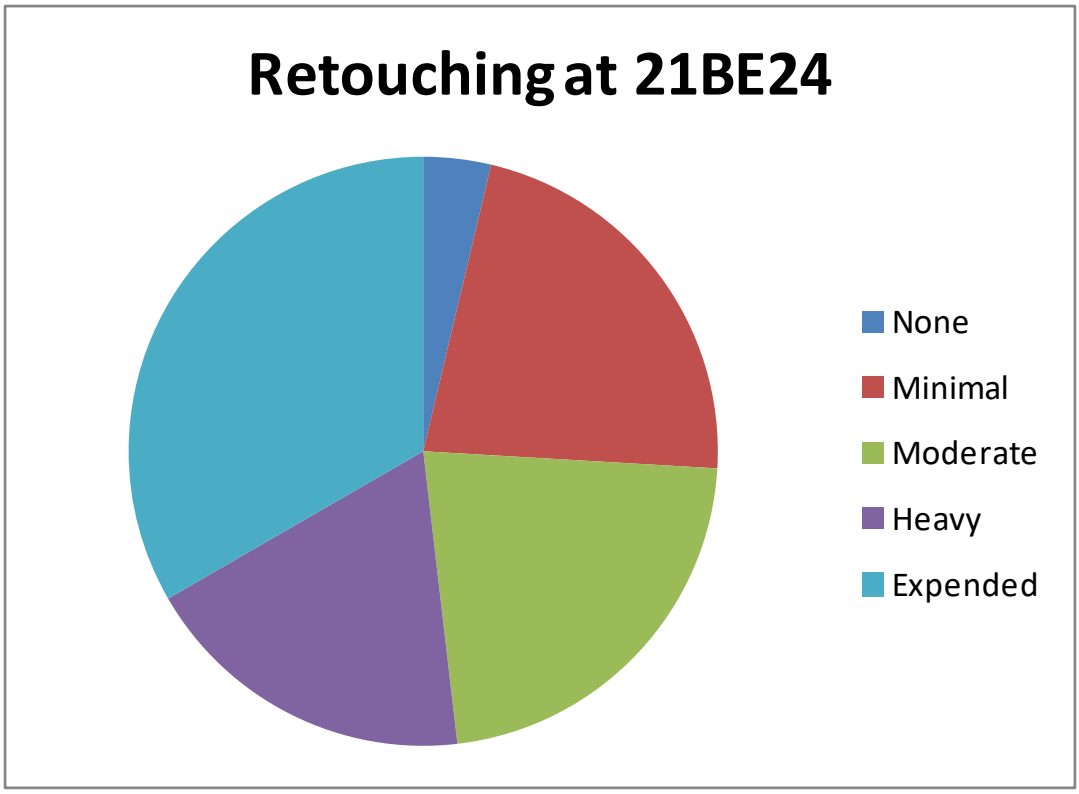
Appendix A, Table 33. Overall results of pottery traits



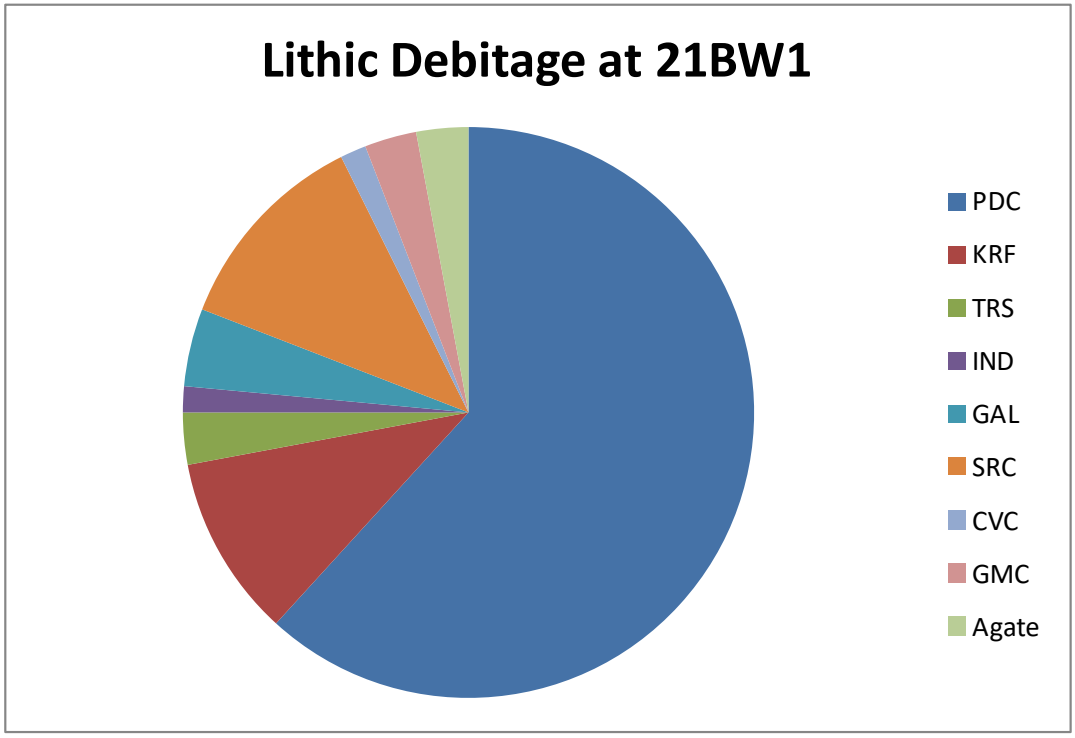
Appendix B, Figure 1. Lithic debitage at 21BE24.



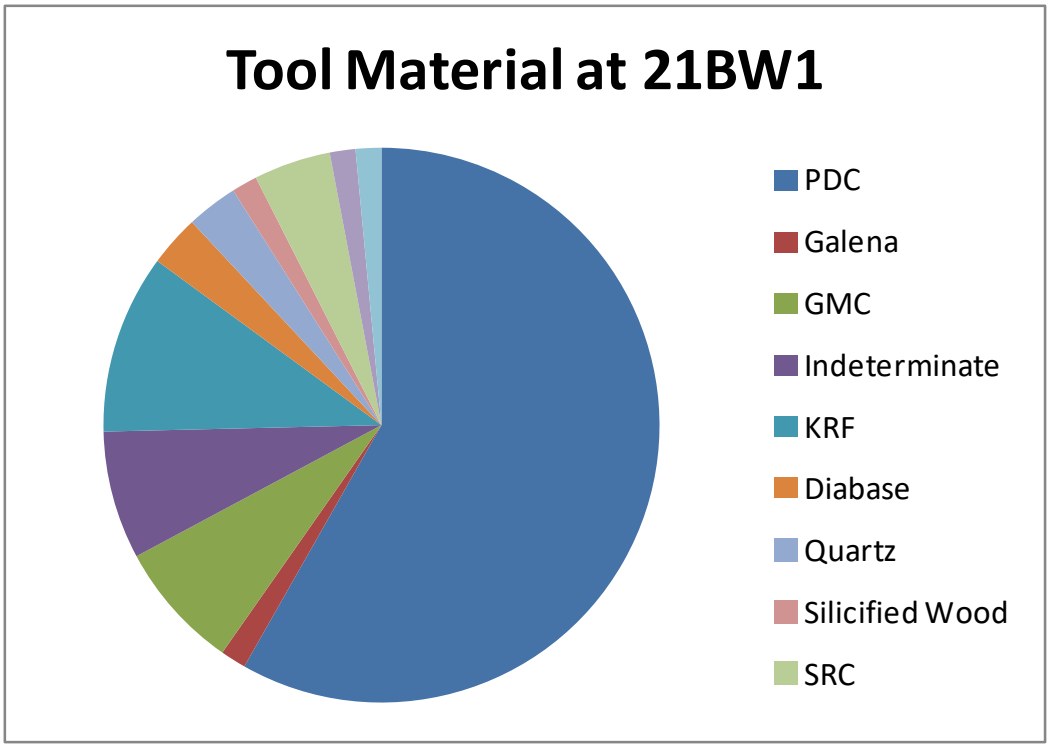
Appendix B, Figure 2. Lithic tool material at 21BE24.



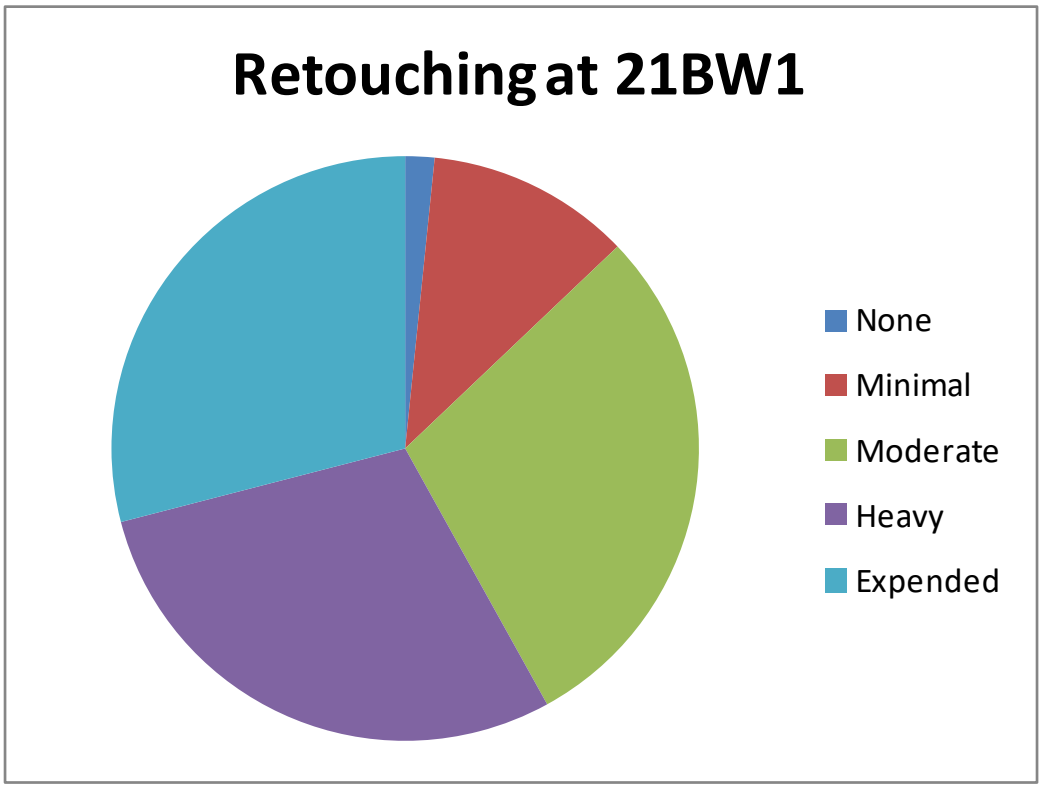
Appendix B, Figure 3. Degree of retouching and tool expenditure at 21BE24.



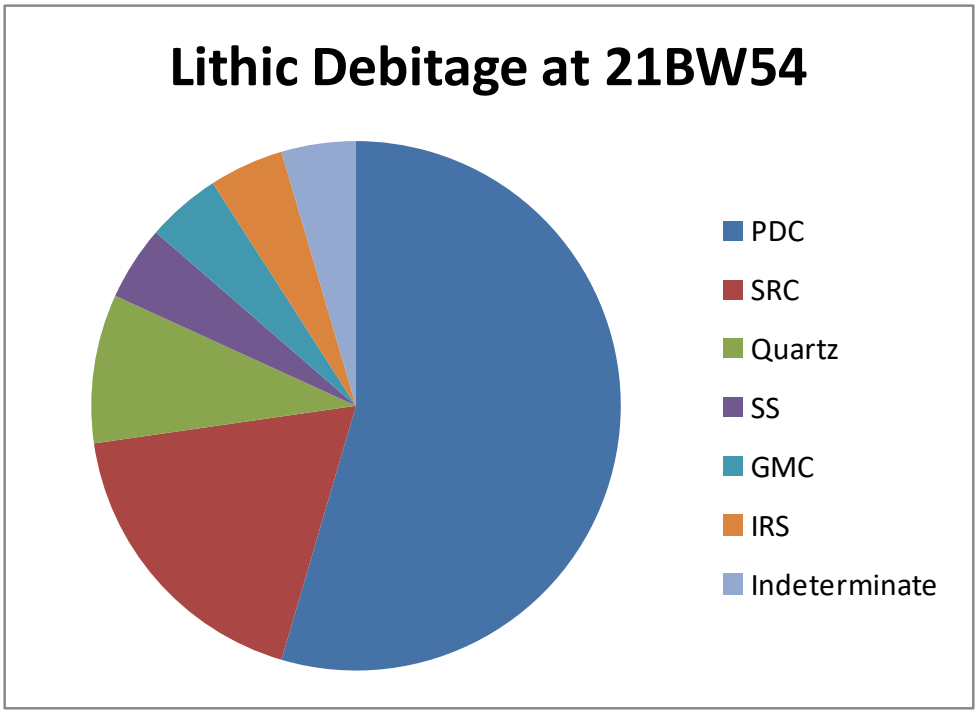
Appendix B, Figure 4. Lithic debitage at 21BW1.



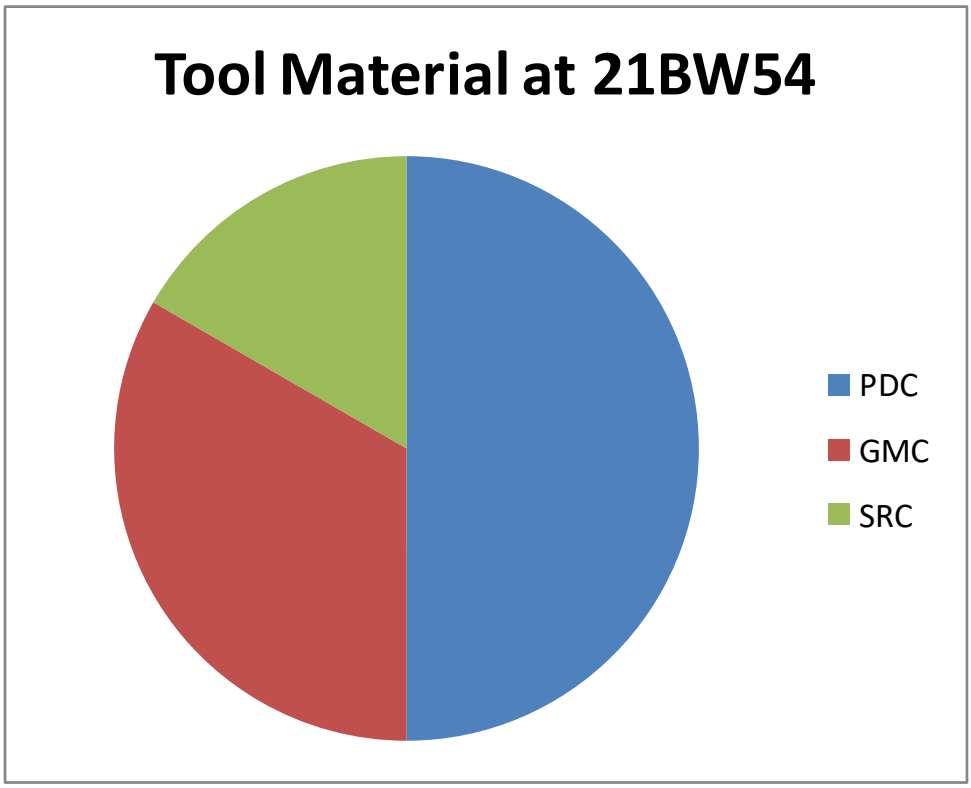
Appendix B, Figure 5. Tool raw material at 21BW1.



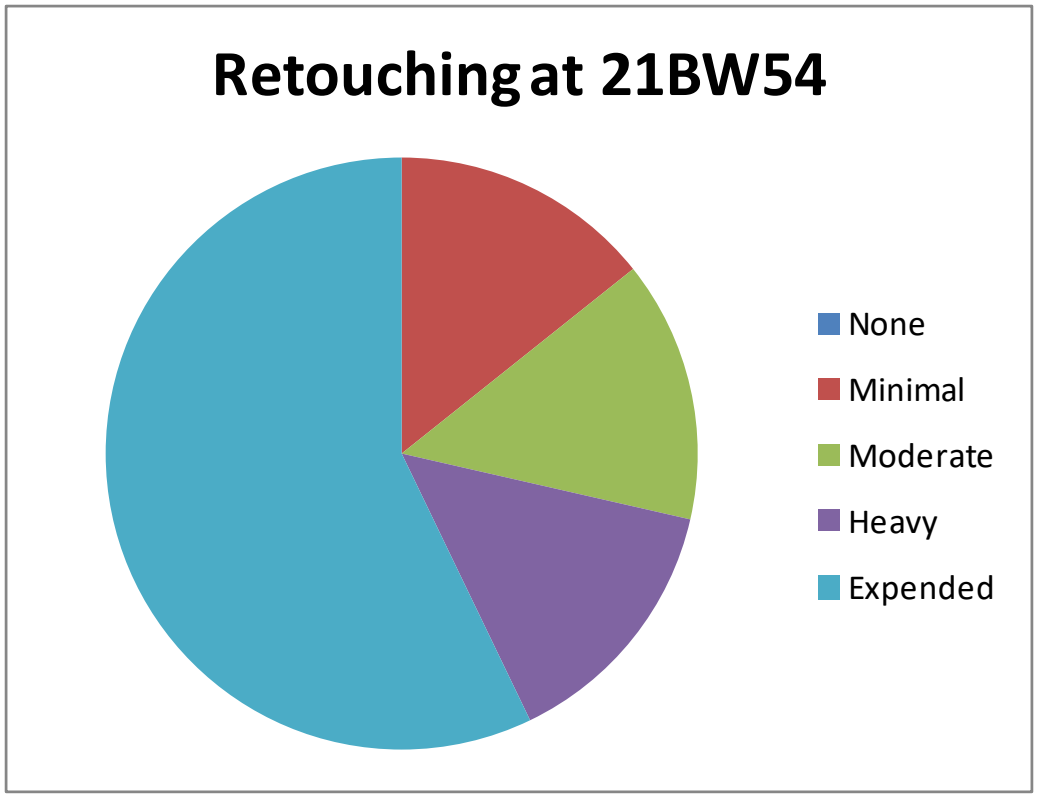
Appendix B, Figure 6. Degree of retouching and expenditure at 21BW1.



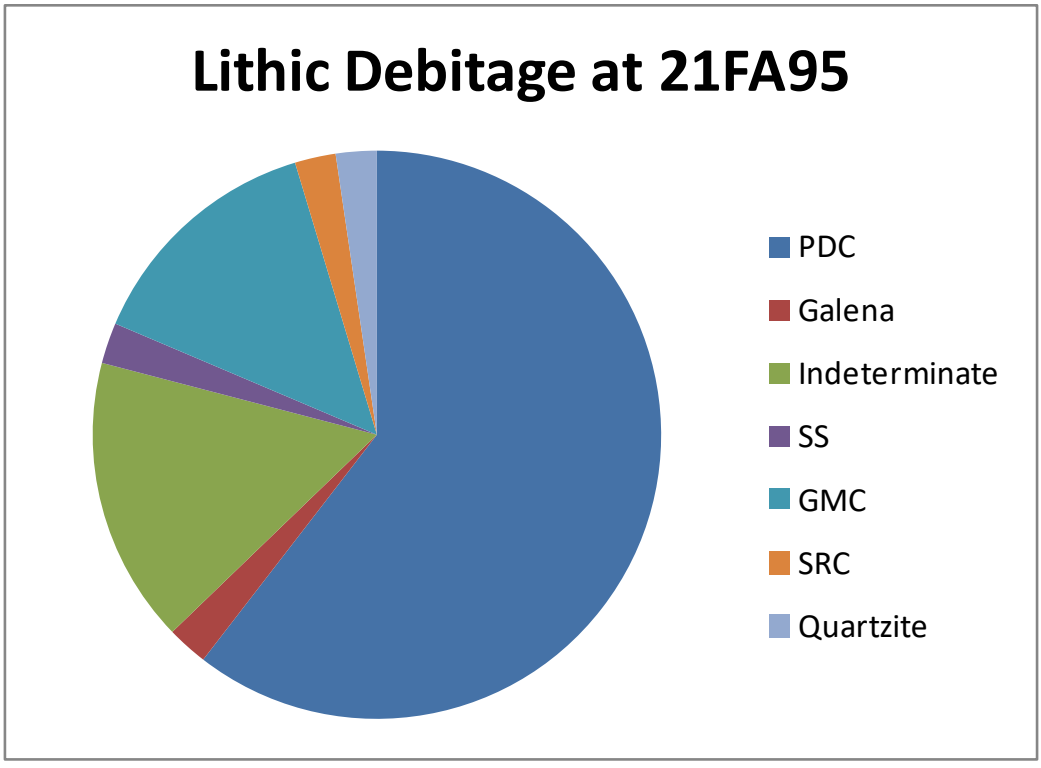
Appendix B, Figure 7. Lithic waste raw material at 21BW54.



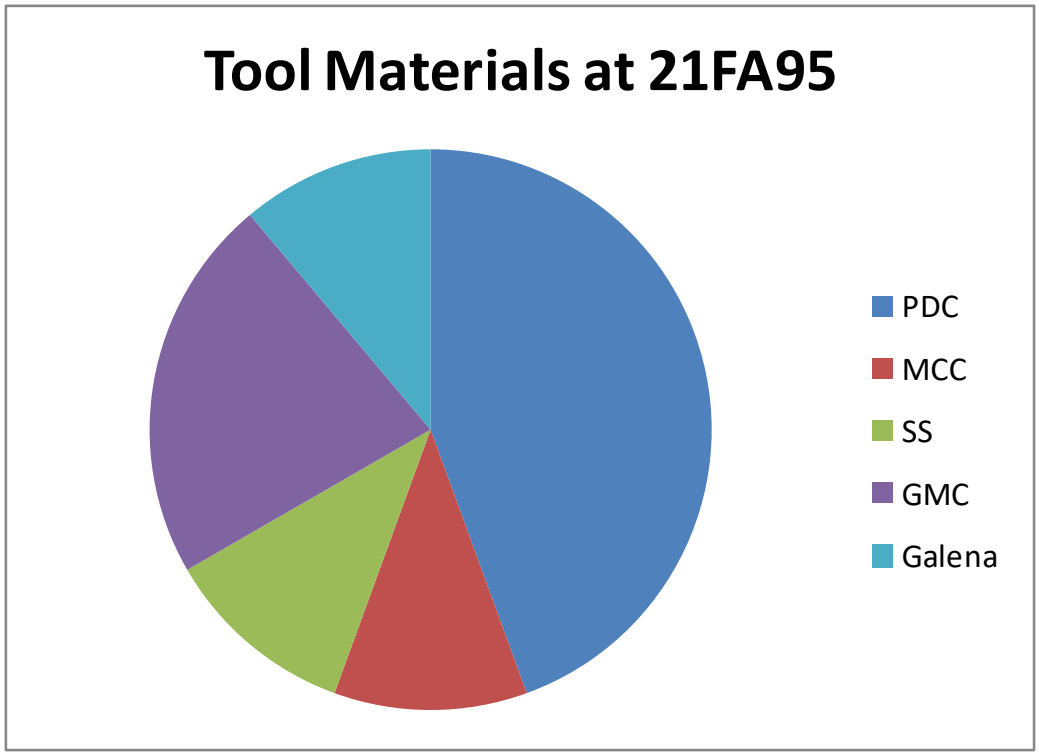
Appendix B, Figure 8. Lithic tool material at 21BW54.



