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A Macroscopic Examination of Expedient Tools: Comparing Replicated Collections and Precontact Collections to Aid in Determining Site Type

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A Macroscopic Examination of Expedient Tools: Comparing Replicated Collections and Precontact Collections to Aid in Determining Site Type

by

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A Thesis

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Abstract

This thesis project was utilized to examine the use of expedient tools, or stone tools made with little to no production effort, through macroscopic means to determine if specific activities were being enacted on a site. CRDA8-Site5 (36GR0418) functioned as an Early, Middle, and Late Woodland lithic reduction and tool production locus, based on the recovery of 2,442 precontact artifacts, including lithic debitage, chipped stone tools, and polished, ground, and pecked stone tools (PGP). The lack of artifact rich features with datable charcoal and additional artifact types, such as faunal remains, left little to give insight into further site purpose. By allowing more analysis to occur on expedient tools, the ability to more acutely define site activities presents itself.

The project took place in two parts. Part one included the replication of the use-wear produced on expedient tools from various materials within the parameters of controlled production. Part two of the project was comprised of using the comparative collection to macroscopically identify use-wear patterns on the expedient tool collection from all three phases of the CRDA8- Site5 (36GR0418) collection.

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“I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived. I did not wish to live what was not life, living is so dear; nor did I wish to practice resignation, unless it was quite necessary. I wanted to live deep and suck out all the marrow of life, to live so sturdily and Spartan-like as to put to rout all that was not life, to cut a broad swath and shave close, to drive life into a corner, and reduce it to its lowest terms.” -Henry David Thoreau

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Chapter 1: Introduction

Overview

Within the fast-paced field of professional Cultural Resource Management (CRM) in Pennsylvania, little time is afforded to the exploration of the interpretive potential of smaller precontact sites whose function is unclear due to the lack of cultural features, a variety of specific tool types, or a variety of artifact materials (i.e., worked bone, groundstone tools, precontact ceramic, shell, or butchered faunal remains). The state-named site category options on the Pennsylvania Archaeological Site Survey (PASS) form serve as either more specific functional groups for sites with known purposes or broader catchall groupings for sites of unknown function. There are three broad catchall categories on the PASS form that sites are often placed into and include: unknown site function with a radius of greater than 20 meters (m), open precontact sites with an unknown function, and general lithic reduction sites (PHMC 2017a). While there are guidelines for completing a PASS form from the Pennsylvania State Historic Preservation Office/ Pennsylvania Historical and Museum Commission (PA SHPO/PHMC), for the category of site type, the guidance simply asks the recorder to "check the one that best represents the site" which leaves the broader categories as open ended as they sound with little definition (PHMC 2007:2).

This thesis project examines the use of expedient tools, or stone tools made with little to no production effort, through macroscopic means (Andrefsky 1998) to determine what activities were being enacted on one of these broader categorized site types. By first creating a baseline collection of identifiable use-wear patterns and recording various metrics, it was determined that some attributes measured on the experimental flakes could be deemed significantly different, or functionally diagnostic enough to be applied to precontact tools to aid in the determination of their use. In applying the significant attributes to a precontact collection of expedient tools, like those recovered from CRDA8-Site5 (36GR0418), it can be determined if a range of activities other than flint knapping was occurring at the site.

Binford refers to these expedient tools as situational gear which are produced for a specific use without forethought but rather as a response to a situation (Binford 1979). At first glance, expedient tools can provide little information beyond the knowledge that some activity other than flint knapping was occurring at the site. These alternate activities can include but are not limited to: butchery, hide scraping and leather work, woodworking, ceramic production, or plant processing. These activities in most cases involve material, such as animal soft tissue, wood or fibers, that are perishable and do not preserve well. If preservation is not optimal on a site, the information left behind by more perishable artifacts will not be always evident.

Once a baseline collection is created and the database of identifiable use-wear patterns exists, the information can be utilized to aid in further analysis of expedient tools. By allowing more analysis to occur on expedient tools, the ability to more acutely define site activities presents itself.