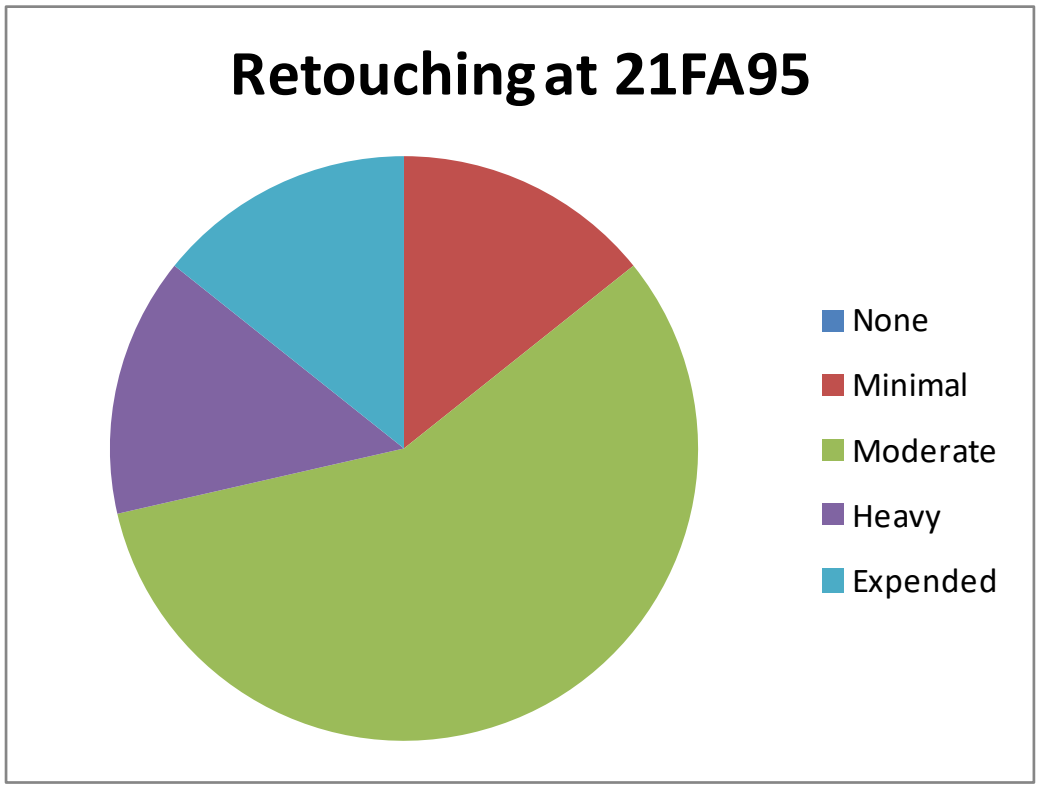
Appendix B, Figure 9. Retouching and expenditure at 21BW54.



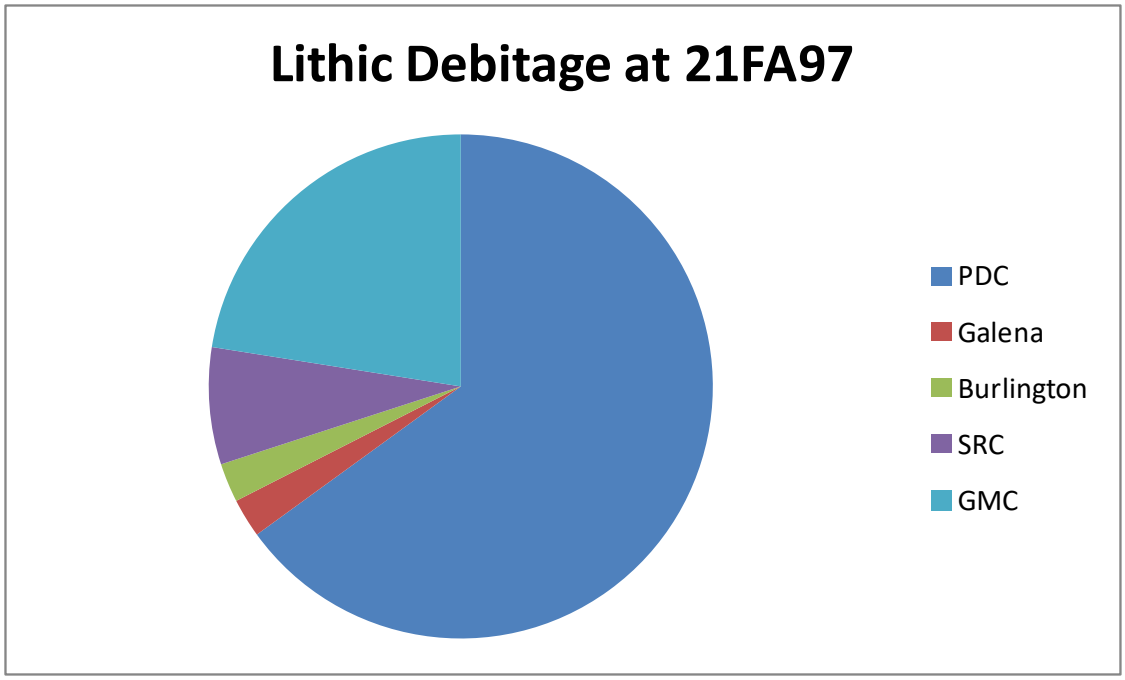
Appendix B, Figure 10. Lithic debitage raw materials at 21FA95.



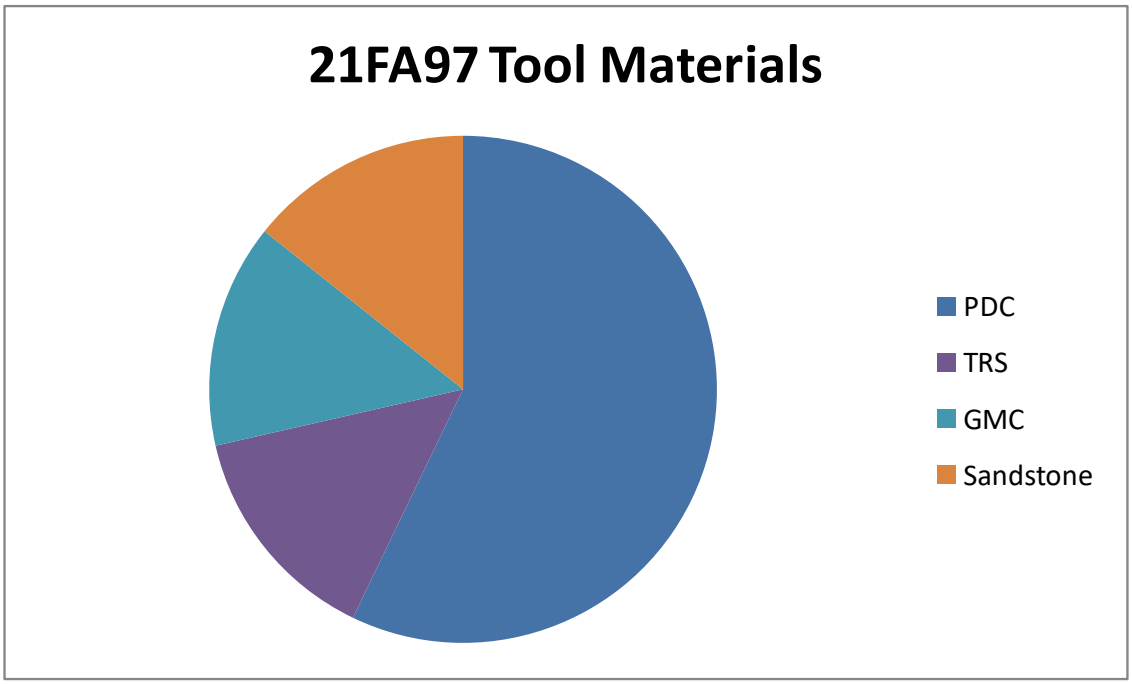
Appendix B, Figure 11. Lithic tool raw material at 21FA95.



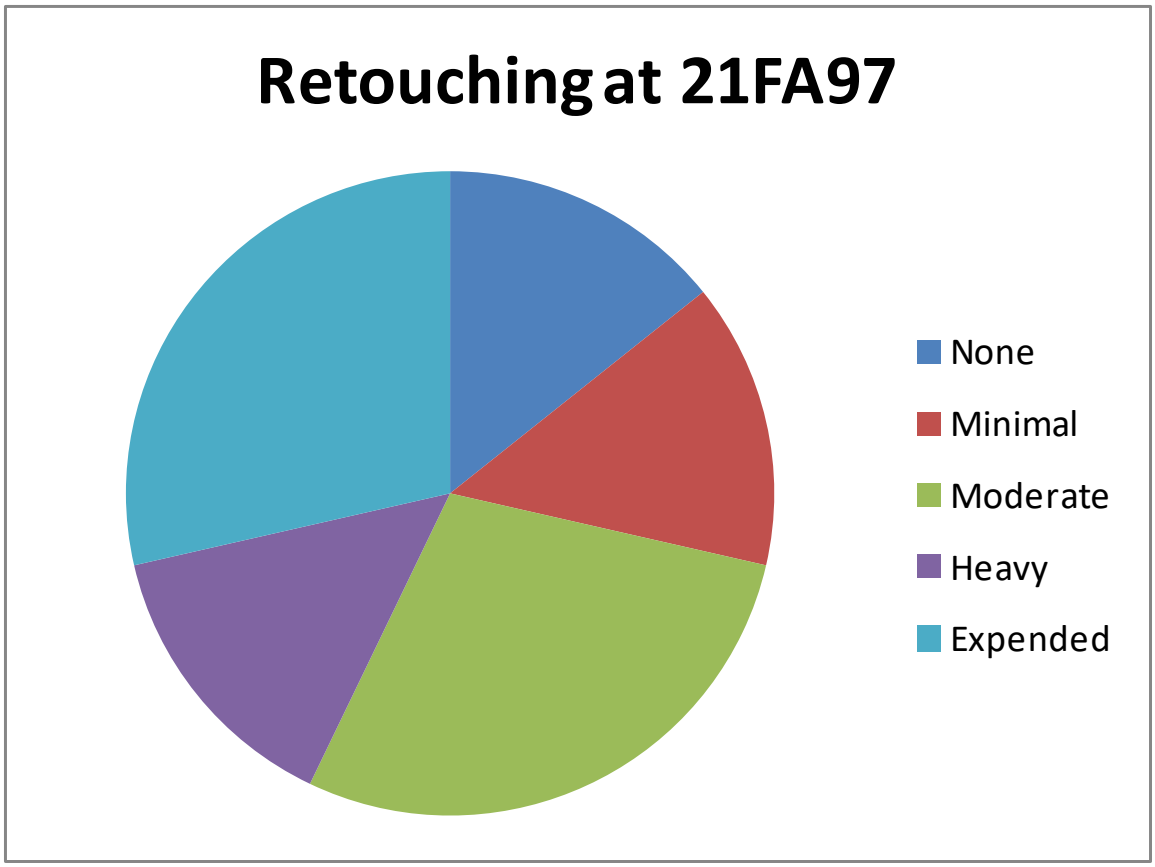
Appendix B, Figure 12. Degree of retouching and expenditure at 21FA95.



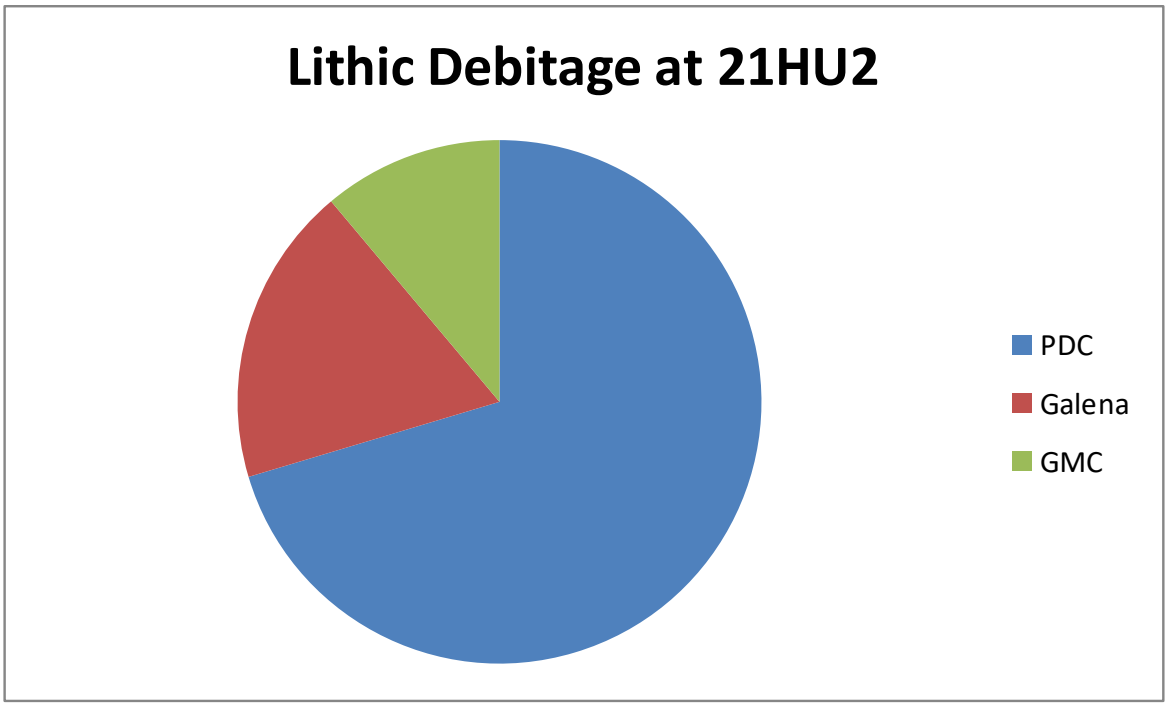
Appendix B, Figure 13. Chart displaying frequency of waste material at 21FA97.



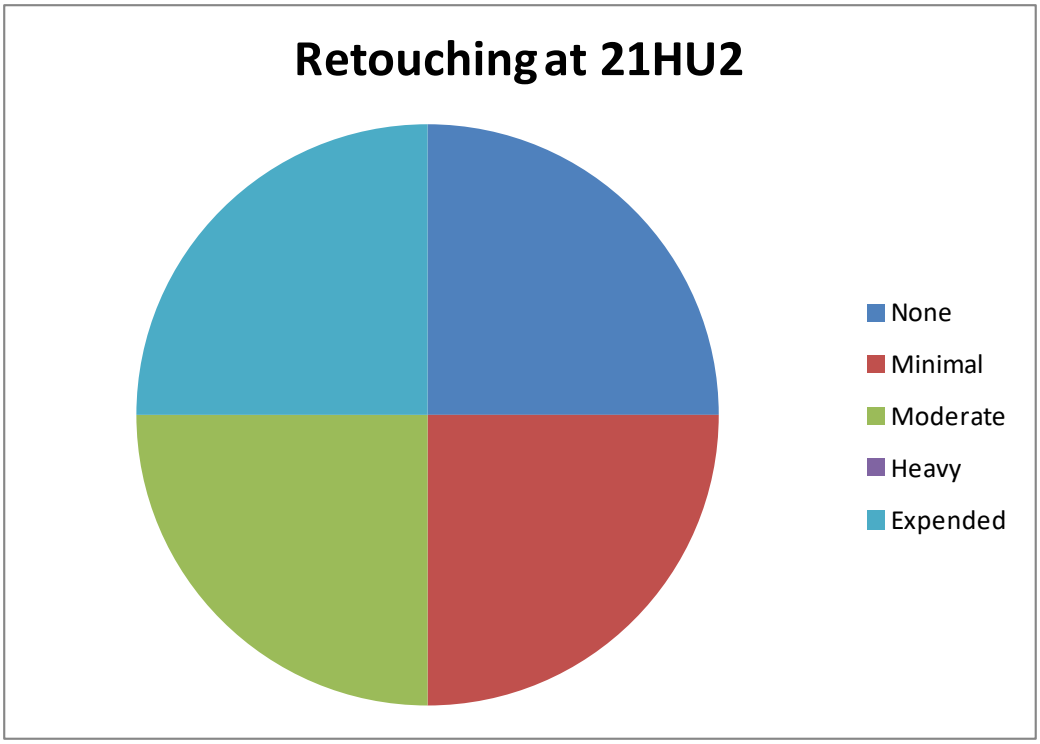
Appendix B, Figure 14. Raw material frequency in tools at 21FA97.



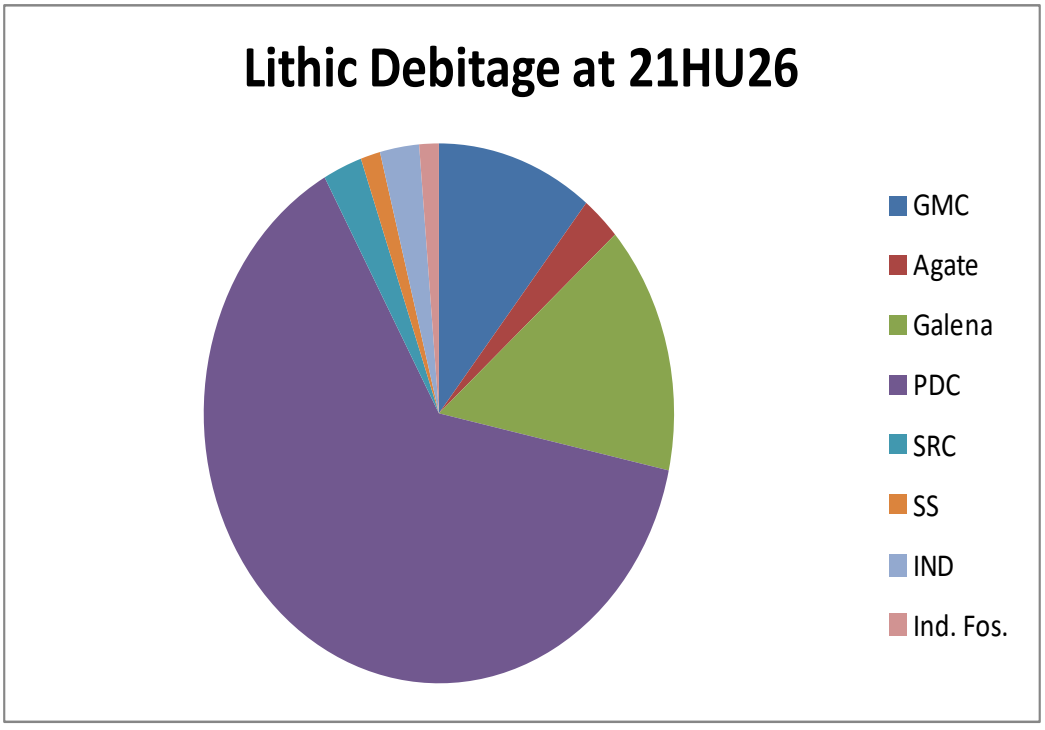
Appendix B, Figure 15. Degrees of retouching and expenditure at 21FA97.



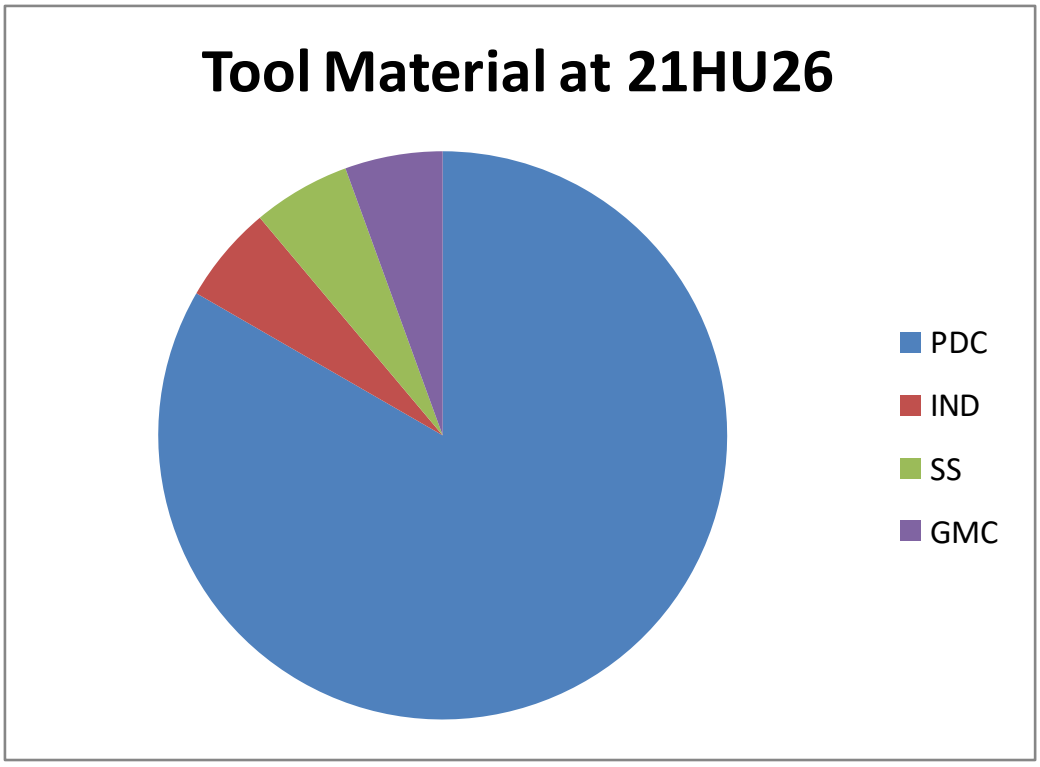
Appendix B, Figure 16. Lithic debitage raw material at 21HU2.



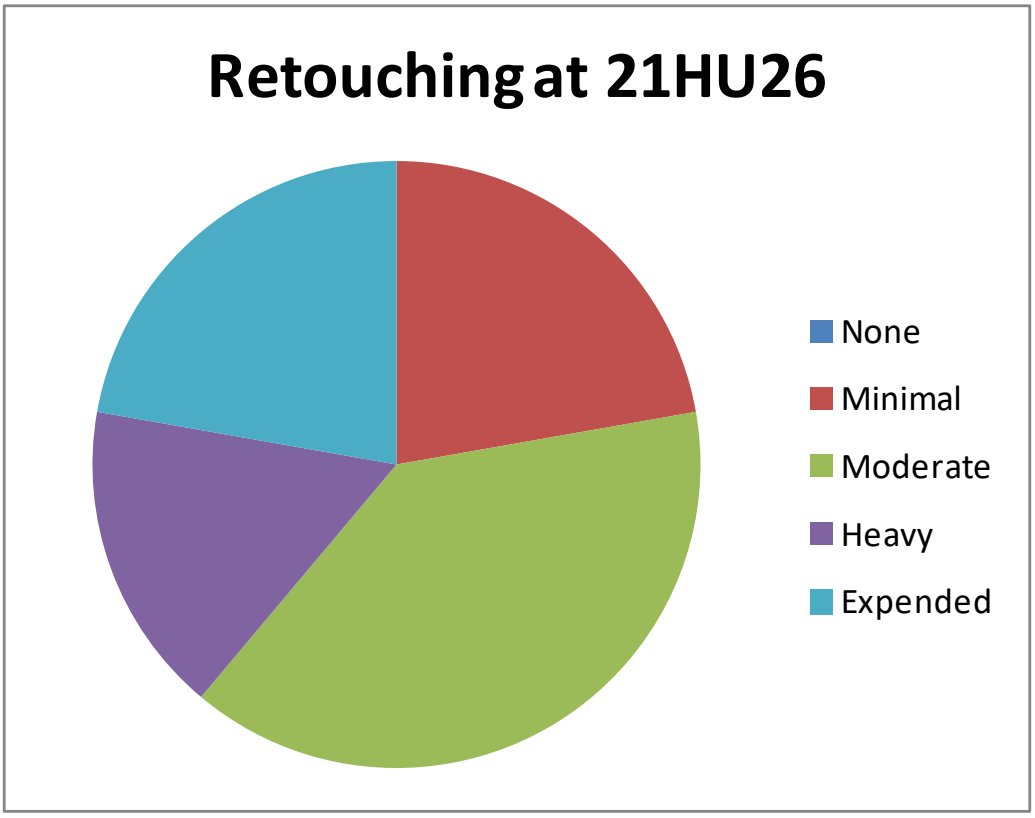
Appendix B, Figure 17. Retouching and expenditure at 21HU2.



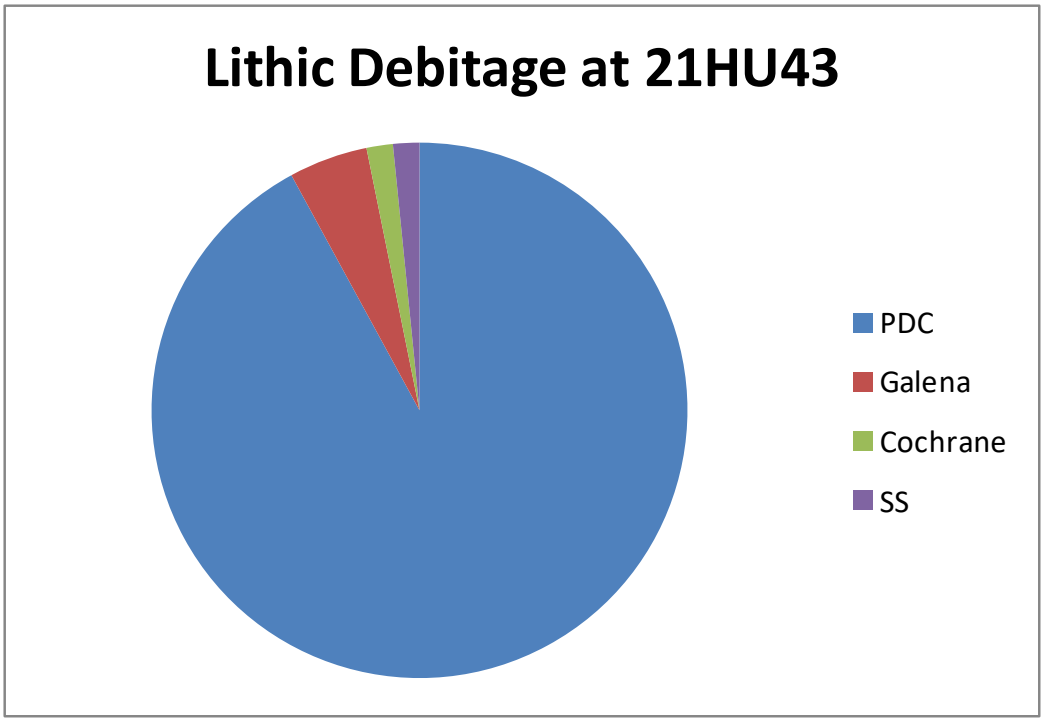
Appendix B, Figure 18. Lithic debitage raw material at 21HU26.



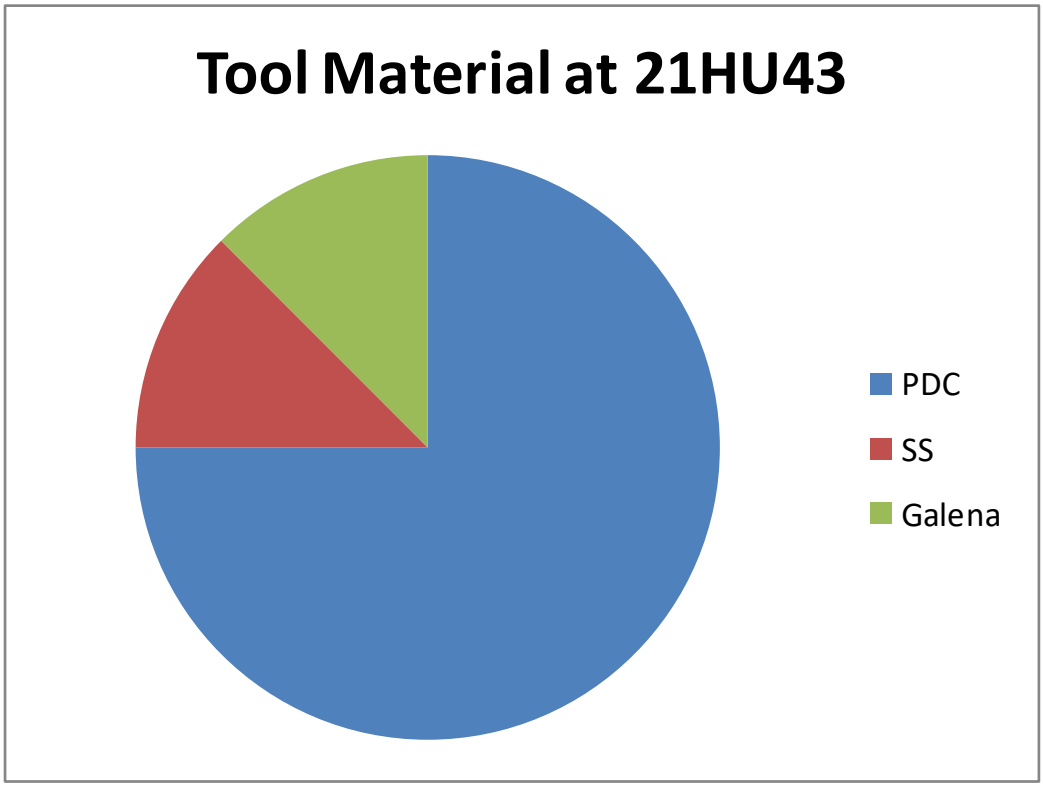
Appendix B, Figure 19. Lithic tool raw material at 21HU26.



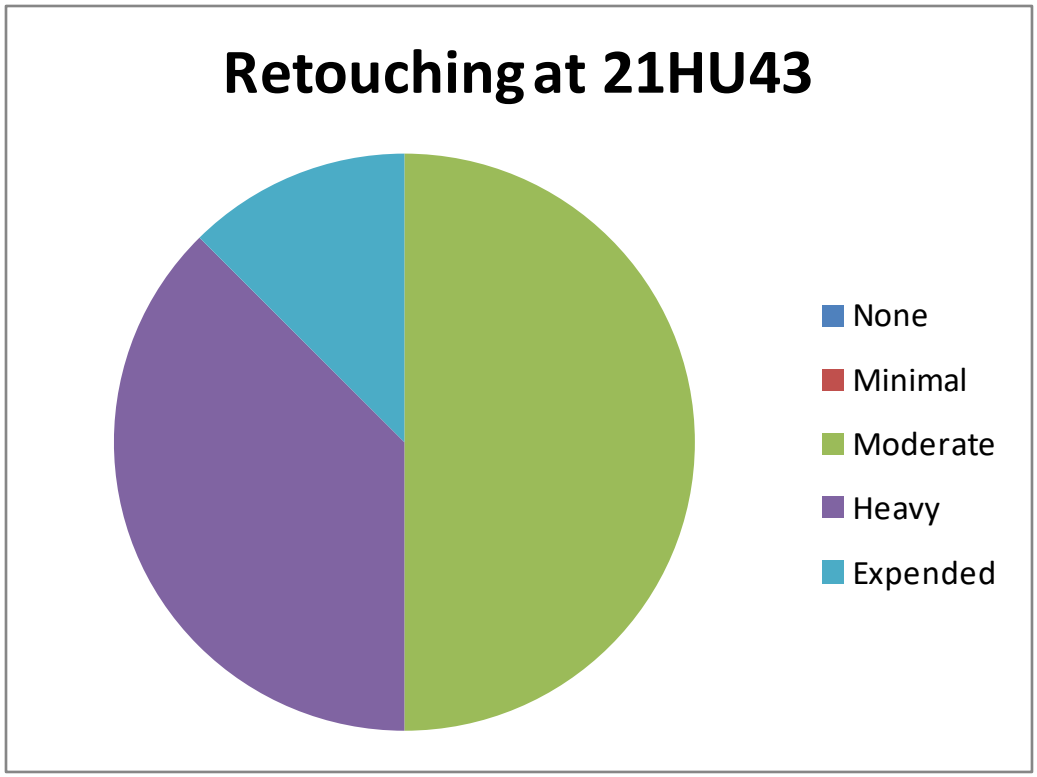
Appendix B, Figure 20. Retouching and expenditure at 21HU26.



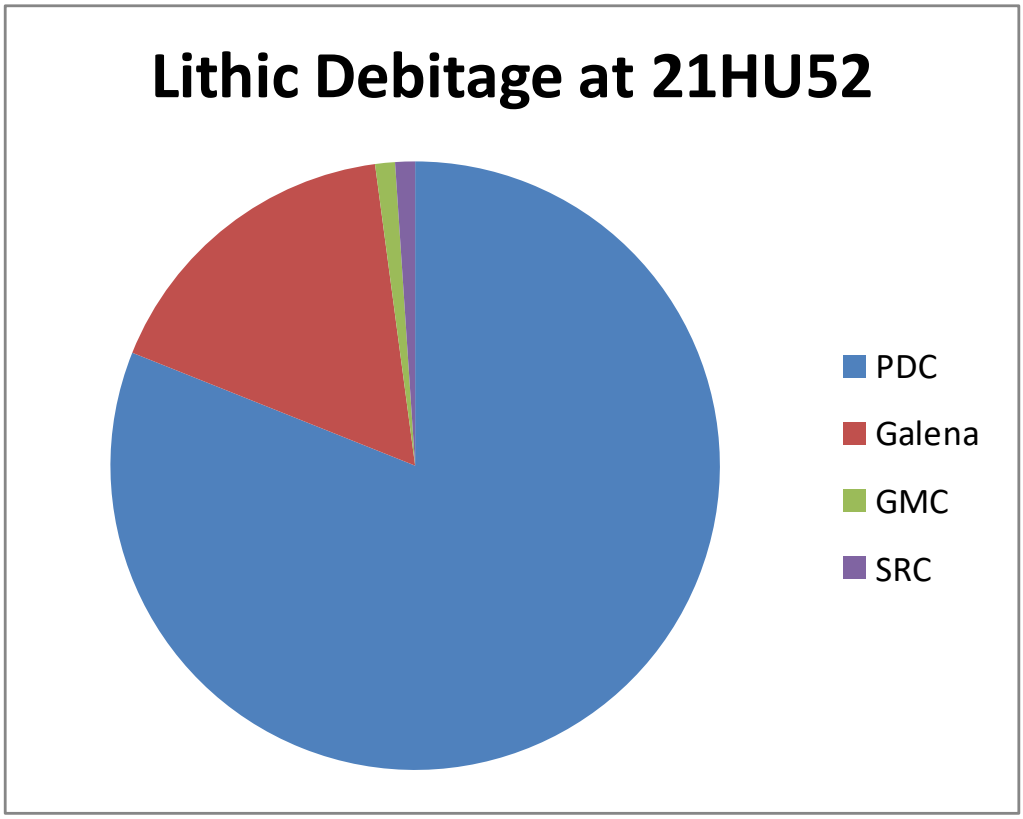
Appendix B, Figure 21. Lithic debitage raw material from 21HU43.



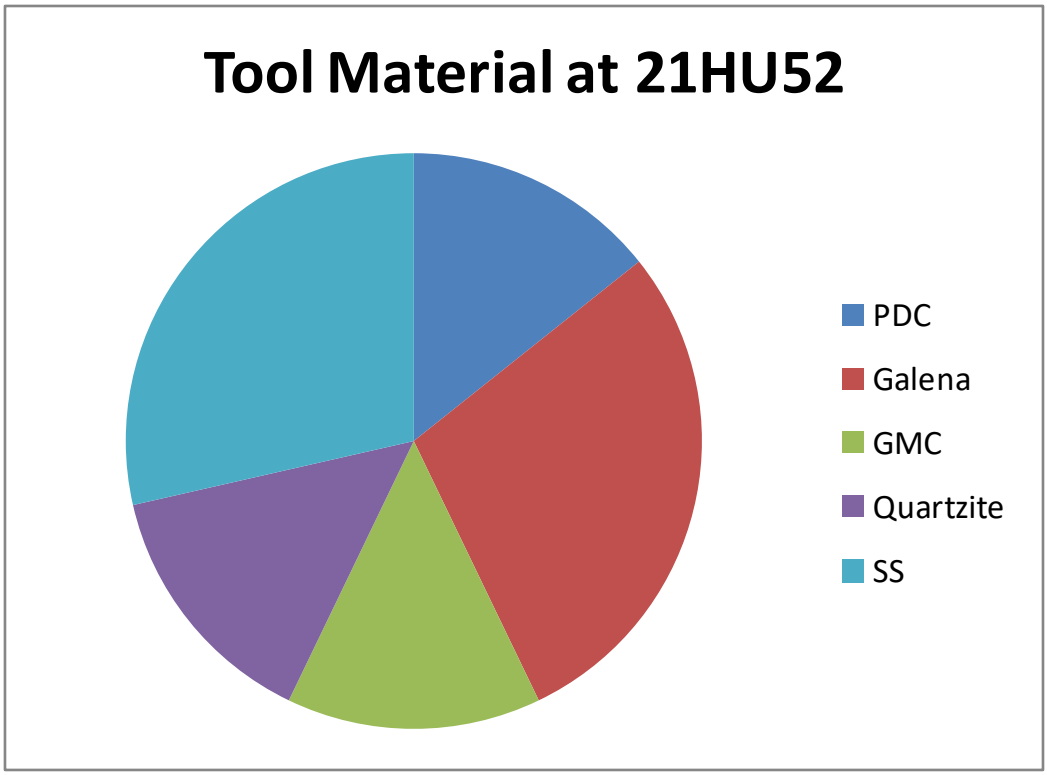
Appendix B, Figure 22. Lithic tool materials at 21HU43.



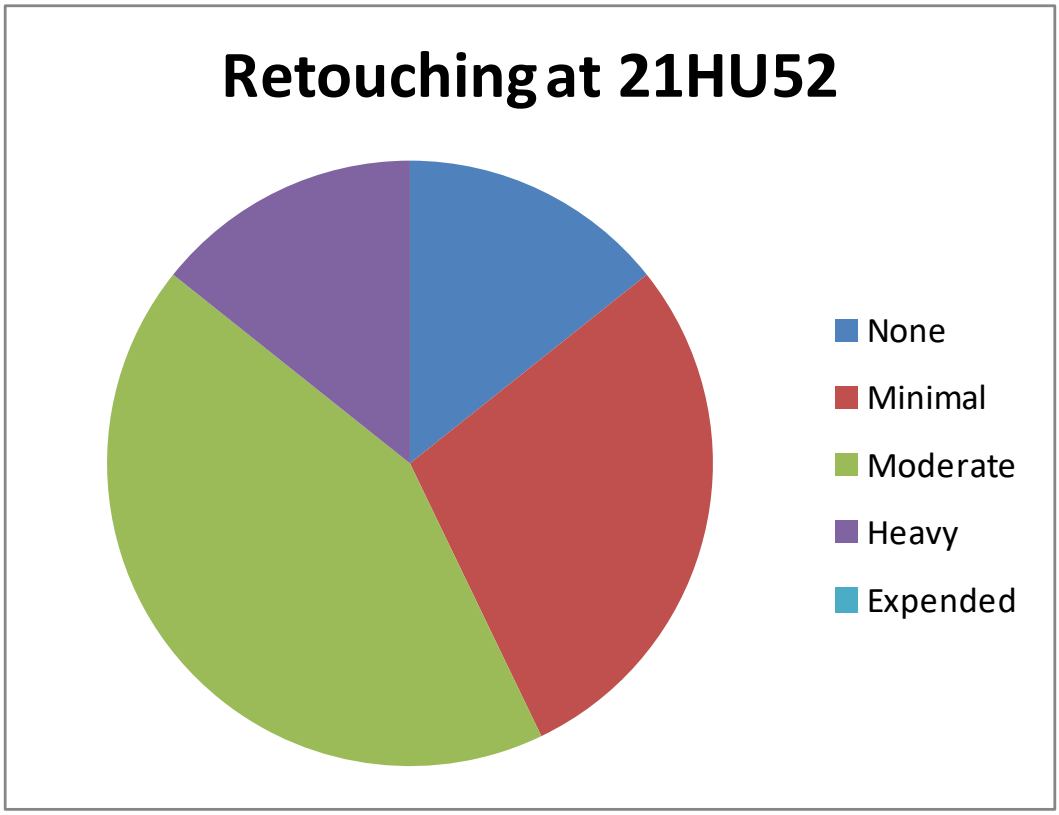
Appendix B, Figure 23. Retouching and expenditure at 21HU43.



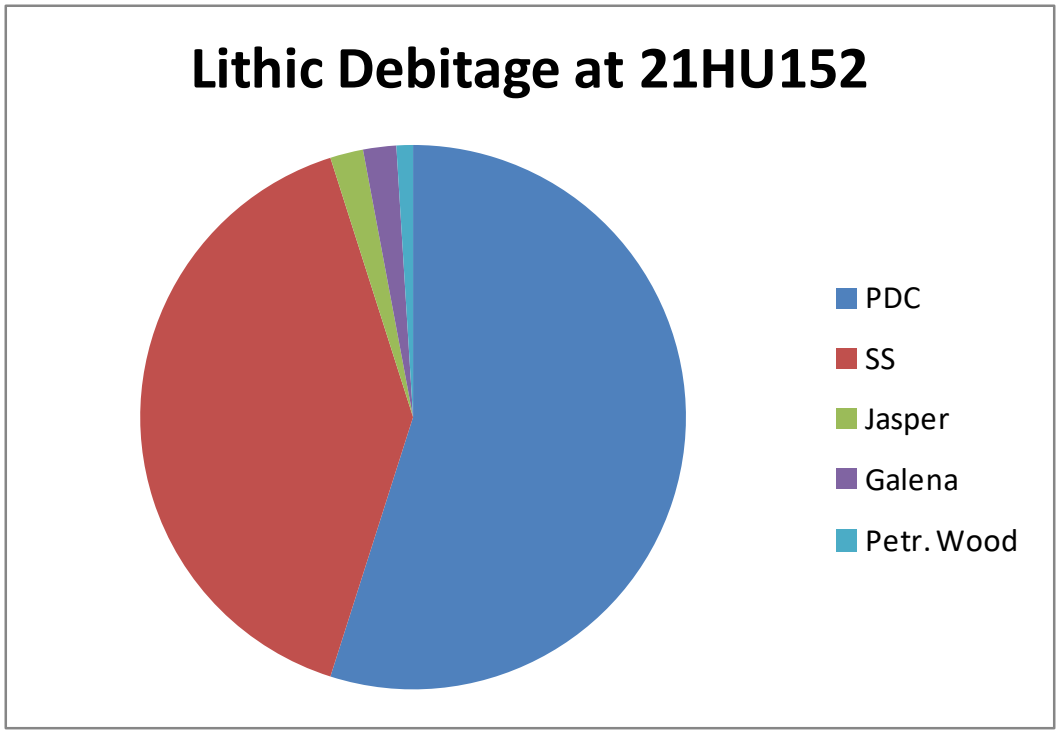
Appendix B, Figure 24. Lithic Debitage raw material at 21HU52.



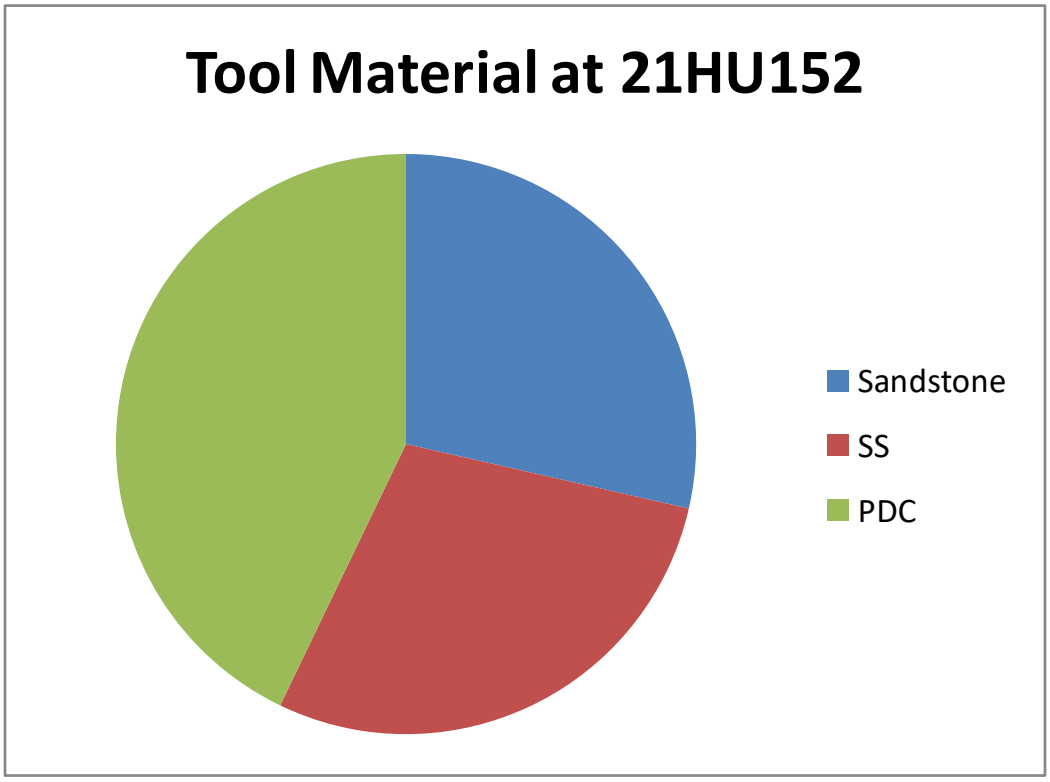
Appendix B, Figure 25. Lithic tool raw material at 21HU52.



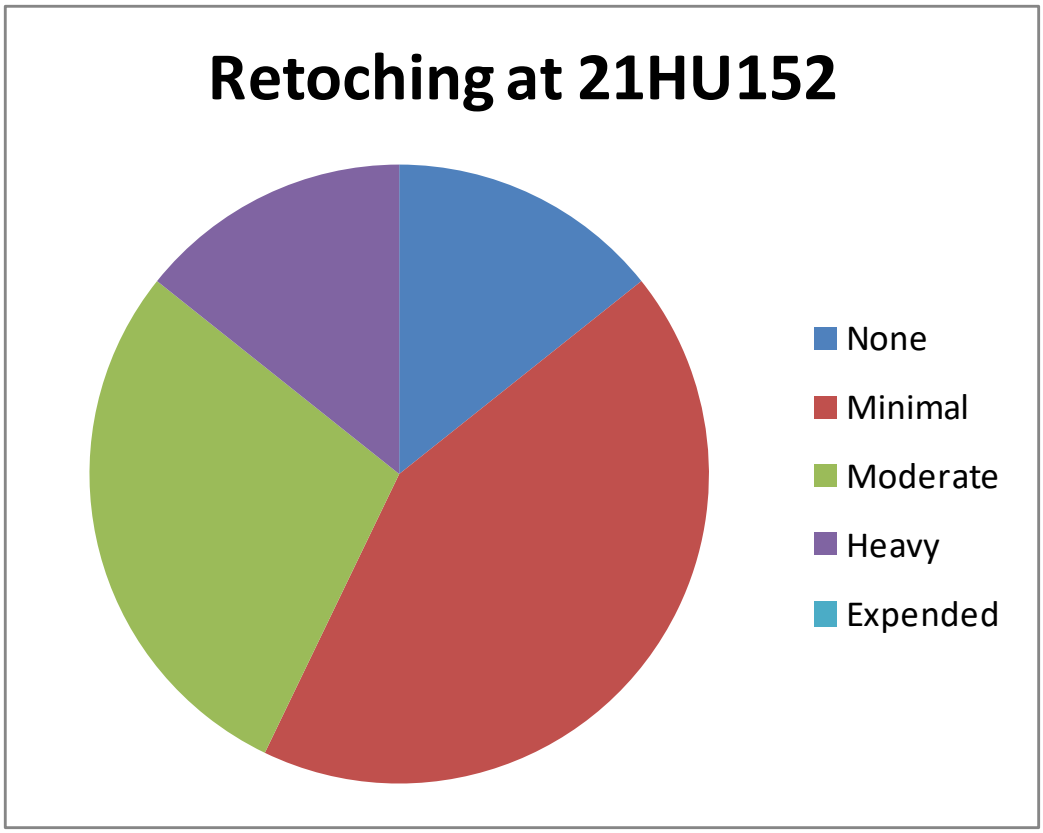
Appendix B, Figure 26. Degrees of retouching and expenditure at 21HU52.