Scope of Work

The project took place in two parts. Part one included the replication of the use-wear produced on expedient tools from various materials within the parameters of controlled production. Expedient tools were knapped from local chert types of comparable quality to those tools recovered from CRDA8-Site5 (36GR0418). The expedient tools produced for replication of use-wear mimicked those recovered from CRDA8- Site5 (36GR0418) and consisted of simple utilized flake tools produced on biface thinning flakes, primary flakes, and secondary flakes. The flakes produced were used at differing angles, lengths of time, and number of strokes on materials such as fresh and dried meat; soft and hard wood; fresh, tanned, and raw hide; soaked bone and bone; wetland and dryland plants; and sandstone. The use-wear produced was then recorded and served as a baseline collection of identifiable use-wear patterns. Part two of the project was comprised of using the comparative collection to macroscopically identify use-wear patterns on the expedient tools recovered from the phase I and II archaeological surveys and the phase III data recovery excavations completed at the CRDA8-Site5 (36GR0418) site.

The ability to compare the two collections allowed me to macroscopically identify what sort of general activities were occurring on the site during its precontact occupation. Although the hope for this project was to allow me to provide a more specific site description with a range of activities that occurred at the site, the data collected did not change the site’s functional designation from a generic ephemeral/tool production campsite category and allow it to be placed into a more defined site type. Based on the statistical evidence and examination of potential activity areas across the site, CRDA8-Site5 (36GR0418) remains an Early Woodland (2,700 B.P.–2,000 B.P), Middle Woodland (2,000 B.P.–1,500 B.P), and Late Woodland (1,500 B.P.–900 B.P.)

lithic reduction and tool production locus with an occupation spanning nearly 1,800 years off and on.

Chapter 2: Background Research

Precontact Context

Regional culture histories can be important to shed light on the idiosyncrasies and differences within each area. By reviewing the small variances within a region, it can be determined how an area fits into the larger context. From the larger contexts, we can begin to highlight the patterns of specific culture areas. Though the entire state of Pennsylvania is within the Eastern Woodlands cultural area, the variance between the eastern portion and western portion of the state is great.

Paleoindian. Towards the conclusion of the last glacial period, portions of Pennsylvania remained locked under the ice. While areas as far south as Potterville, Pennsylvania, within the area of current-day Moraine State Park, have had the landscape modified by the terminal push of the North American glacial ice sheets, southern Pennsylvania remained untouched by the ice. During the Late Pleistocene, southern Pennsylvania was a mix of patchy coniferous woodlands and open grassy environments (Carr and Moeller 2015; PHMC 2017b).

During the Paleoindian period (16,500 B.P.–10,000 B.P.) within southwestern Pennsylvania early humans exploited various types of megafauna, such as horse and mammoth, as well as smaller animals such as caribou and elk. In addition, they also exploited a variety of naturally occurring plants and tubers (McCann1994; Neusius and Gross 2014; PA Archaeologist 2011). The human population of North America during this time was relatively new and density was low. This meant food was widely available and competition among the small, mobile bands was low (Carr and Moeller 2015; PHMC 2017b).

In Pennsylvania, the Paleoindian period is further divided into two subcategories: Pre-Clovis and Paleoindian/Clovis (Carr and Moeller 2015; PA Archaeologist 2011). The Pre-Clovis Paleoindian (16,500 B.P.–11,200 B.P.) tool kits were small and contained basic scrapers, flake knives, and points as well as the use of portable prismatic blades. The indistinguishable tool kit of Pre-Clovis Pennsylvania has made the identification of these older sites more difficult (PA Archaeologist 2011). Though sites with definitive artifacts were rare, sites such as Meadowcroft Rockshelter and the Krajacic Site aided in the definition of the Pre-Clovis Miller Complex within western Pennsylvania (Adovasio 1998).

Meadowcroft Rockshelter (36WH0297), one of Pennsylvania's longest occupied sites, was used by small bands in the area as early as 16,000 B.P. Radiocarbon dating confirms the use of Meadowcroft from as early as 15,050 B.P. through early historic periods dating to 175 B.P. +/- 50 (Adovasio et al. 1978: 639). Paleoindians exploited areas like Meadowcroft Rockshelter as seasonal basecamps and utilized them primarily for hunting, collecting, and food processing (Adovasio et al. 1978; McConaughy 2004).