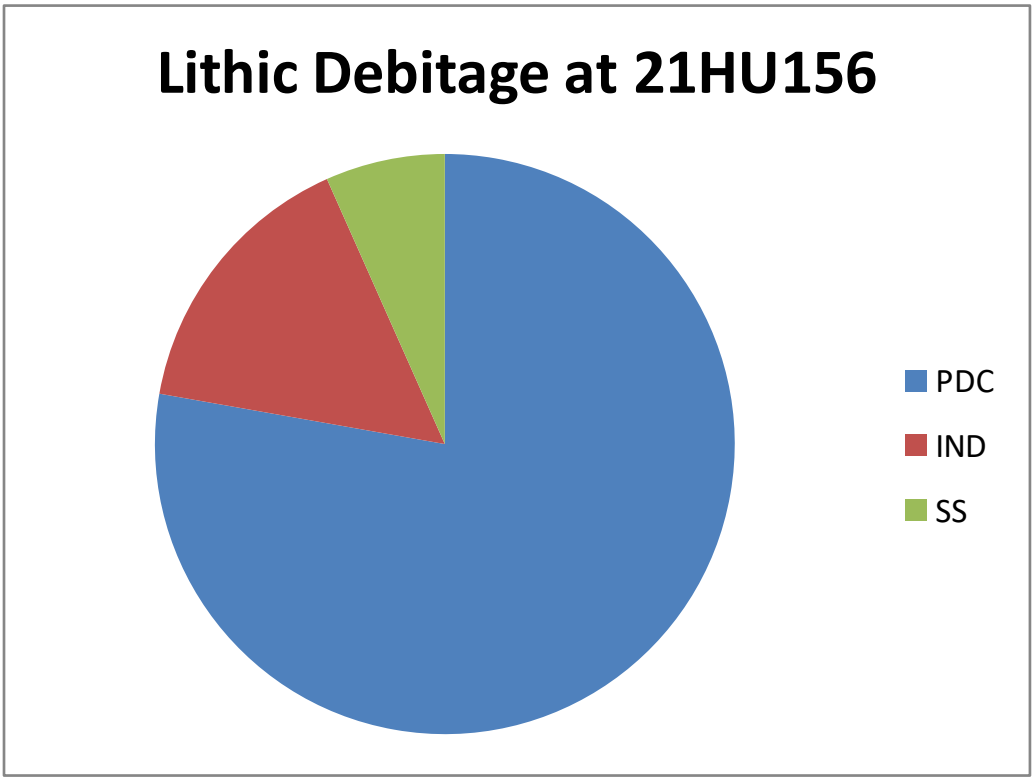
Appendix B, Figure 27. Debitage raw material at 21HU152.



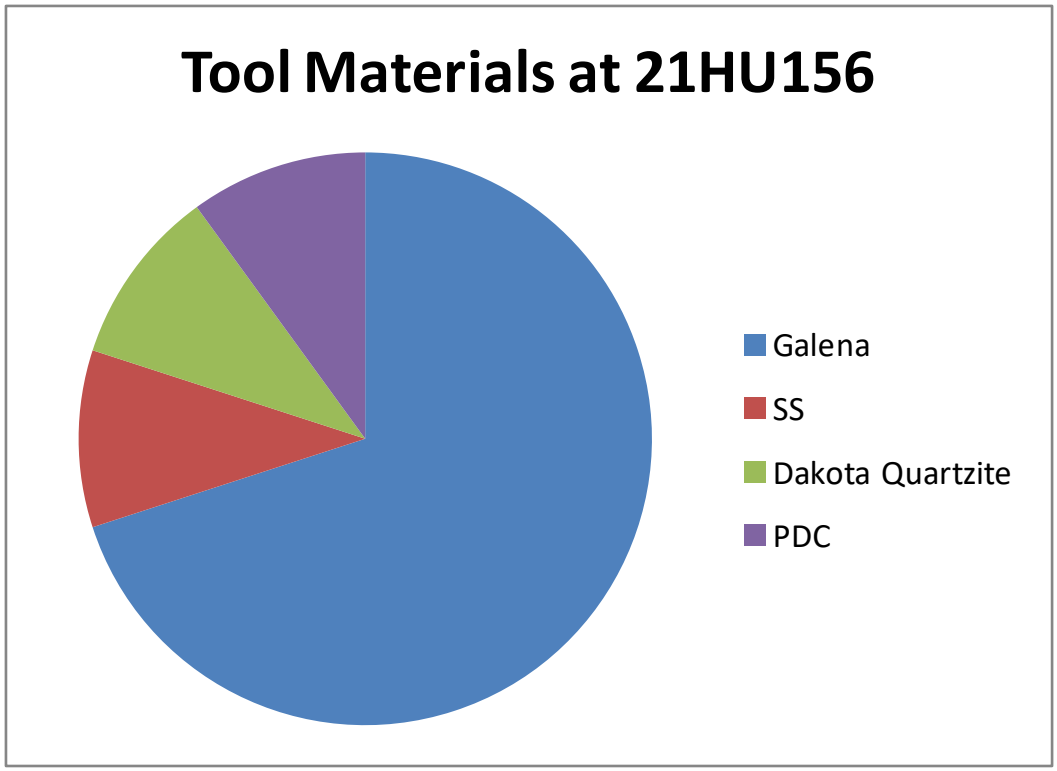
Appendix B, Figure 28. Raw material types for tools at 21HU152.



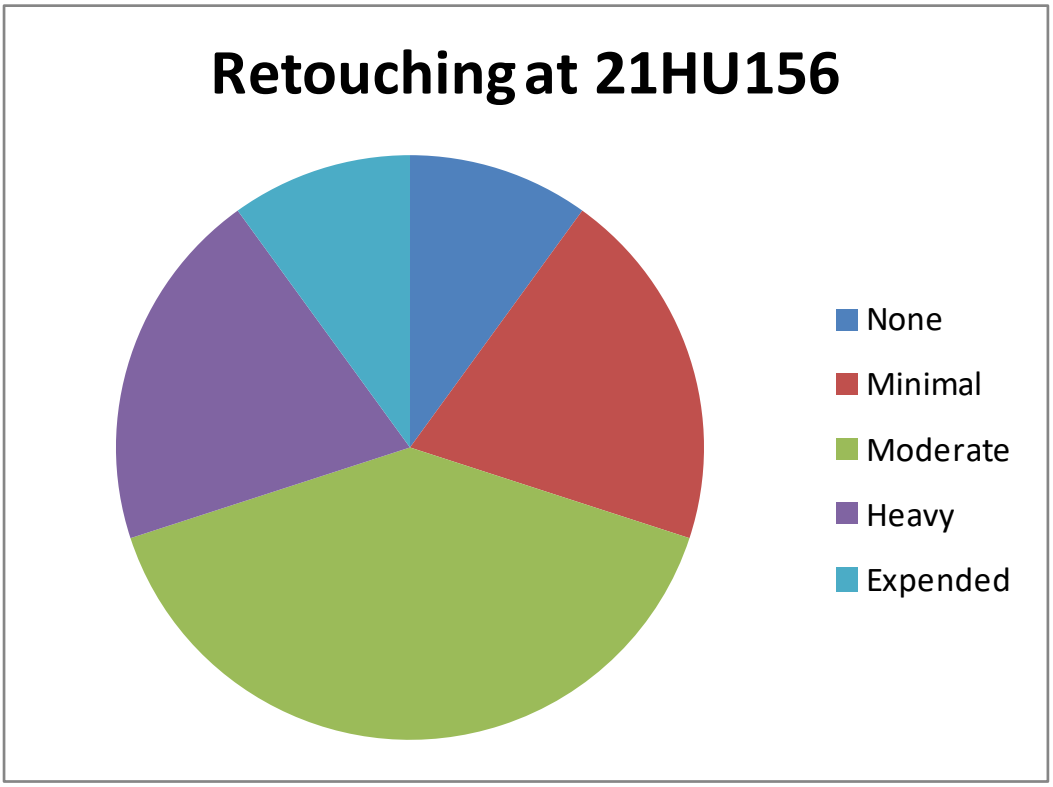
Appendix B, Figure 29. Degrees of retouching and expenditure at 21HU152.



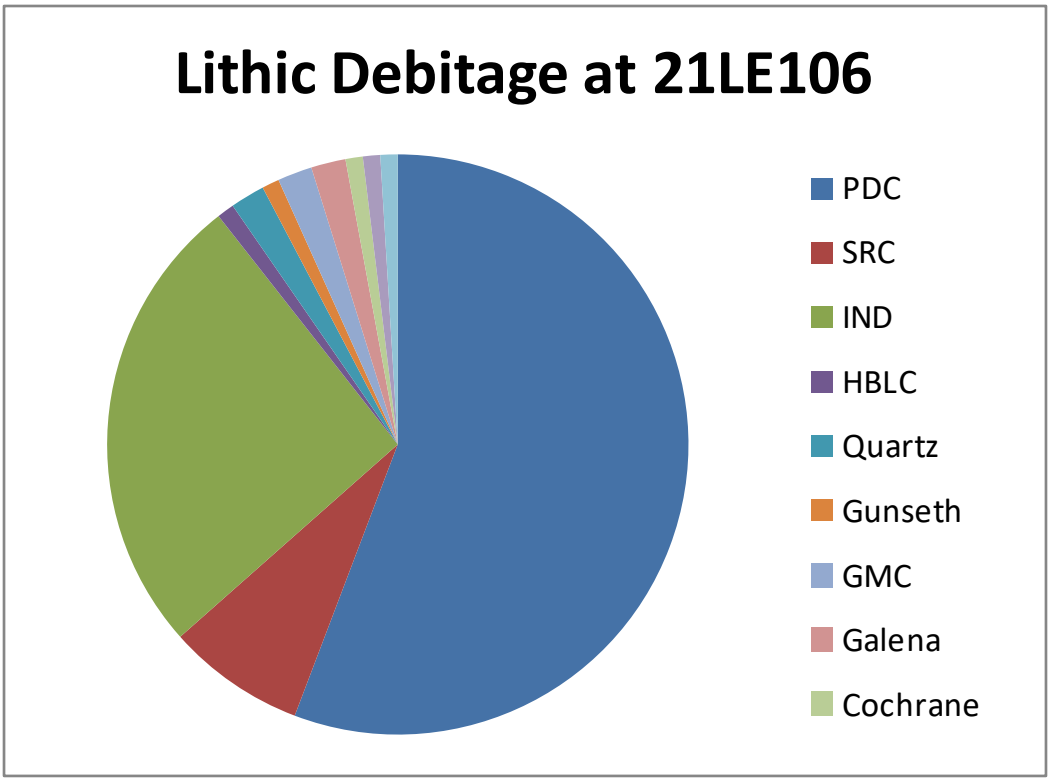
Appendix B, Figure 30. Lithic debitage raw material at 21HU156.



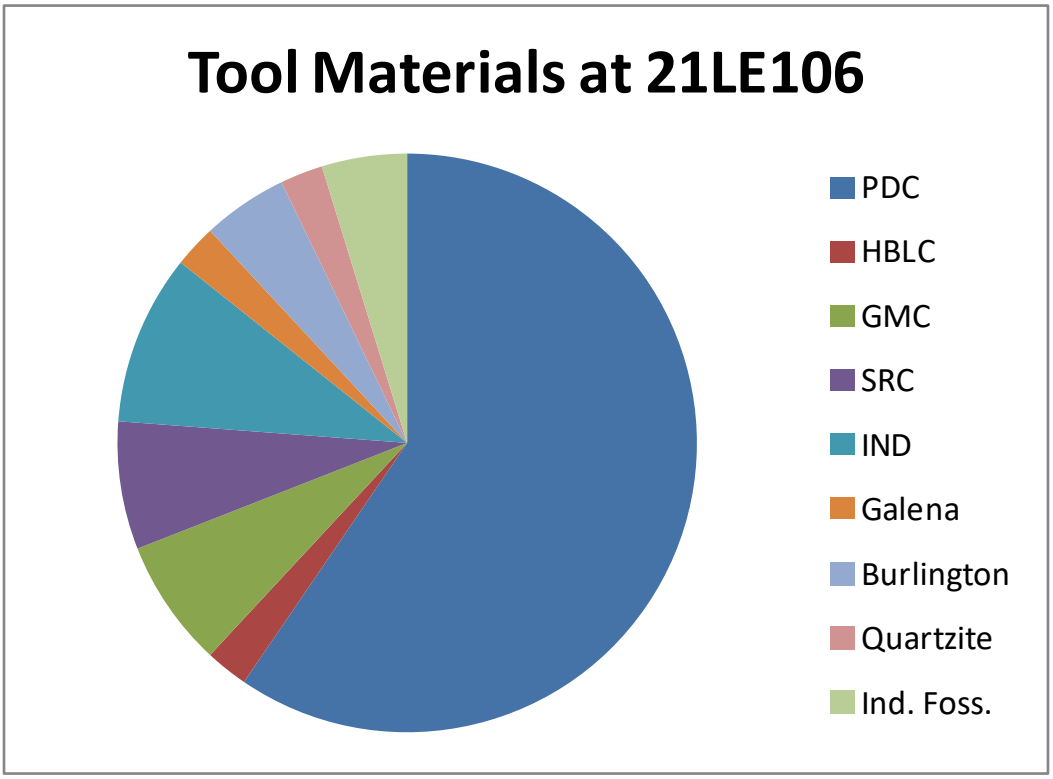
Appendix B, Figure 31. Tool raw materials at 21HU156.



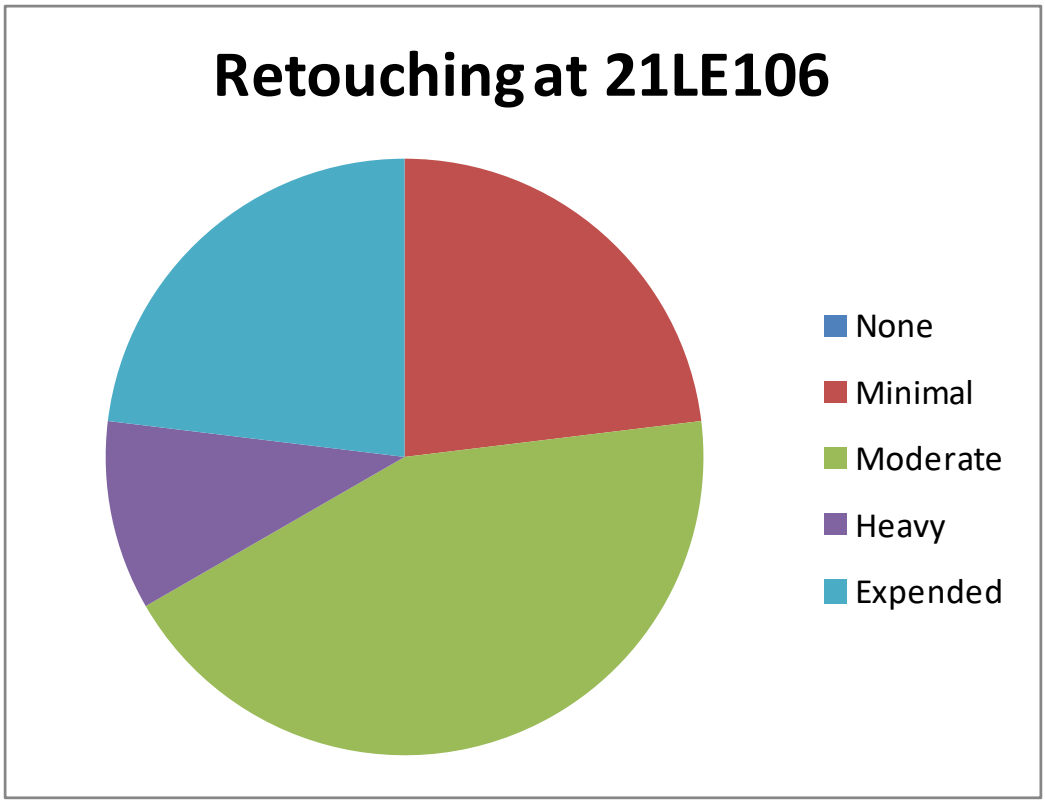
Appendix B, Figure 32. Degrees of retouching at 21HU156.



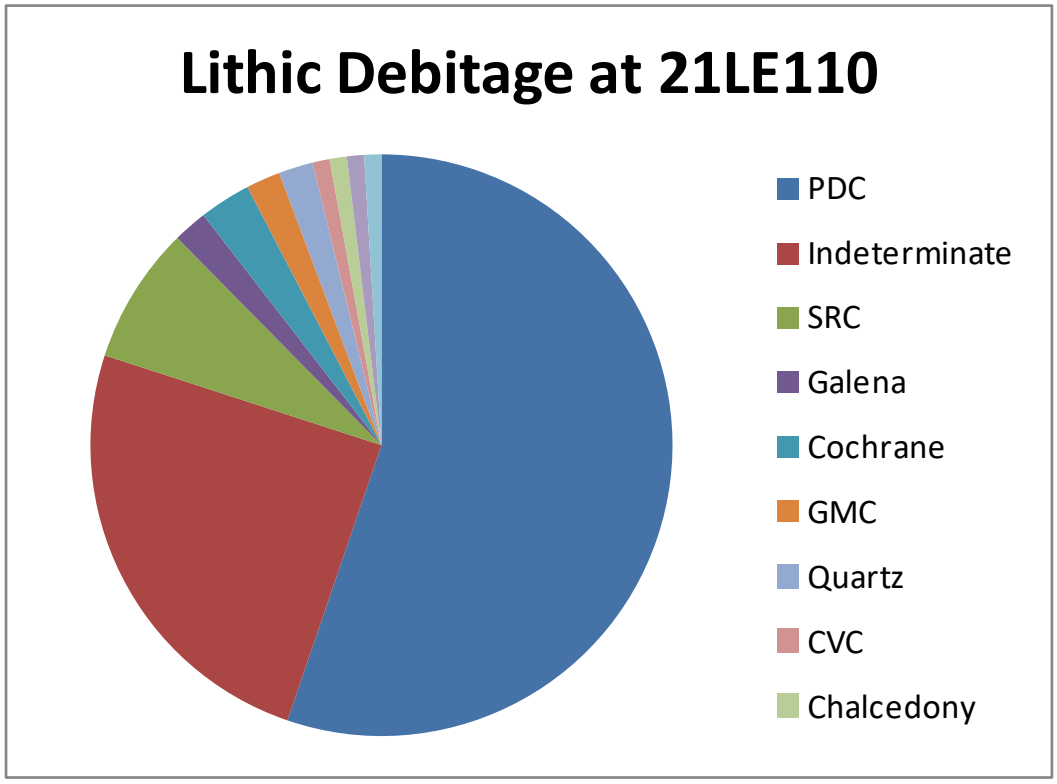
Appendix B, Figure 33. Debitage raw materials at 21LE106.



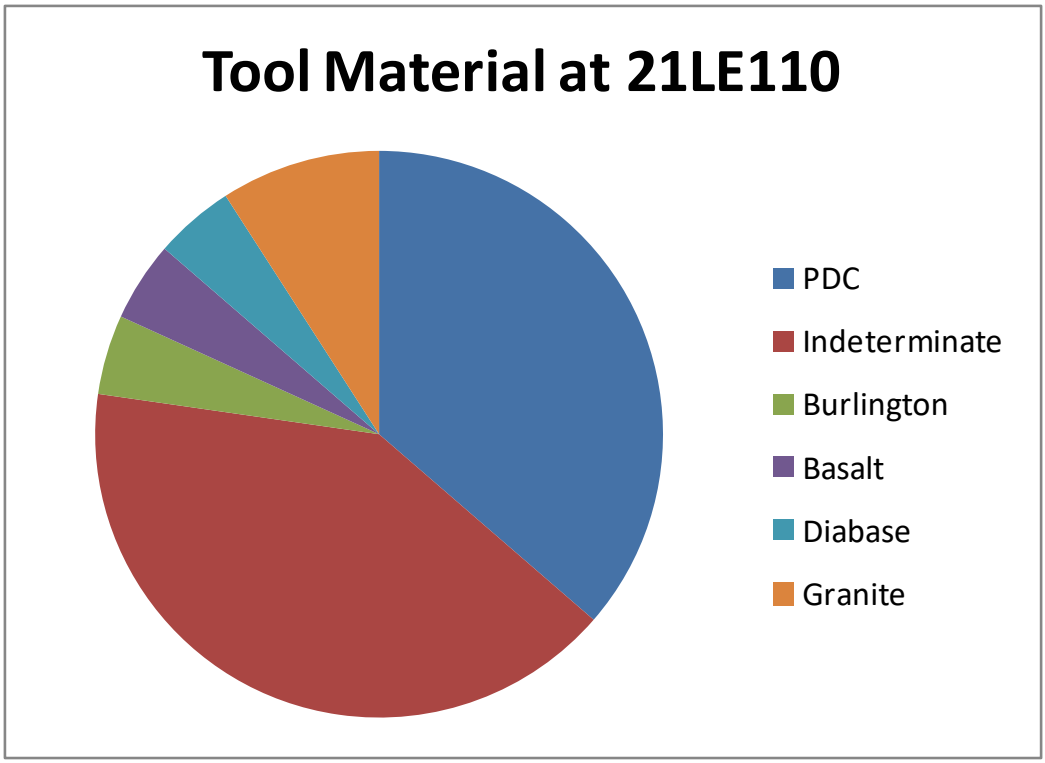
Appendix B, Figure 34. Tool raw material at 21LE106.



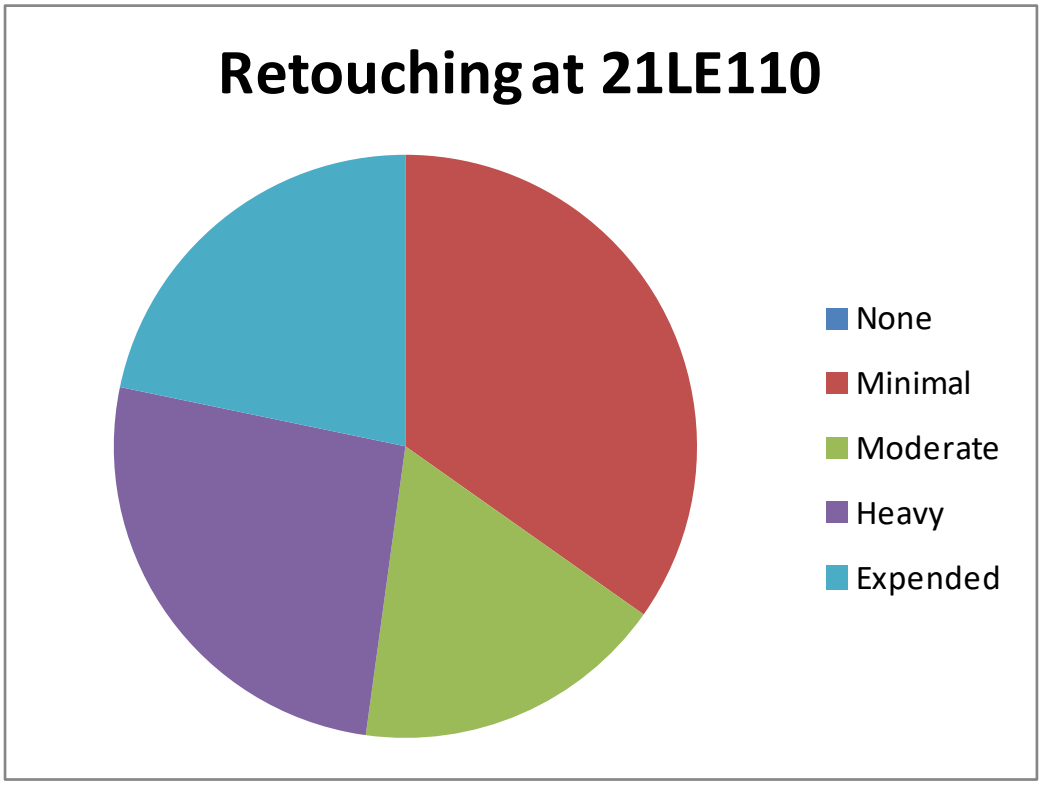
Appendix B, Figure 35. Degrees of retouching and expenditure at 21LE106.



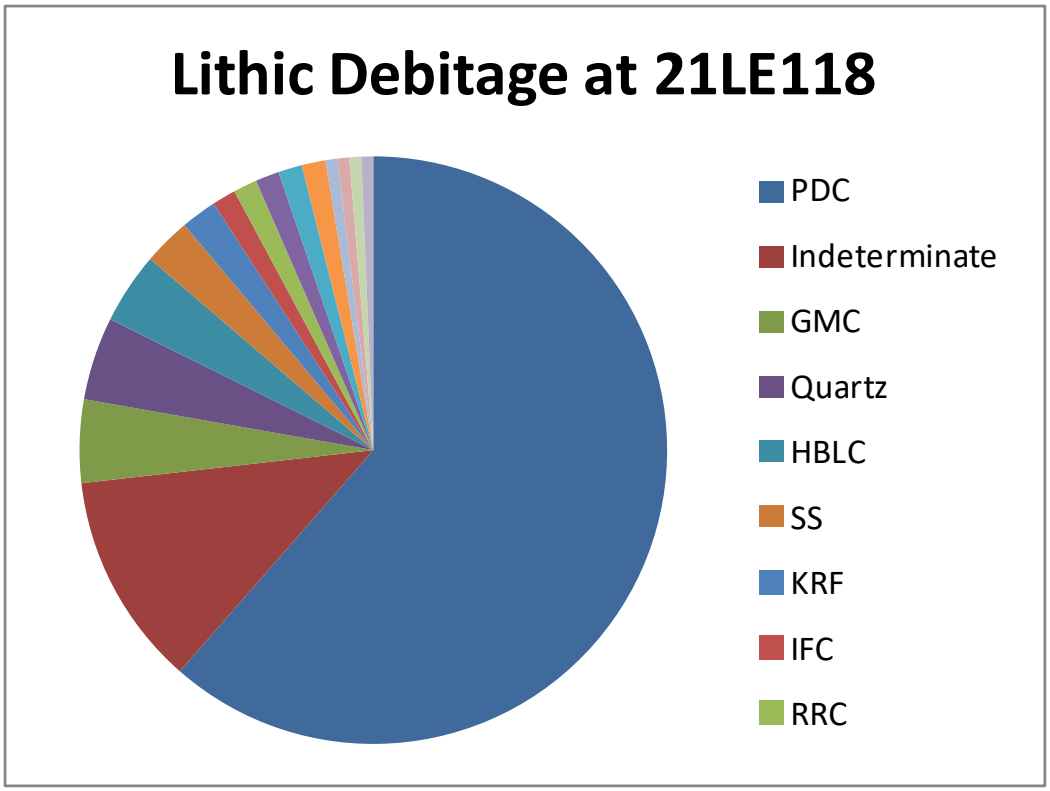
Appendix B, Figure 36. Raw material of lithic debitage at 21LE110.



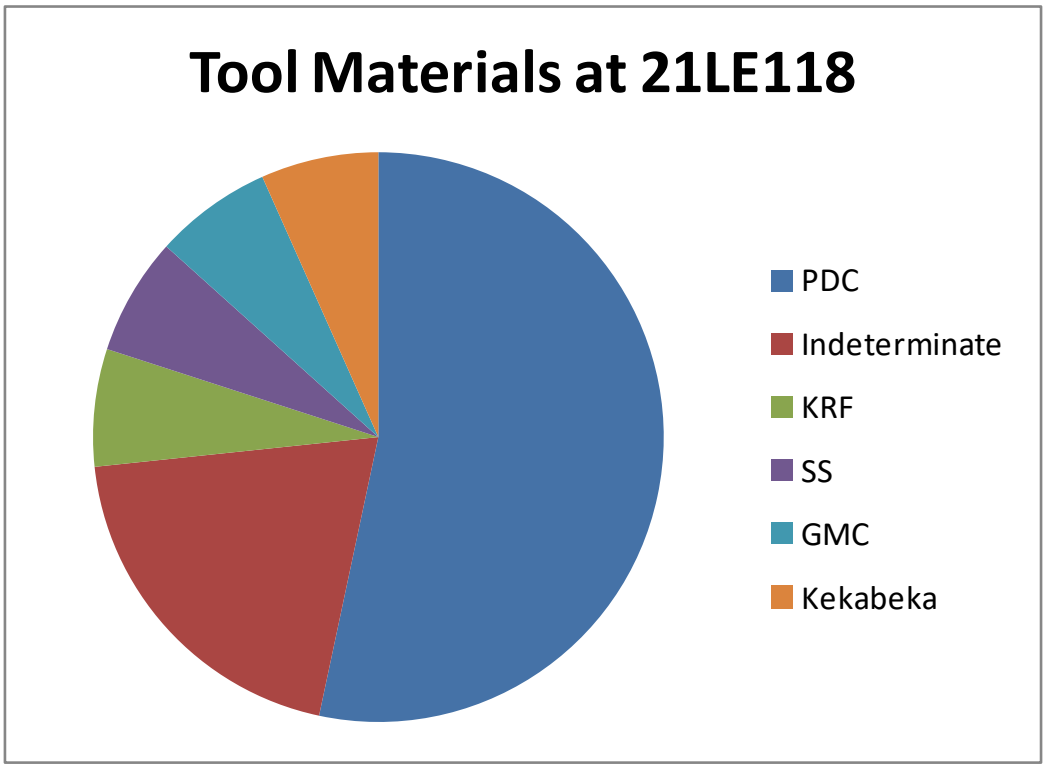
Appendix B, Figure 37. Lithic tool raw material at 21LE110.



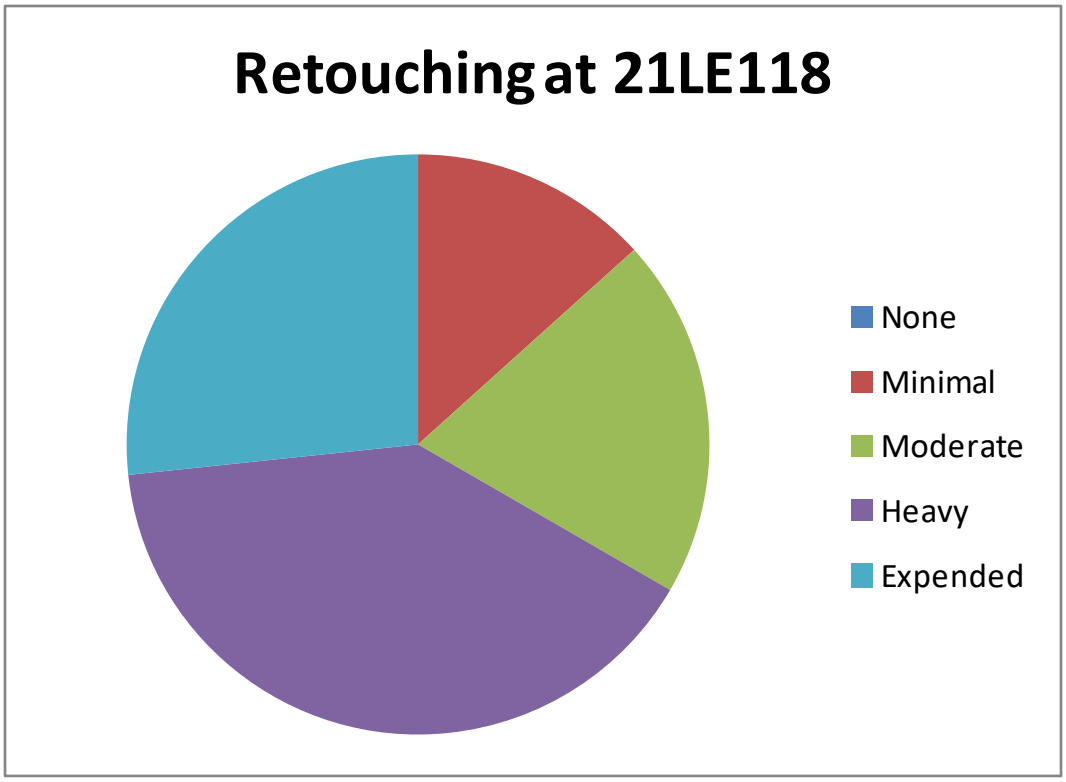
Appendix B, Figure 38. Retouch and expenditure at 21LE110.



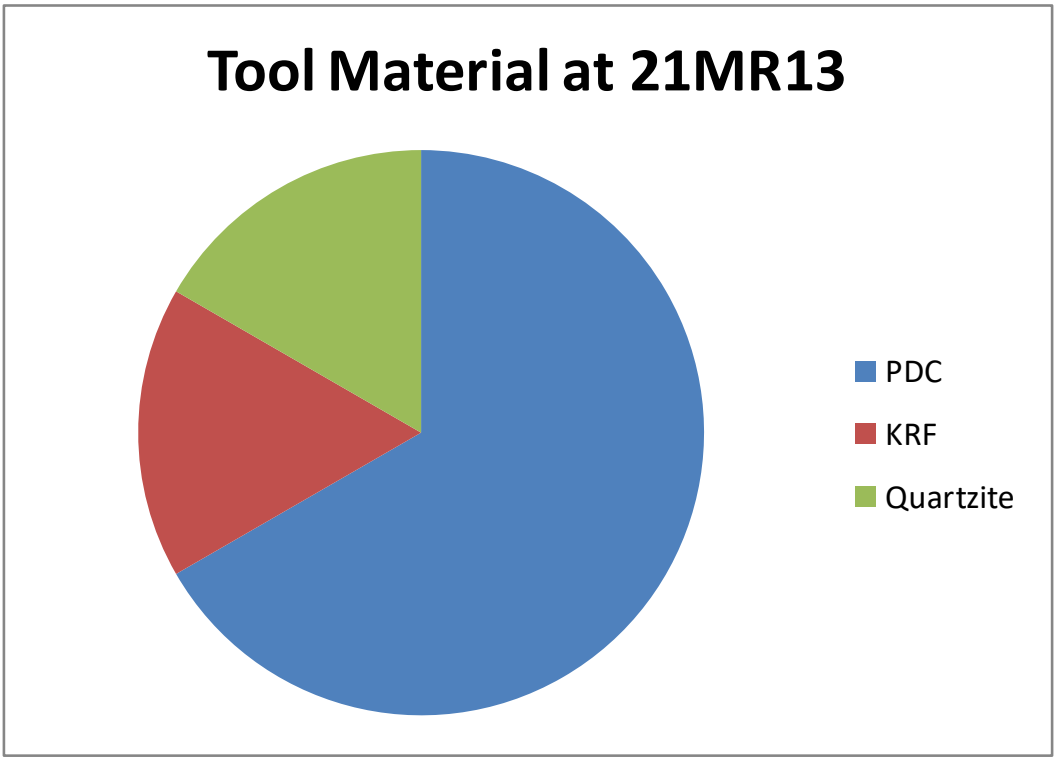
Appendix B, Figure 39. Lithic debitage raw material at 21LE118.



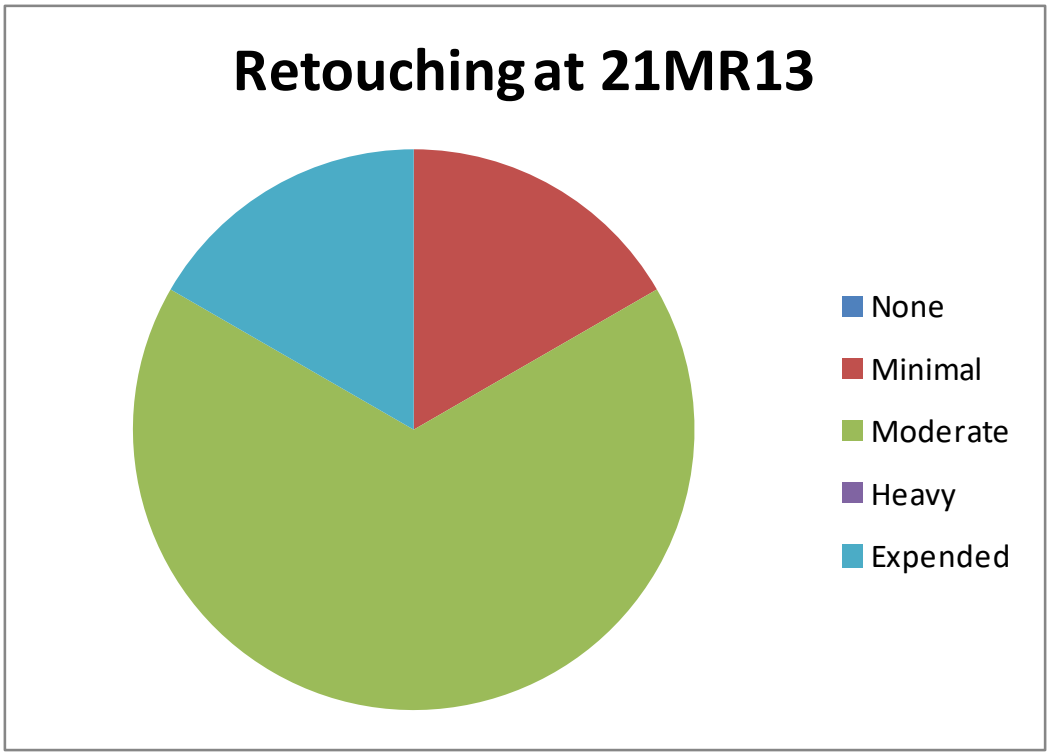
Appendix B, Figure 40. Lithic tool raw materials at 21LE118.



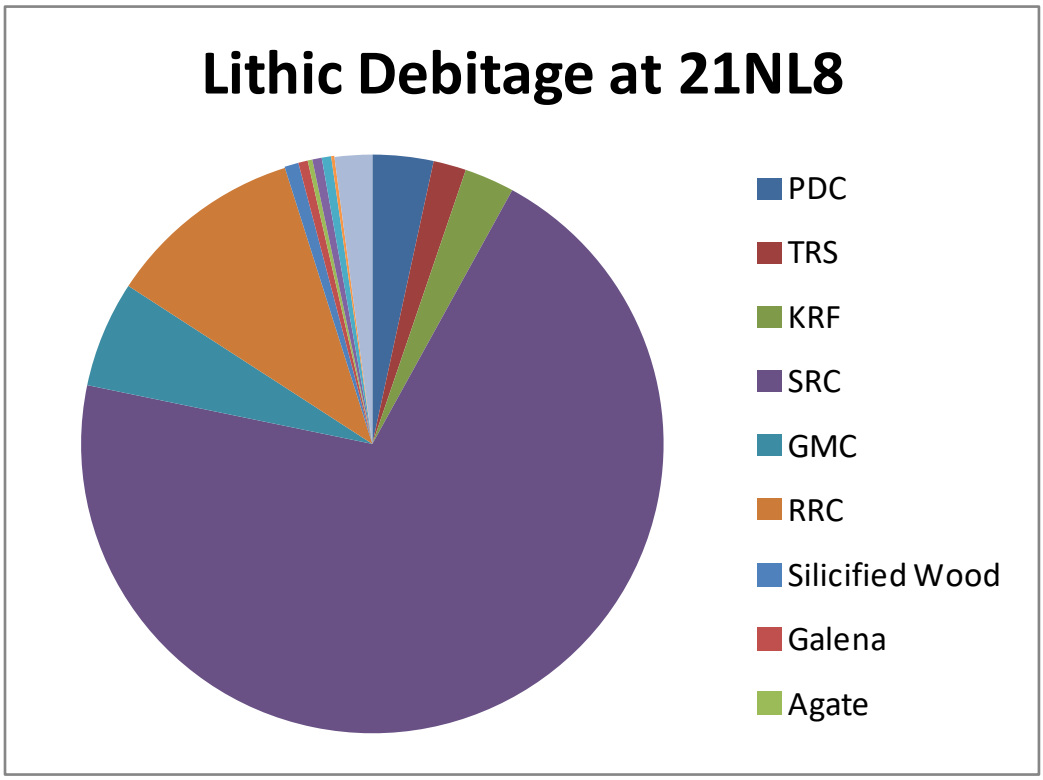
Appendix B, Figure 41. Retouching and expenditure at 21LE118.



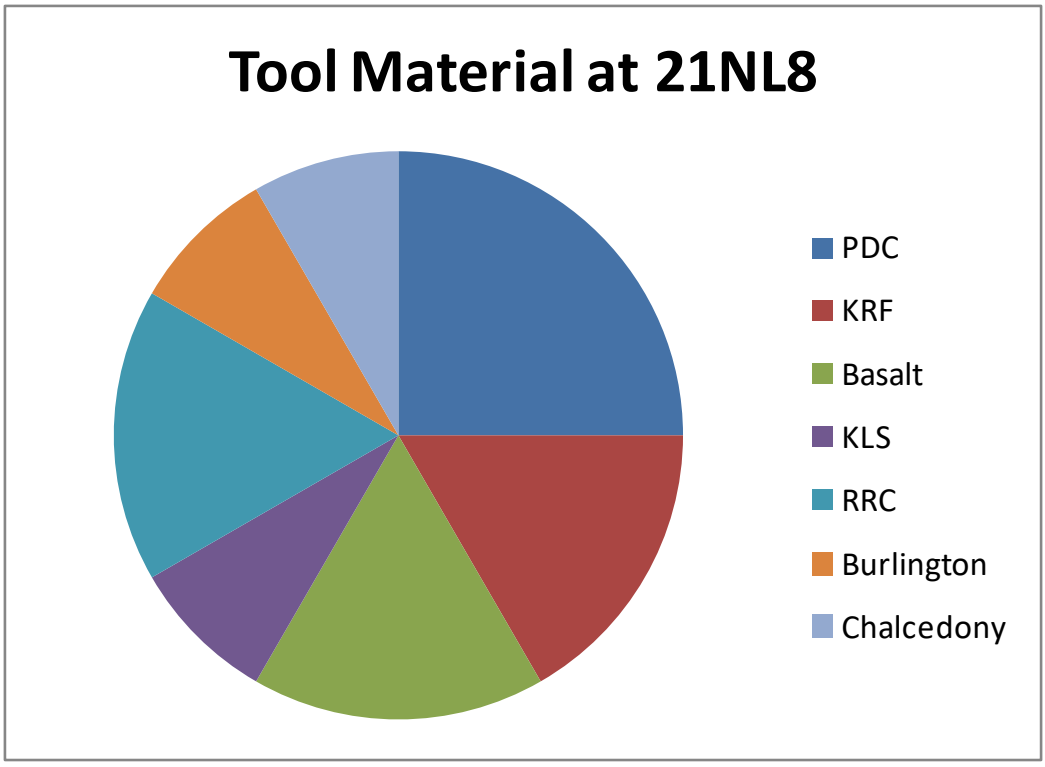
Appendix B, Figure 42. Lithic tool materials at 21MR13.



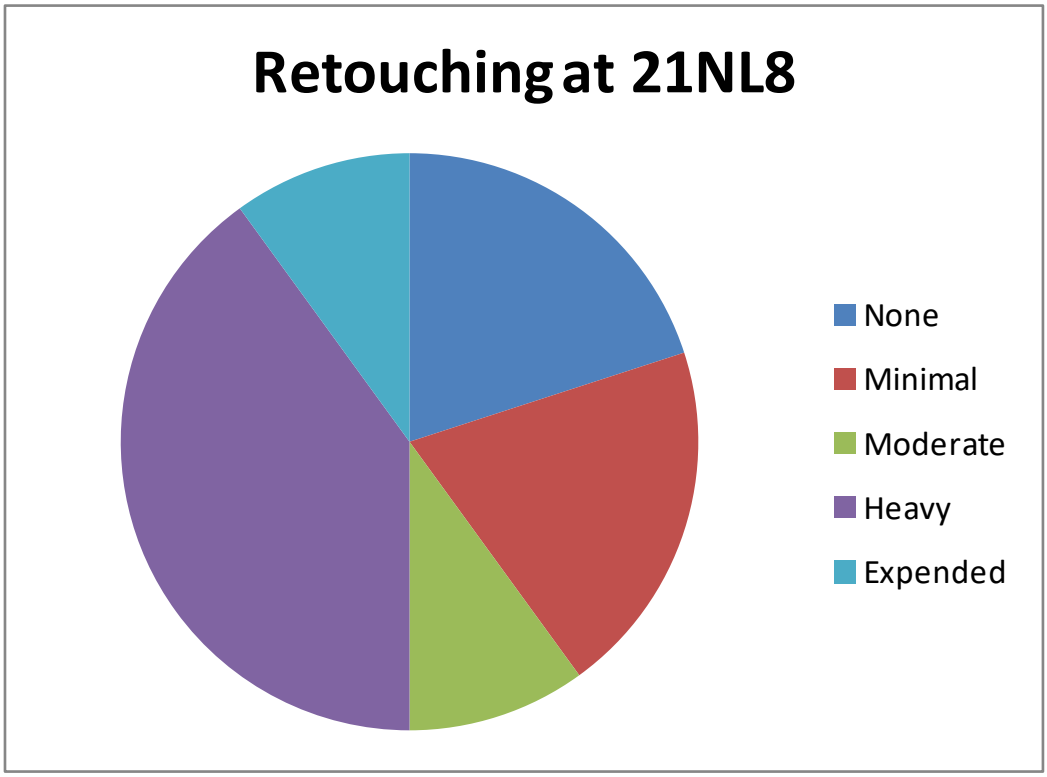
Appendix B, Figure 43. Degrees of retouching and expenditure at 21MR13.



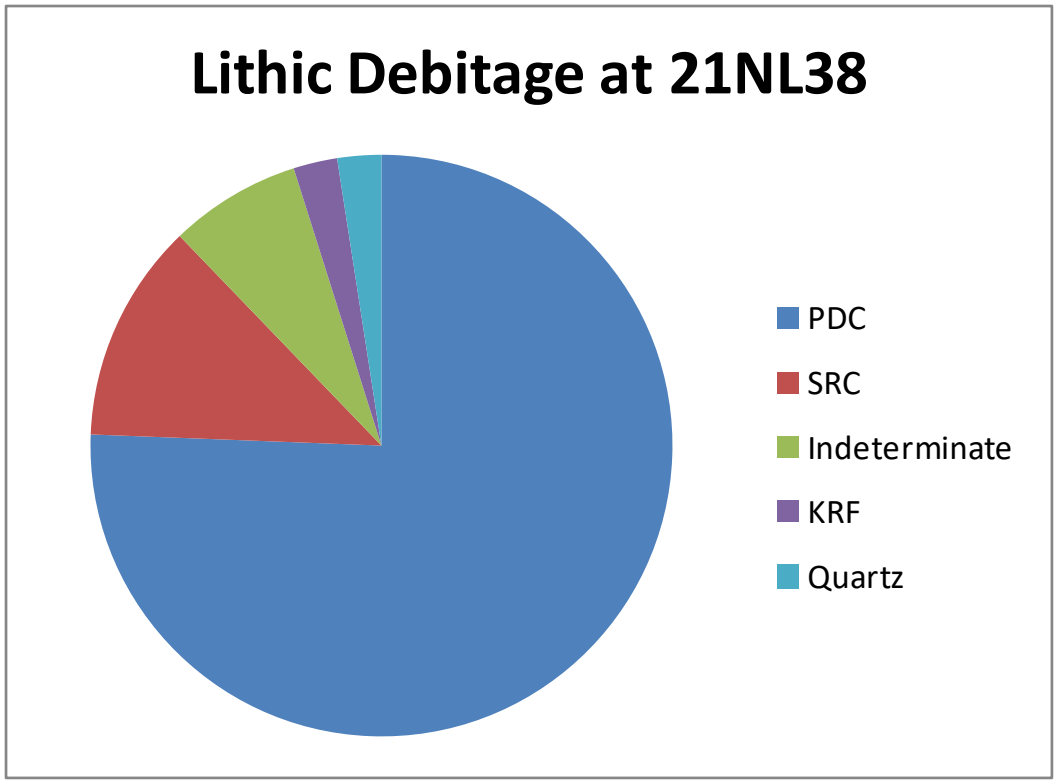
Appendix B, Figure 44. Lithic debitage at 21NL8.