Sealed beneath a rockfall securely dated to 8,050 B.P., one of the oldest occupied levels at Meadowcroft has produced fire features that have been radio carbon dated to as old as 12,305 +/- 975 B.P., placing it securely within the Pre-Clovis period within Pennsylvania (Adovasio et al. 1978; Adovasio et al. 1990; McConaughy 2004). This level, commonly referred to as Stratum IIa, yielded 13 chipped stone lithic tools and

104 lithic debitage fragments during the first three years of excavations in the early 1970s and an additional 300 in 1976 to 1977 field season (Adovasio et al. 1978: 644). The tool types recovered from Meadowcroft and included in the Miller Complex included Miller lanceolate, bilaterally retouched rhomboidal flake knives or Mungai knives, gravers, and denticulate pieces, among others (Adovasio 1998; Adovasio et al. 1978).

It was not until the Paleoindian/Clovis period (11,200 B.P.–10,000 B.P.) that the hallmark tool type, the fluted point, made its way into the tool kits of early Pennsylvanians. Fluted points, knives, and scrapers are all frequently linked to the Paleoindian/Clovis tool kit (PHMC 2017a). Sites such as the Prosperity Site (36WH1408), located in Washington County, Pennsylvania on a peninsular upland bench and hilltop above the Tenmile Creek, are excellent examples of Paleoindian/ Clovis sites in the area. The Prosperity Site contained not only the base of a fluted point, but 24 additional Paleoindian tool kit tool types. These types included gravers, scrapers, bladelets, wedges, and spokeshaves (Davis et al. 2012).

Subsistence patterns for all Paleoindian peoples involved seasonal migrations, following the migratory patterns of waterfowl and caribou and the pattern of availability of edible plants (McCann 1994). Small family groups would have regular seasonal routes to exploit the area around them frequenting places such as Meadowcroft Rockshelter in Avella, Pennsylvania.

As the Holocene replaced the Pleistocene, a global trend of warming began to modify the environment. Mixed open forests of the Pleistocene gave way to closed spruce/pine forests. Both the change in vegetation and extinction of mega fauna required early humans to modify their exploitation of their environment.

Archaic. The Early Archaic (10,000 B.P.–9,000 B.P) correlates with the environmental shift at the close of the Pleistocene. The Early Archaic is represented sparingly in Pennsylvania, due in part to retreating glaciers reworking previously used landscapes (Davis 2014a). Due to the scarcity of sites, the Early Archaic tool kit is not very well known; however, fluted points associated with Paleoindian period give way to smaller, corner notched points such as Big Sandy and Thebes points (Northeast Region Projectile Points 2017; PHMC 2017c;).

Subsistence patterns of those in the Early Archaic did not differ greatly from those in the Paleoindian. Early Archaic peoples still utilized season rotations; however, the changing environment allowed them to expand food resources to include more wild plants, deer, and shellfish (McCann 1994). While the preference for floodplain and stream terrace settings remain high, during this time there was an increased number of upland sites. The Early Archaic saw a 59 percent rise in upland sites over the Paleoindian period (PHMC 2017c). These stratified upland sites with good preservation are important, allowing insight into the supplementation of Early Archaic diets with various plant products. While fishing gained importance, so did nut and seed collection (Carr and Moeller 2015).

During the Middle Archaic (8,000 B.P.–6,000 B.P), the climate had warmed enough to promote the spread oaks and other hardwoods, allowing for the consumption of greater amounts of walnuts, hickory nuts, and acorns. The increased number of plants containing edible berries also drew birds and mammals to feed, allowing for the exploitation of game in the deciduous woodlands (Carr and Moeller 2015; PHMC 2017c).

As population density increased and larger numbers of groups arose to compete with each other, a group’s mobility and territorial size decreased. Hunter-gatherer groups began to exploit areas near inland swamps as well as maintaining the use of upland areas (Maryland Archaeological Conservation Lab 2012). This population increase can be correlated to the emergence of more sedentary lifeways as the Archaic progresses (Carr and Moeller 2015; PHMC 2017c).

Bifurcate points, such as LeCroy, mark the beginning of the Middle Archaic along with greater tool diversity along with various stemmed points such as Stanley points (MACL 2012; Neusius and Gross 2014). The Middle Archaic also saw an increase in groundstone tools such as mortars and pestles for plant processing and net weights for fishing, as well as celts, adzes, and axes (MACL 2012).

As populations continued to increase during the Late Archaic (6,000 B.P.–4,300 B.P), groups spread from inland swamps to include more fresh water streams and estuaries. These environments allow for the increased exploitation of freshwater mussels and fish (MACL 2012; PHMC 2017c). The intensification of avian exploitation is also seen in the Late Archaic (Davis 2014a).

The Late Archaic tool kit is more defined than that of the earlier Archaic. The presence of bannerstones mark the definitive emergence of the atlatl, revolutionizing a hunter’s effectiveness (Neusius and Gross 2014; PHMC 2017c). Along with better hunting techniques, larger sites thought to be group base camps contain tools for hide working, wood working, and even weaving (Davis 2014a). These larger base camps also exhibit increased signs of long distance networking. Many items used for ceremonial purposes, such as copper and marginella beads, began to make their way across vast trade networks (Neusius and Gross 2014). Groups began to re-center along major rivers to take advantage of their access to commodities from distant areas of the country.

Meadowcroft Rockshelter, again, is an excellent example of an Archaic site type within western Pennsylvania. The Early Archaic is represented in features with radiocarbon dates from Stratum IIb between 9075 +/- 115 B.P. and 8010 +/- 110 B.P. (McConaughy 2004). Diagnostic projectile points associated with the Middle and Late Archaic were all recovered from stratigraphic contexts with features that were able to be radiocarbon dated within the Rockshelter. Middle and Late Archaic points represented in Stratum IIb at Meadowcroft include several stemmed point variants, a Kirk serrated-like point, and a Brewerton Corner Notched-like. Features within Stratum IIb contained hickory, walnut, butternut, and oak nutshells, as well as several bone awls (McConaughy 2004). These items support the general trend of an increase or intensification in wild plant exploitation and hide working.

Transitional. The Transitional period (4,300 BP-2,700 BP) in Pennsylvania saw the climate become drier, therefore sending populations to live along waterways for longer periods of time throughout the year (Carr and Moeller 2015). While there have been no burials recovered within Pennsylvania from this period, contemporaneous sites located in New Jersey, such as the Savich Farm, containing burials suggest increased ceremonialism and a wider network of trade (PHMC 2017d).

Research studies conducted by James Hatch and Minetey Maxham on the spatial and temporal distribution of jasper from known quarries within Pennsylvania aid in illustrating the increased distance of trade networks during the Transitional Period within Pennsylvania (Hatch and Maxham 1995). While the use of jasper, a material not native to the region, was largely contained within both the Delaware and Susquehanna Watersheds, the results of this study shows approximately 10 percent of sites within the Ohio Watershed contained jasper transported into the region from the eastern part of the state. While the use of jasper declines as distance from the quarry increases, PASS files show an increase in jasper during the Transitional period (Hatch and Maxham 1995). Whether obtained for trade or to use as a material for cache objects, the presence of jasper on Ohio Watershed sites shows the vastness of trade routes within Pennsylvania.

The Transitional period tool kit includes broadspears in addition to stemmed and notched points from the Late Archaic. The tool kit continues to see a rise in the number of netsinkers, bannerstones and grinding stones in conjunction with evidence of the collection of seeds. New plants were being exploited during this time, including knotweed, little barley, chenopodium, and maygrass (Carr and Moeller 2015; PHMC 2017d).

Sites that characterize this time period include large fire cracked rock (FCR) features suggesting that food was being prepared for larger groups. It is at these sites where the first steatite bowls are recovered, marking the beginning of the container revolution (Carr and Moeller 2015; PHMC 2017d).

In western Pennsylvania, the cultural shift from the Late Archaic to the Transitional was not as palpable as it was within eastern Pennsylvania. While FCR features become more common in the area, hallmarks of the periods, such as broadspears and steatite or soapstone bowls, are rarely found (Kinsey 1968; McCann 1994; PHMC 2017d). One fragmentary section of rudimentary, plaited basketry was recovered from Stratum III at Meadowcroft Rockshelter dating to the Transitional period.