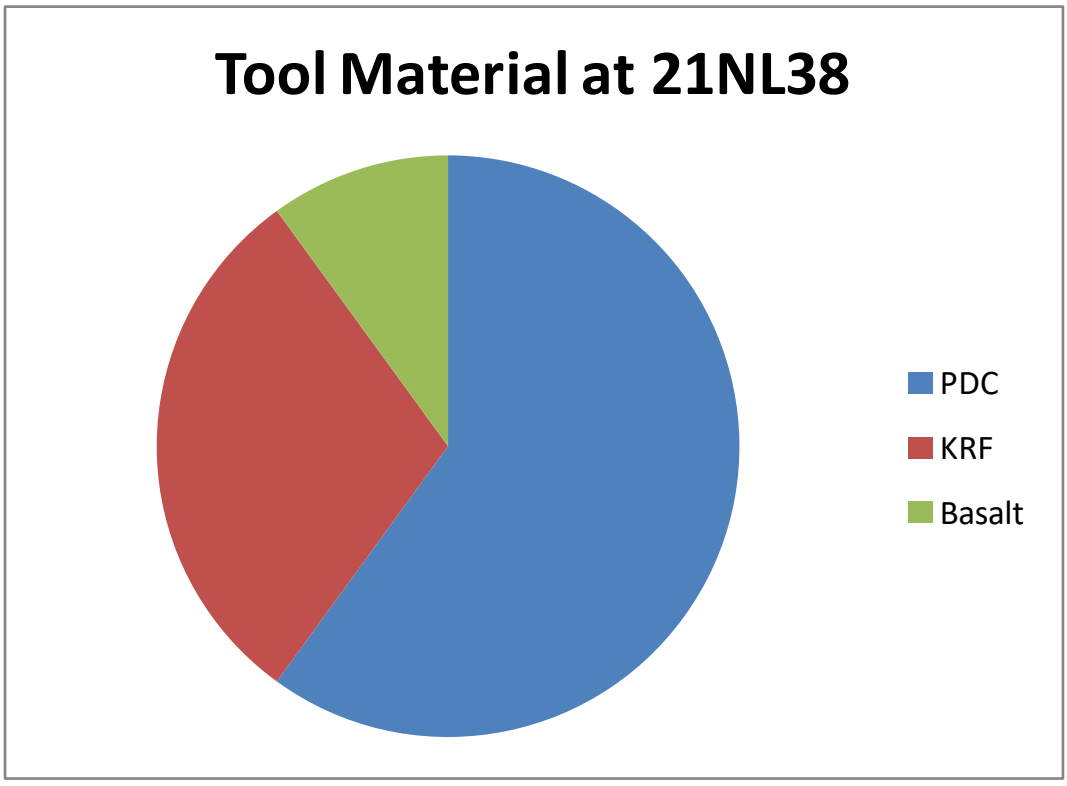
Appendix B, Figure 45. Lithic tool raw material at 21NL8.



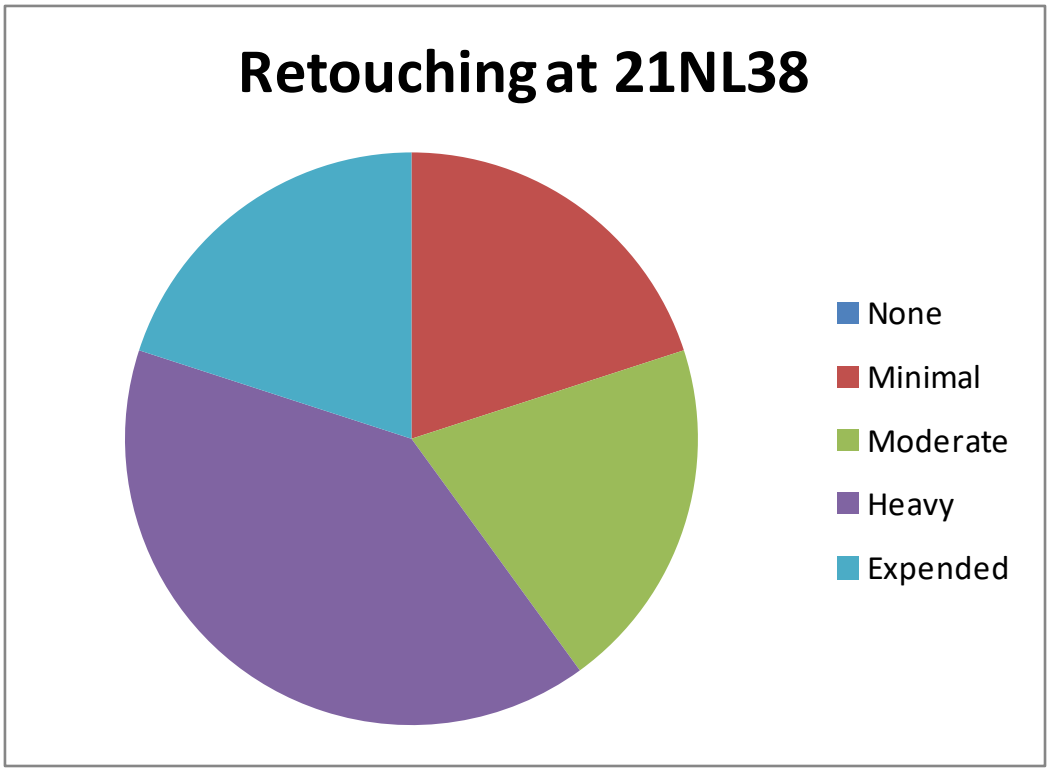
Appendix B, Figure 46. Degree of retouching and expenditure at 21NL8.



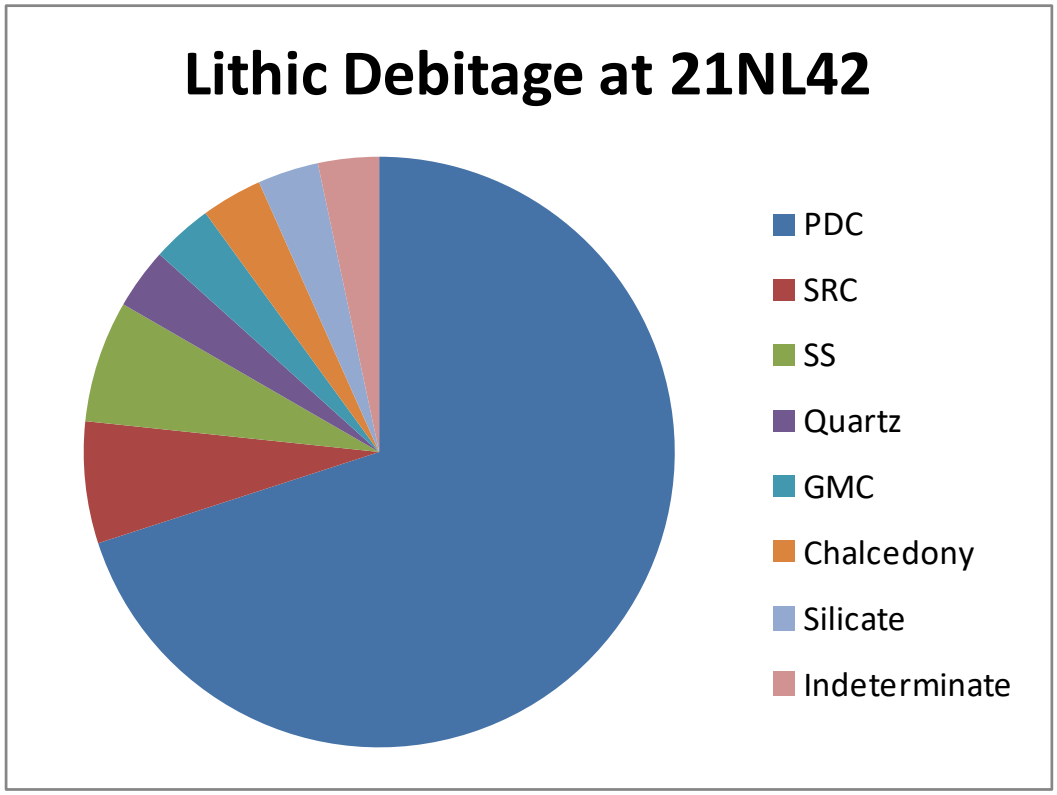
Appendix B, Figure 47. Lithic debitage materials at 21NL38.



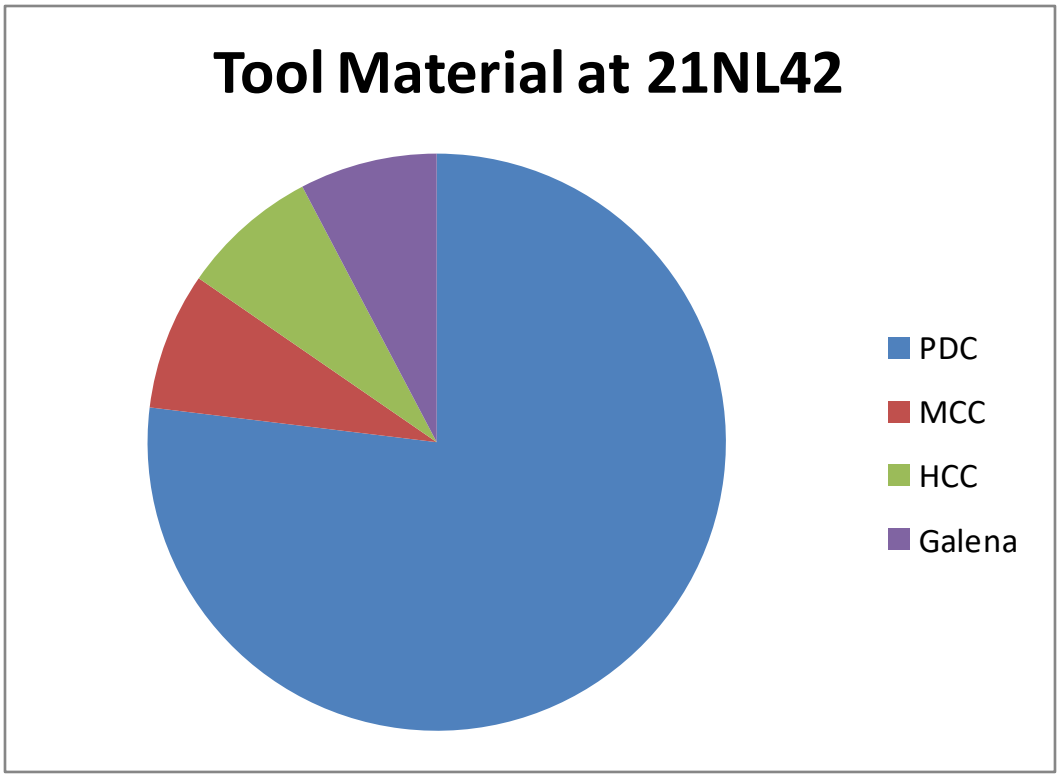
Appendix B, Figure 48. Lithic tool material at 21NL38.



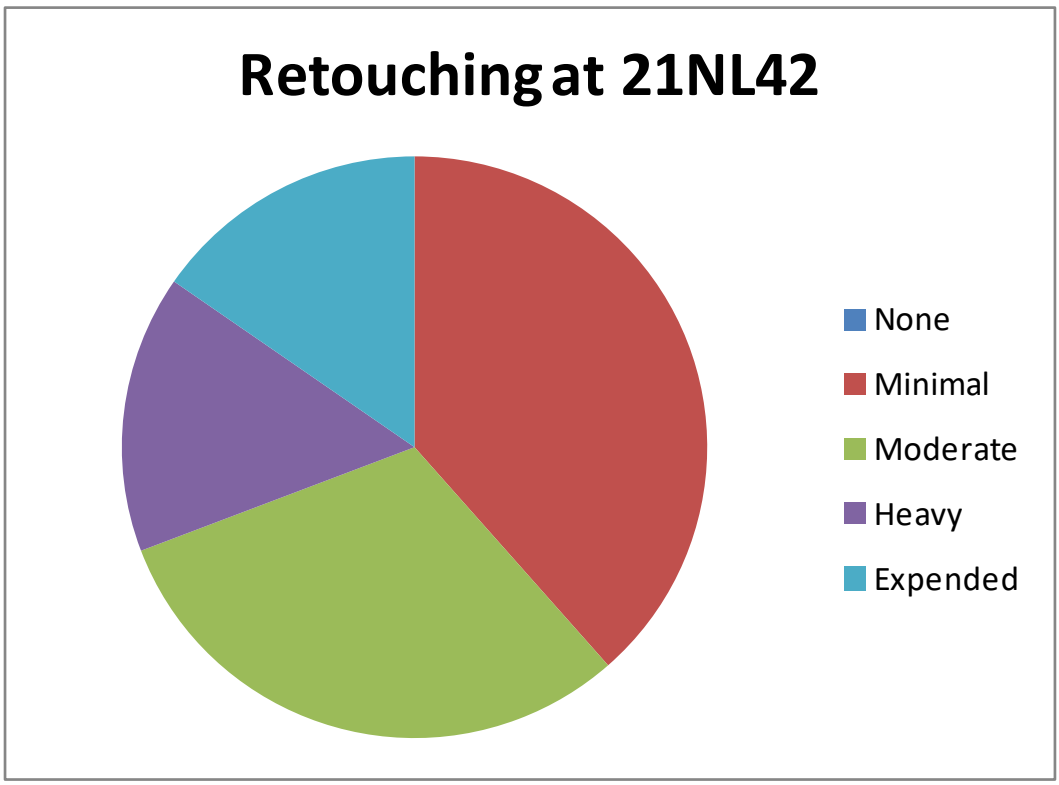
Appendix B, Figure 49. Degrees of retouching and expenditure at 21NL38.



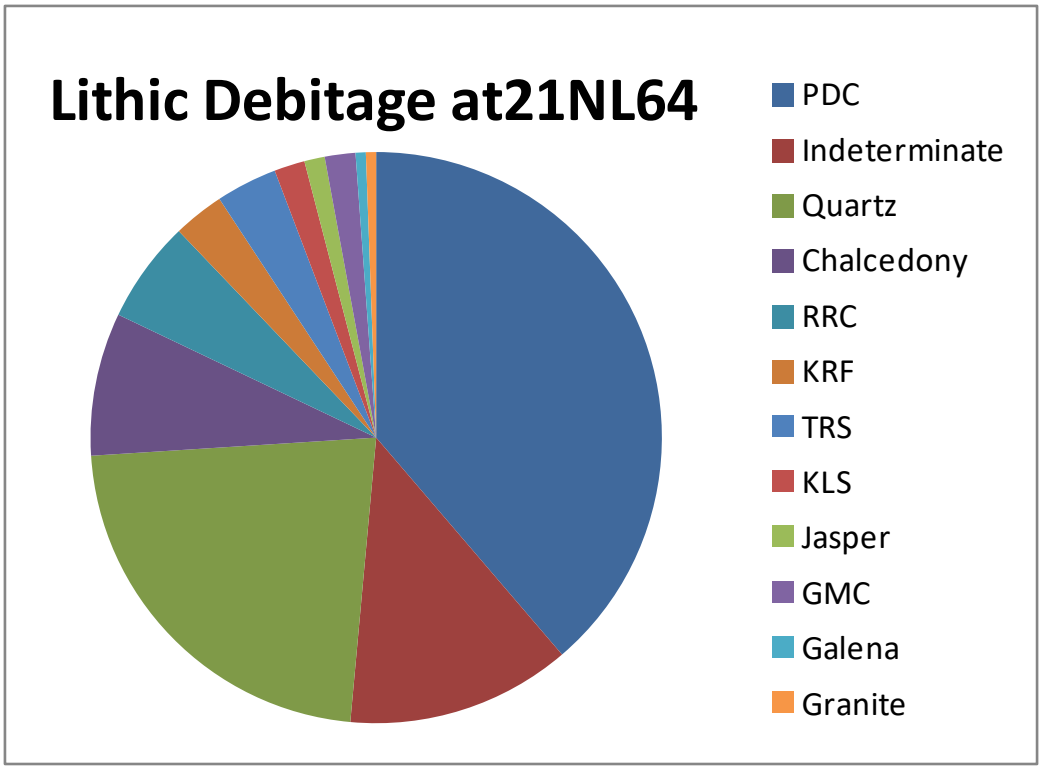
Appendix B, Figure 50. Lithic debitage raw material at 21NL42.



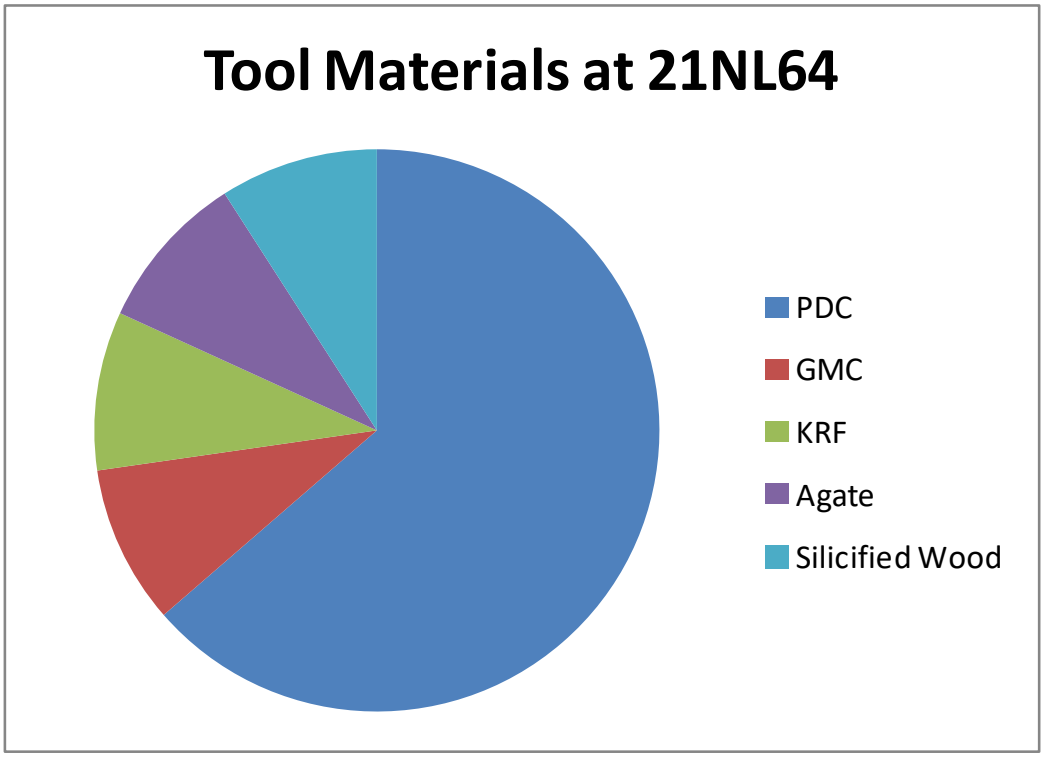
Appendix B, Figure 51. Lithic tool raw material at 21NL42.



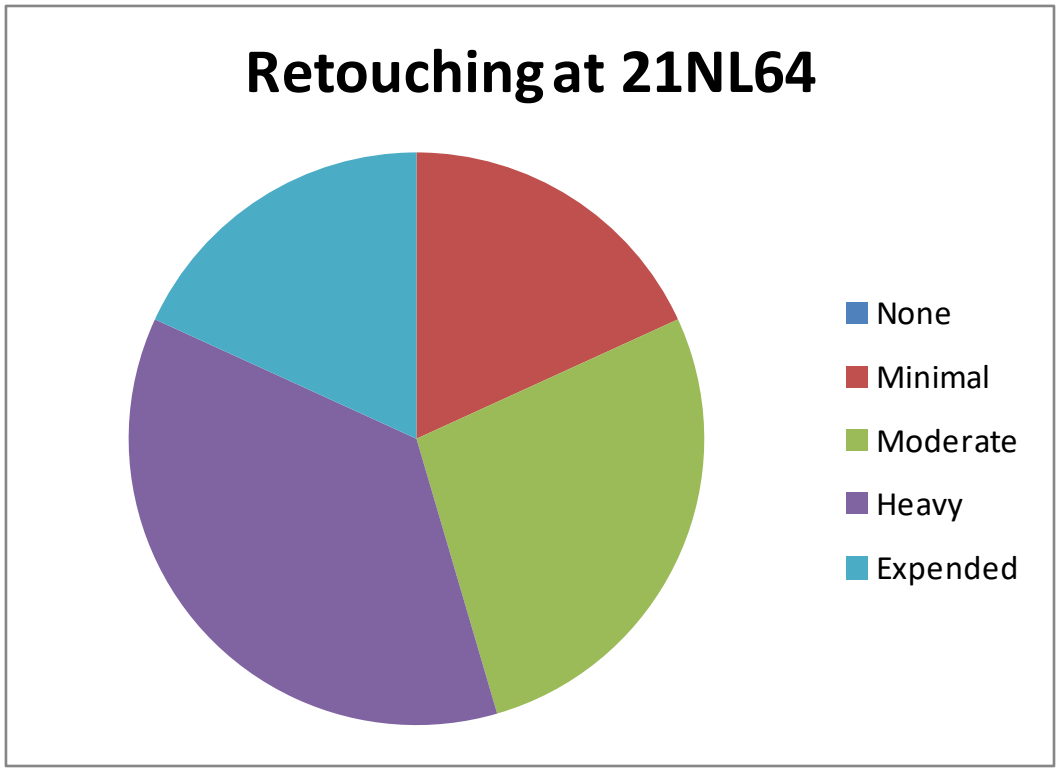
Appendix B, Figure 52. Degrees of retouching and expenditure of lithic tools at 21NL42.



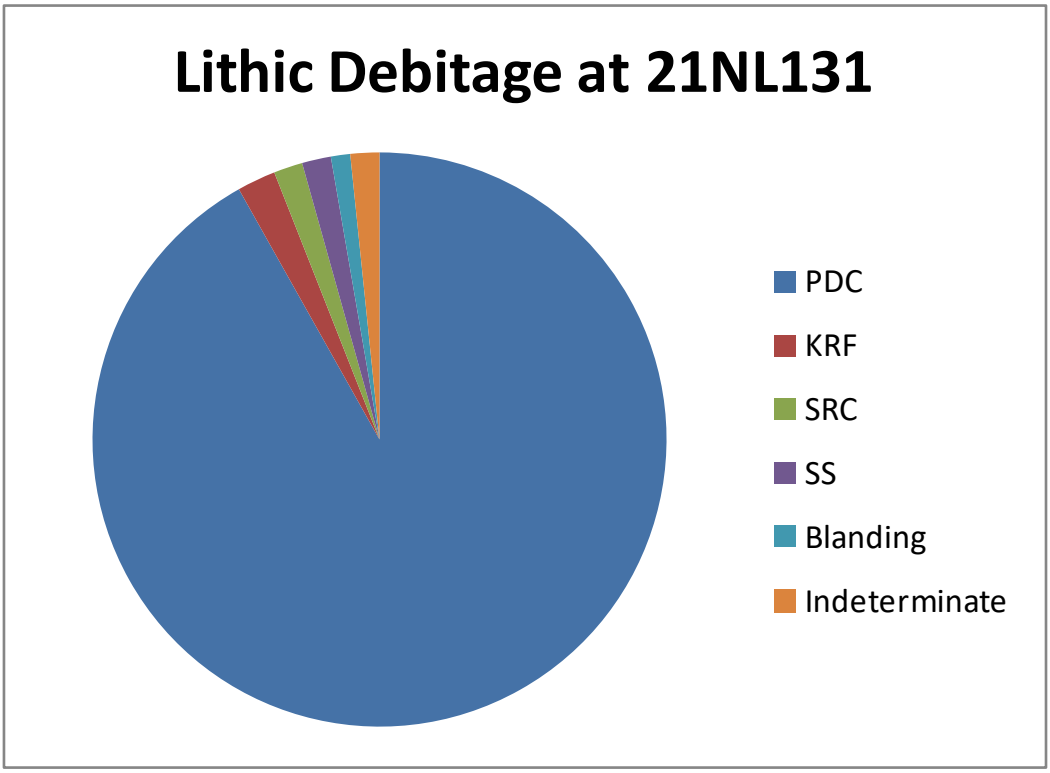
Appendix B, Figure 53. Lithic debitage raw material at 21NL64.



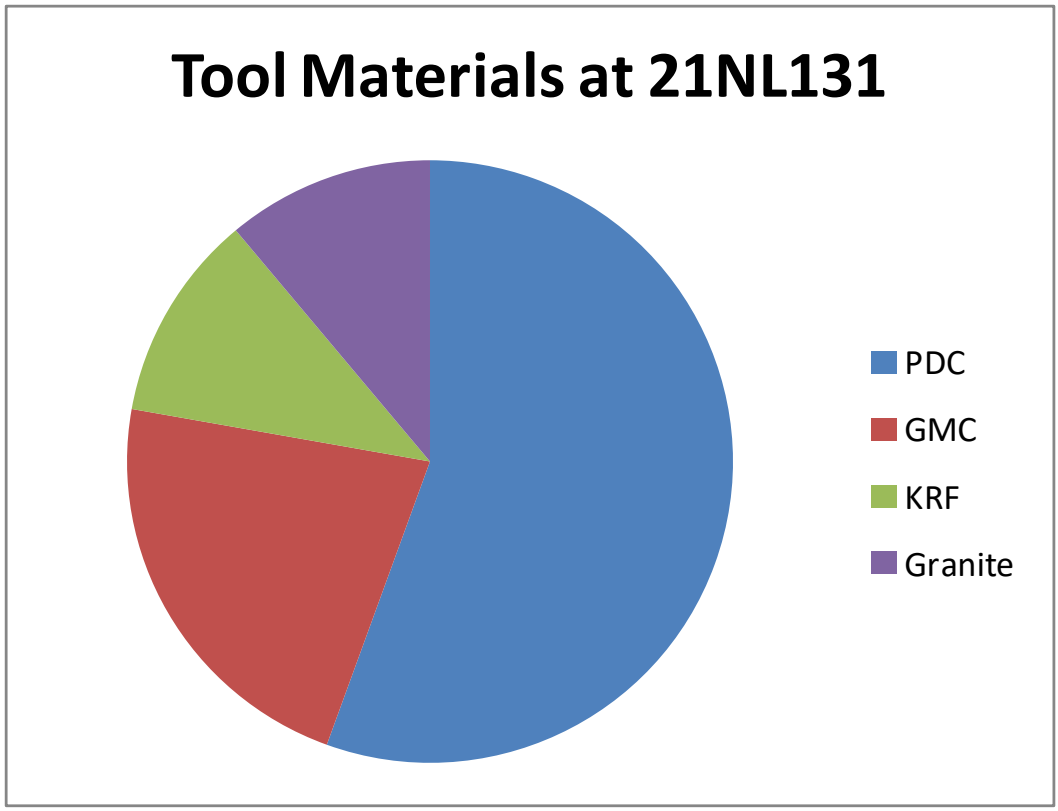
Appendix B, Figure 54. Lithic tool raw materials at 21NL64.



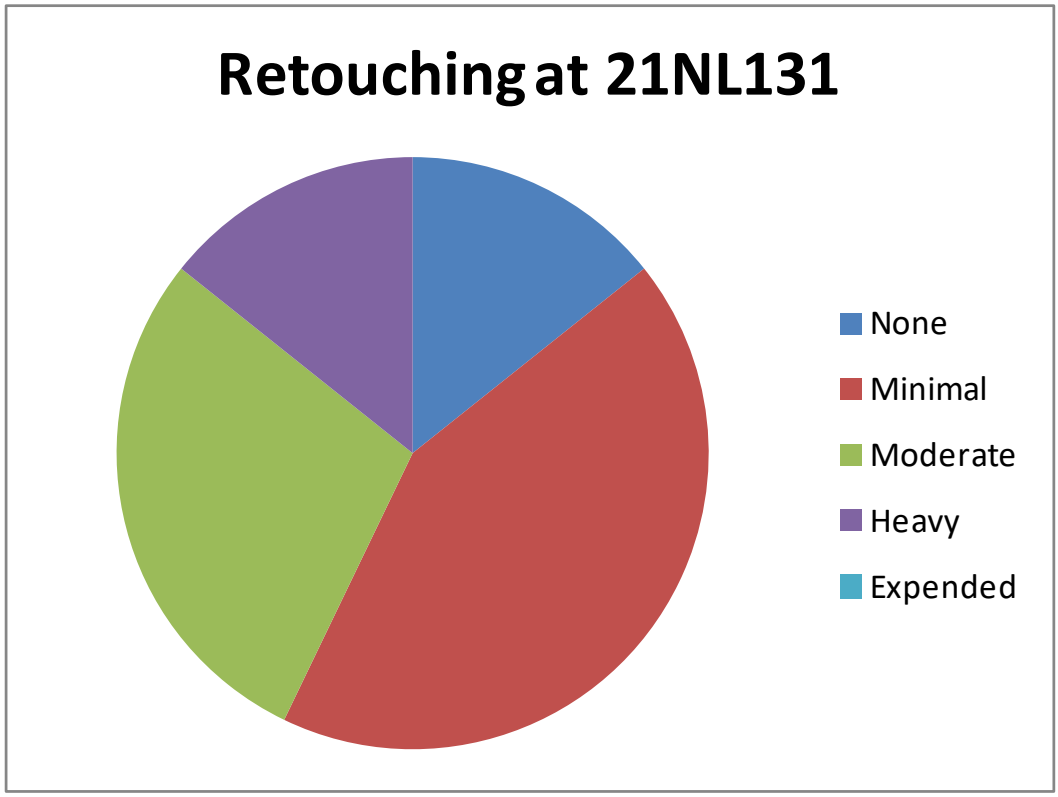
Appendix B, Figure 55. Degrees of retouching and expenditure at 21NL64.



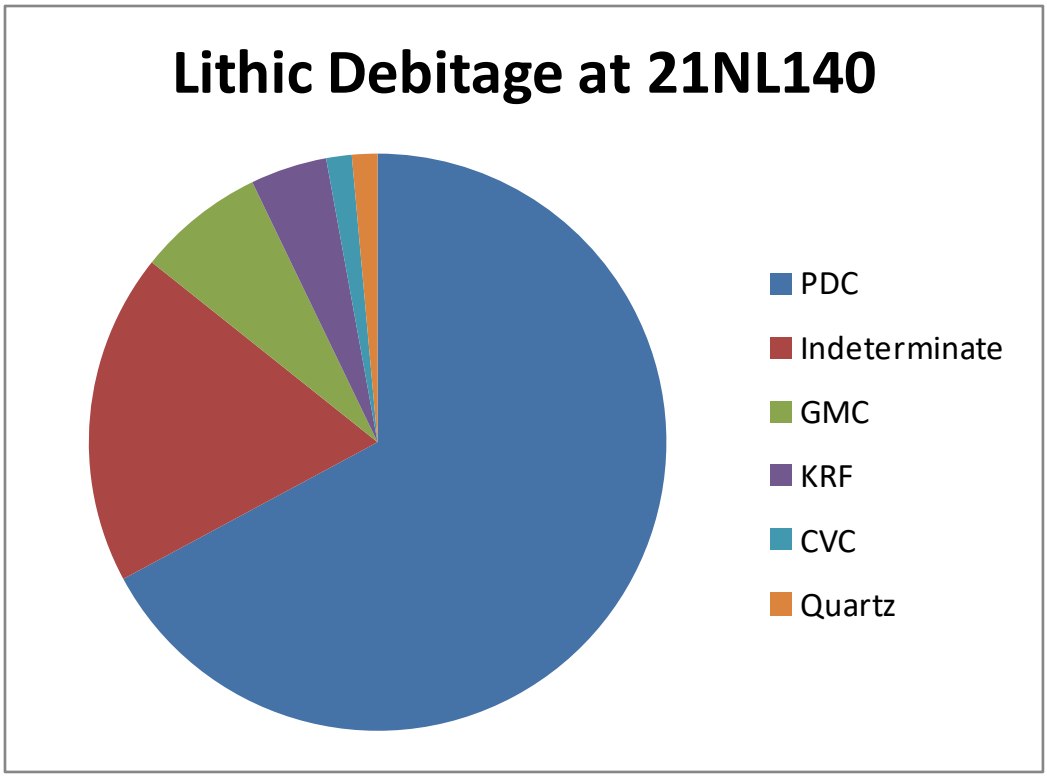
Appendix B, Figure 56. Lithic debitage raw material at 21NL131.



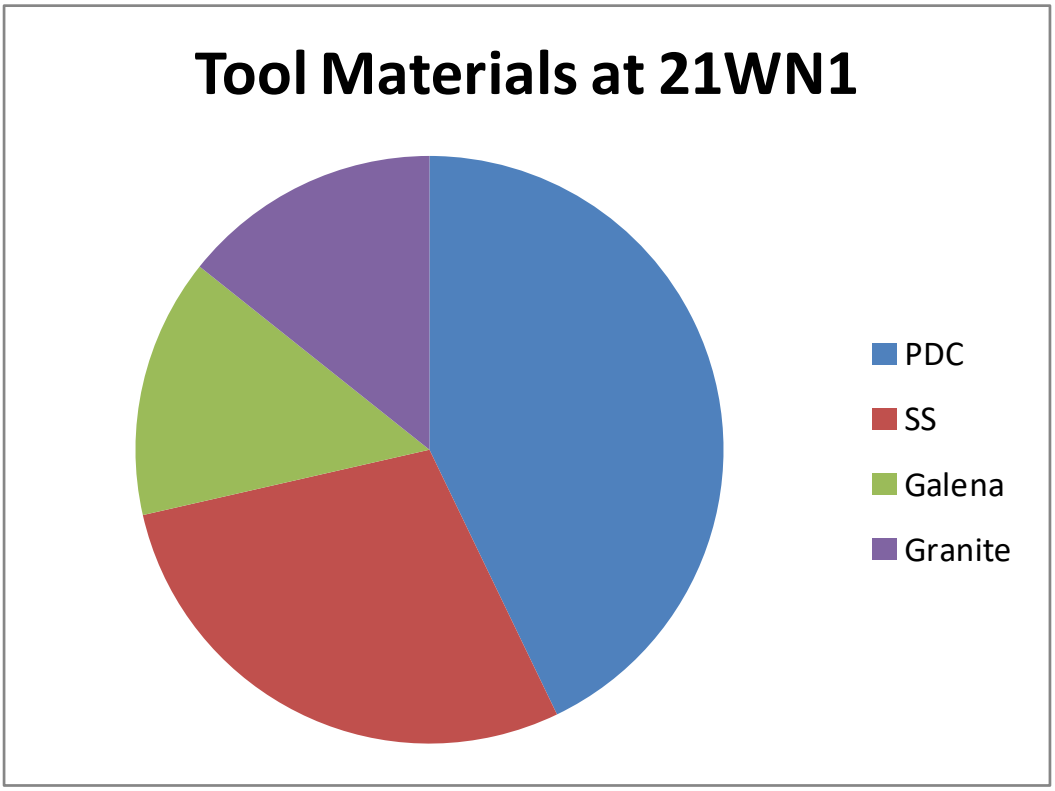
Appendix B, Figure 57. Lithic tool raw materials at 21NL131.



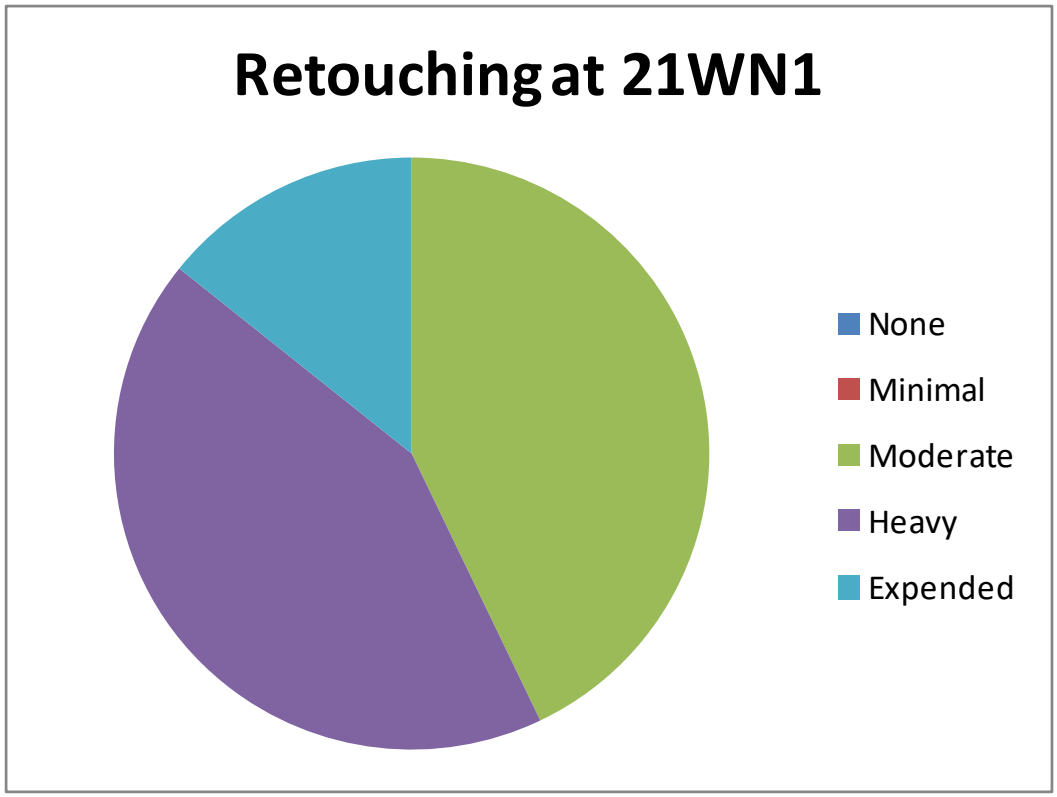
Appendix B, Figure 58. Degrees of retouching and expenditure at 21NL131.



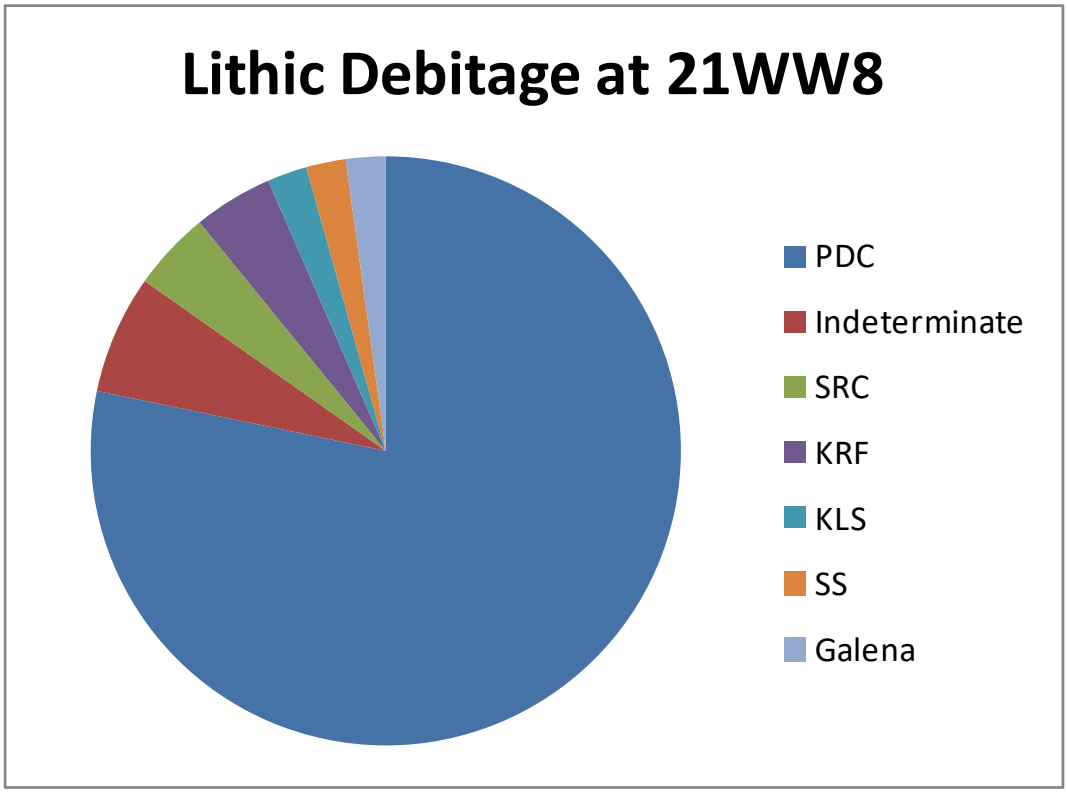
Appendix B, Figure 59. Lithic debitage raw materials at 21NL140.



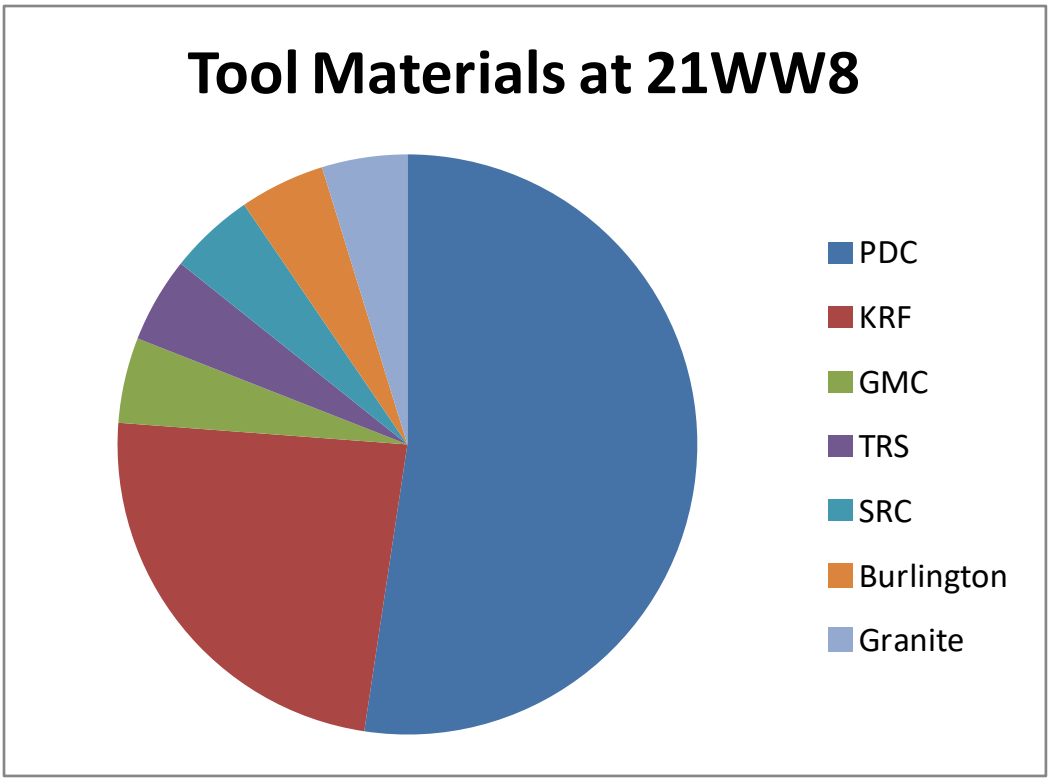
Appendix B, Figure 60. Lithic tool raw materials at 21WN1.



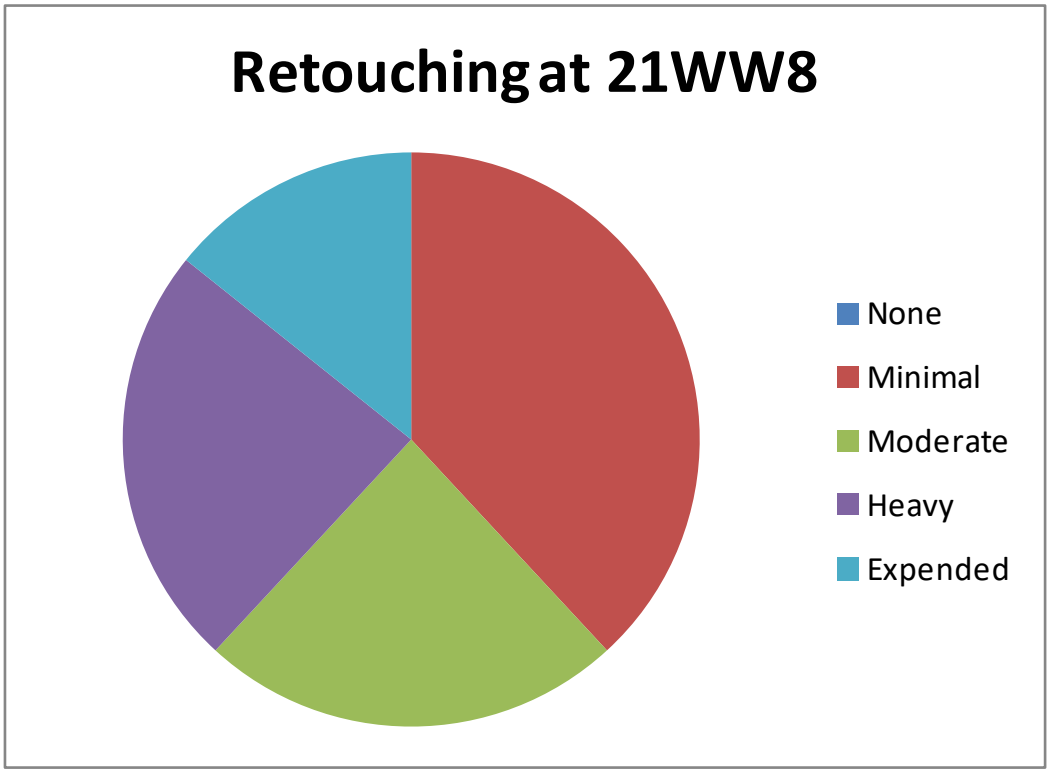
Appendix B, Figure 61. Degrees of retouching and expenditure at 21WN1.



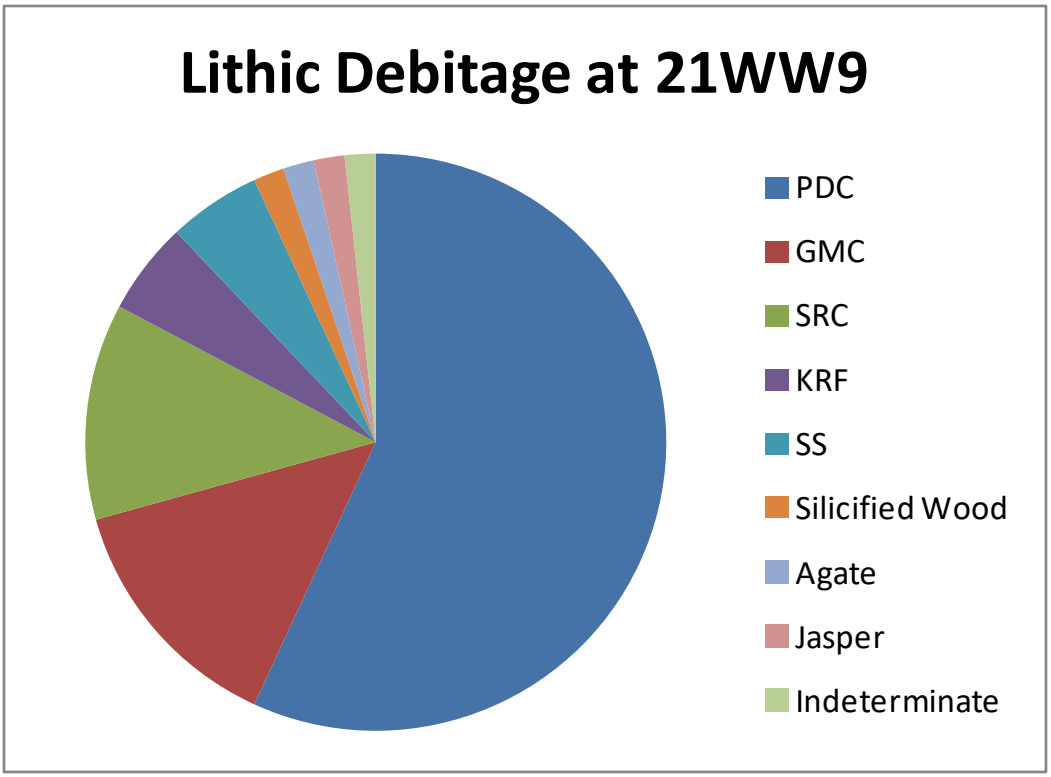
Appendix B, Figure 62. Lithic debitage raw materials at 21WW8.



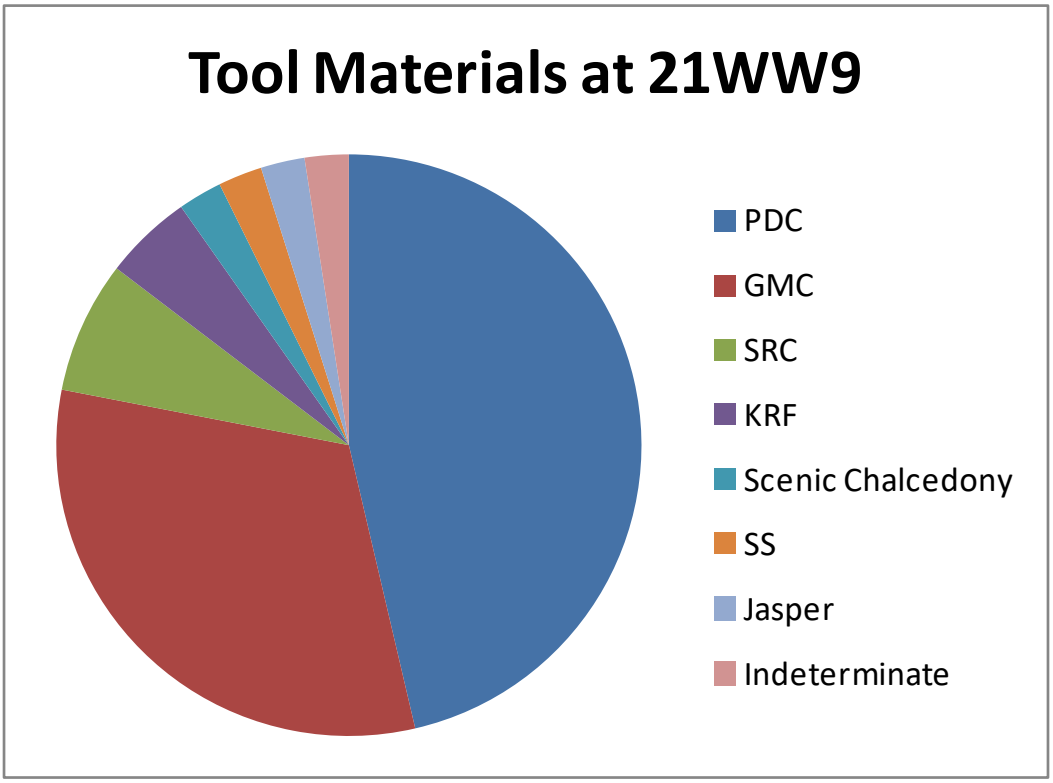
Appendix B, Figure 63. Lithic tool raw material at 21WW8.



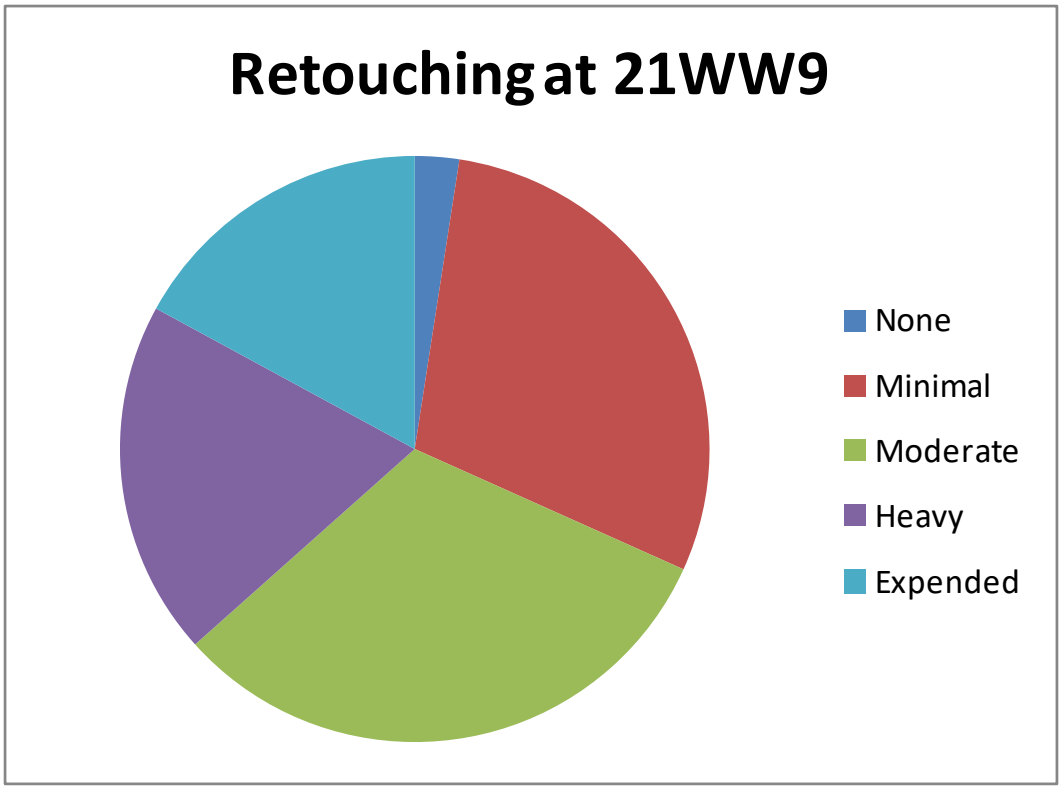
Appendix B, Figure 64. Degrees of retouching and expenditure at 21WW8.



Appendix B, Figure 65. Lithic debitage raw material at 21WW9.



Appendix B, Figure 66. Lithic tool materials at 21WW9.



Appendix B, Figure 67. Degrees of retouching and expenditure of tools at 21WW9.

Appendix C, Photos

Appendix C, Figure 1. Examples of triangular projectile points from 21BE24 (Reichel 2015).

Appendix C, Figure 2. Examples of the most common High Rim cord impressed pottery decorations at 21BE24 (Reichel 2015).

Appendix C, Figure 3. Examples of Cambria/Plains Village punctuated and trailed line pottery from 21BE24 (Reichel 2015).

Appendix C, Figure 4. Examples of punctated High Rim pottery from 21BE24 (Reichel 2015).

Appendix C, Figure 5. Projectile points from the 21BW1 collection. Relevant to the study are Des Moines (Bottom row, second from left), Plains Side Notch (Bottom row, third from left), Madison Triangular (Bottom row, center to second from right) Samantha (bottom right, middle center).

Appendix C, Figure 6. Additional Plains Side Notched points from 21BW1 collections.

Appendix C, Figure 7. Celt or wedge from 21BW1.

Appendix C, Figure 8. Blue Earth Oneota pottery sherd from 21BW1.

Appendix C, Figure 9. Linden Everted Cambria pottery sherd from 21BW1.

Appendix C, Figure 10. 21BW1 pottery including Fox Lake, Late Woodland cordmarked, Late Woodland cord impressed and cord-wrapped stick impressed, plain Late Prehistoric, Late Prehistoric incised, and dentate stamped Late Prehistoric.

Appendix C, Figure 11. Lake Benton Vertical Cordmarked Late Woodland pottery sherd from 21BW1.

Appendix C, Figure 12. Small, indeterminate type rim sherds from 21BW1. Types include Late Woodland cordmarked, Late Woodland cord impressed, Late Prehistoric plain, and small sherds resembling High Rim.

Appendix C, Figure 13. Lithic tools from 21BW54.

Appendix C, Figure 14. Late Woodland cord-impressed neck sherd and dentate stamped Late Woodland neck sherd from 21BW54.

Appendix C, Figure 15. Lithic artifacts from 21FA95.

Appendix C, Figure 16. Blue Earth Oneota pottery sherd from 21FA97.

Appendix C, Figure 17. Lithic artifacts from 21FA97.

Appendix C, Figure 18. Channeled abrader from 21FA97.

Appendix C, Figure 19. Lithic tools from 21HU2 collection.

Appendix C, Figure 20. Shell temper pottery sherd from 21HU2.

Appendix C, Figure 21. Lithic tools recovered from 21HU26.

Appendix C, Figure 22. Shell temper pottery sherds from 21HU26 collection.

Appendix C, Figure 23. Lithic materials from 21HU43.

Appendix C, Figure 24. Tools and pottery from 21HU52 collection.

Appendix C, Figure 25. Lithic tools from 21HU152 collection.

Appendix C, Figure 26. Rim sherds from 21HU152, consisting of Madison Cord Impressed, Madison Plain, and Grant Plain.

Appendix C, Figure 27. Channeled sandstone abraders from 21HU152.

Appendix C, Figure 28. Lithic tools from the 21HU156 collection.

Appendix C, Figure 29. End scraper and utilized flake from 21HU156 collection.

Appendix C, Figure 30. Pottery rim sherds including Madison Ware, Linn Ware, and Grant Ware, from 21HU156.

Appendix C, Figure 31. Projectile points from 21LE106.

Appendix C, Figure 32. Samantha point from 21LE110 (Schirmer et al 2014).

Appendix C, Figure 33. Celt/wedge from 21LE110 (Schirmer et al 2014).

Appendix C, Figure 34. Triangular point from 21LE110 (Schirmer et al 2014).

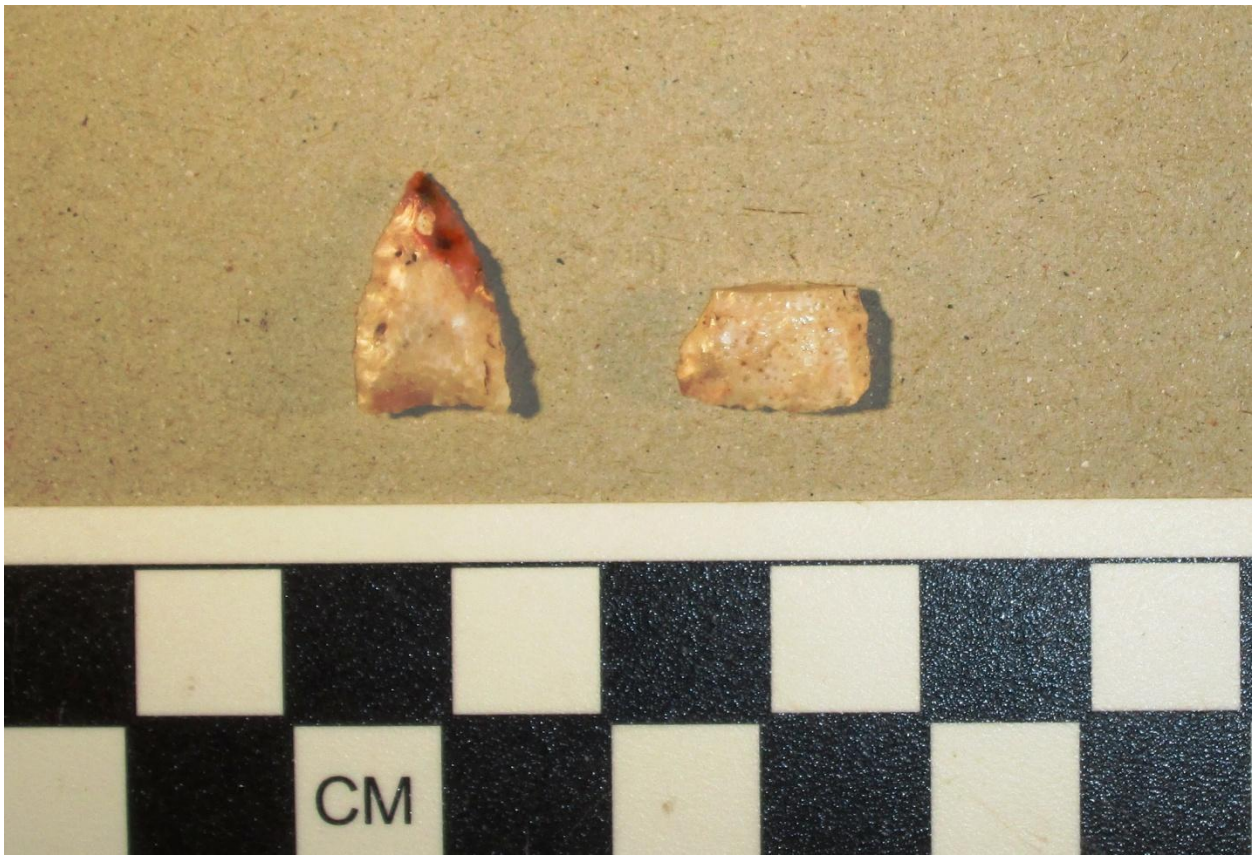
Appendix C, Figure 35. Late prehistoric notched point from 21LE110 (Schirmer et al 2014).

Appendix C, Figure 36. Knife from 21LE118 (Schirmer et al 2014).

Appendix C, Figure 37. Knife from 21LE118 (Schirmer et al 2014).

Appendix C, Figure 38. Fox Lake and Lake Benton pottery sherds from 21MR13.

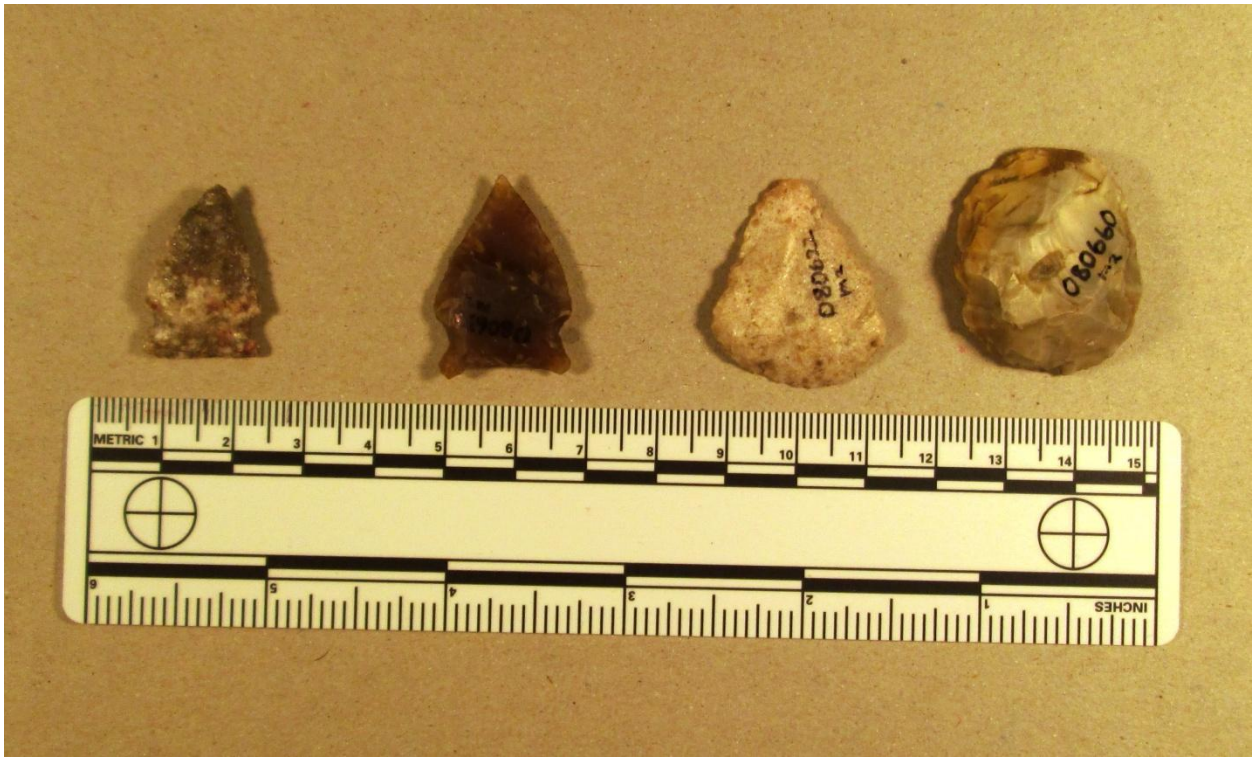
Appendix C, Figure 39. Lithic tools from 21MR13.



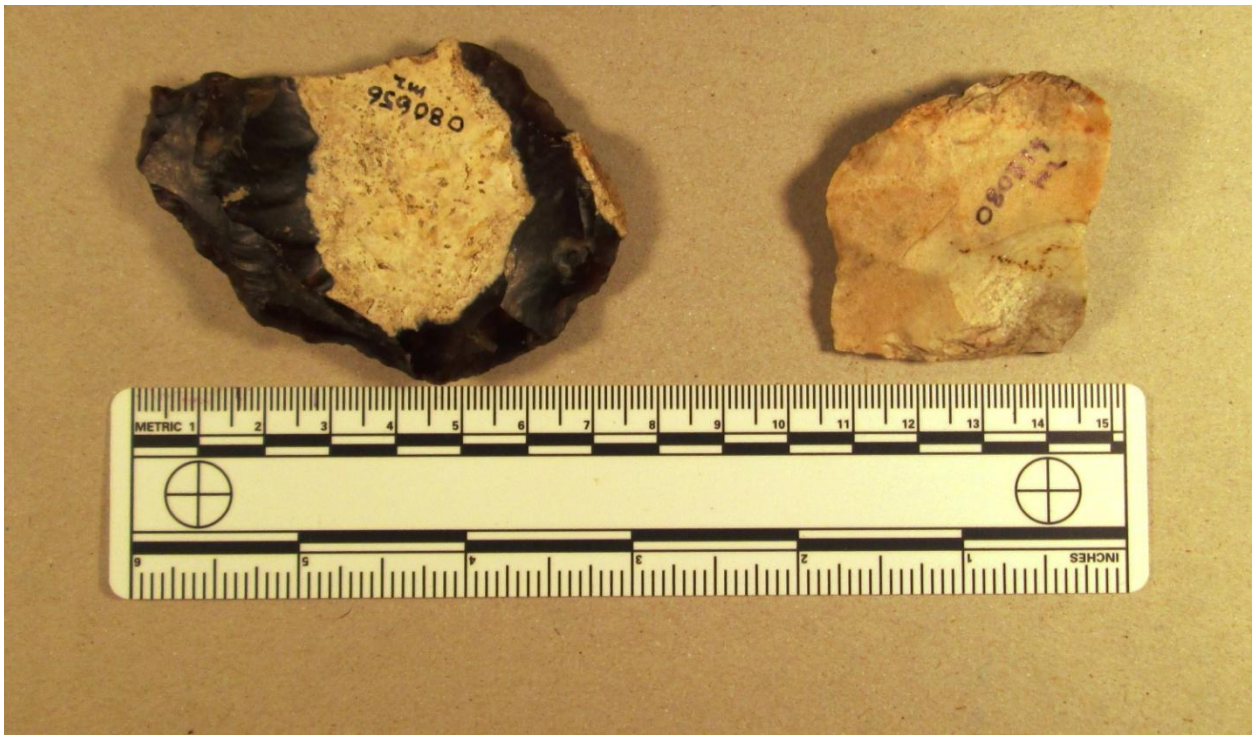
Appendix C, Figure 40. Projectile points from 21NL8.

Appendix C, Figure 41. Diabase tools from 21NL8.

Appendix C, Figure 42. Lithic tools from 21NL8.



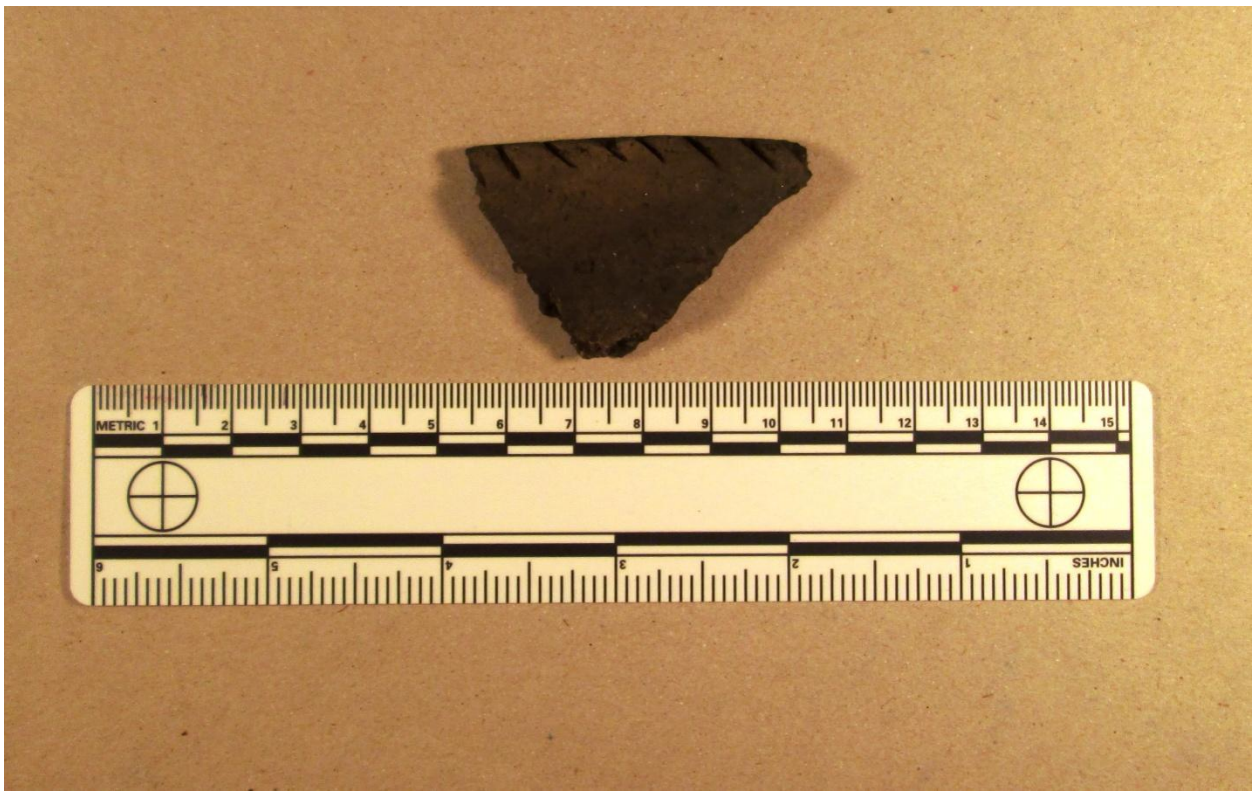
Appendix C, Figure 43. Projectiles and scrapers from 21NL38.



Appendix C, Figure 44. Lithic knife and large utilized flake from 21NL38.

Appendix C, Figure 45. Examples of pottery from 21NL38.

Appendix C, Figure 46. Lithic tools from 21NL42.



Appendix C, Figure 47. Middle Missouri rim sherd from 21NL42.

Appendix C, Figure 48. Lithics from 21NL64.

Appendix C, Figure 49. Projectile points from 21NL131.

Appendix C, Figure 50. Unnamed variety of High Rim horizon pottery from 21NL140.

Appendix C, Figure 51. Lithic tools from 21WN1.

Appendix C, Figure 52. Lithic tools at 21WW8.

Appendix C, Figure 53. Grooved maul from 21WW8.

Appendix C, Figure 54. Pottery from 21WW8.

Appendix C, Figure 55. Rim sherds from 21WW8, identified as Late Woodland in the site form.

Appendix C, Figure 56. Lithic tools at 21WW9.

Appendix C, Figure 57. Pottery at 21WW9, including Terminal Middle Missouri plain rims, Lake Benton cord-wrapped stick impressed, and an unnamed variety of High Rim.