Early Woodland. The Early Woodland period (2,700 B.P-2,000 B.P.) in Western Pennsylvania saw the climate become more like modern conditions with warmer and moister climatic conditions (Neusius and Gross 2014). During the Early Woodland period, the floodplains and terraces of major rivers and waterways became preferred habitation sites (Carr and Moeller 2015; PHMC 2017a). Exploitation of these landforms allowed for groups to expand social networks founded on shell and copper during the Late Archaic and Transitional Periods. These expanded social networks aided in trade, exchange, and group interaction, which likely included hunting and marriage. This also led to the sharing of ceremonial and ritualistic ideas (Davis 2014a).

Attributes of the Early Woodland period included growing populations beginning to establish both cultural identities and territorial boundaries while expanding trade and exchange routes. Increased sedentism is coupled with the introduction of rudimentary plain, flat bottomed ceramic vessels and domesticated plants, such as squash and maygrass (Carr and Moeller 2015; Davis 2014a; PHMC 2017e). New tool forms and point types, including Forest notched points, also make their appearance.

Although the Forest notched point was originally typed in 1955 by Mayer-Oakes at the Siggins Site (36FO0001), the type did not gain popularity until excavations at the Thorpe Site (36AL0285) were complete (George 1998; MACL 2012). Of the 23 diagnostic points recovered from the Thorpe Site, a total of 12 (52 percent) were Forest Notched points. Thought to develop out of Transitional period Broadspear type, the Forest notched point is believed to have an 800 year timespan and be confined to the Upper Ohio River Valley. Based on diagnostic artifacts, feature types, house patterning, and C-14 dating, the Thrope Site was dated to the Early Woodland (George 1998). While many Adena objects, including stemmed points, gorgets, and pipe fragments, were recovered from contexts with Forest Notched points at the Thorpe Site and others, a Forest notched point has not been recovered from a mound burial context (George 1998). Overall, this suggests trade and contact in western Pennsylvania between Early Woodland cultures and Adena cultures, known as the Adena Interaction Sphere (Carr and Moeller 2015).

In the Ohio River Valley, the utilization of burial mounds and elaborate ceremonial burial practices called Adena diffused from the Mississippi River Valley into new areas. The Adena people preferred round houses clustered in small hamlets (PHMC 2017e). Although widespread through both the Upper Mississippi River Valley and the Ohio River Valley, the Adena culture in Pennsylvania was isolated to the southwestern portion of the state and did not extend past present-day Pittsburgh (Dragoo 1963; Ritchie and Dragoo 1959).

Adena mounds, like the Graves Creek Mound and the Cresap Mound both located in West Virginia, were conical and usually contained several burials along with numerous diagnostic artifacts. Artifacts commonly recovered from Adena mounds include stemmed points, cache blades, stone tablets, gorgets, pendants, and effigy objects made from exotic copper and mica (Dragoo 1963; Neusius and Gross 2014). Ceramic vessels with ceramic styles known as Adena Plain pottery and Fayette Thick were recovered from mound contexts. Adena Plain pottery types were tempered with limestone or grit and consisted of a plain, undecorated surface. Conversely, Fayette Thick pottery types were tempered with crushed shale or igneous rock and consisted of a cordmarked exterior decoration. The walls of these vessels varied in thickness (Dragoo 1963; Neusius and Gross 2014).

Middle Woodland. The Middle Woodland period (2,000 B.P.–1,500 B.P.) in western Pennsylvania is associated with the Hopewell culture, which spread out of Ohio’s Scioto valley. The Hopewell culture expressed itself in both earthworks and mounds much like the Adena culture did before it. As Adena is replaced by Hopewell, the Hopewell Interaction Sphere is an excellent example of how far trade networks and the Hopewellian influence could reach outside of the Eastern Woodlands. Trade goods including obsidian from the Rocky Mountains, copper from the Great Lakes, marine shells from the Gulf Coast, and sharks’ teeth from the Atlantic Coastal Region all made their way into Hopewell Culture (Neusius and Gross 2014; PHMC 2017e). Hopewell sites during the Middle Woodland period included unusual and diverse raw materials that were utilized to create tools and ritual artifacts (Davis 2014a).

In addition to the production of fine ornamental goods made from exotic materials, Hopewell people also grew corn and squash. While further west Hopewell people lived in larger state-level society, in southwestern Pennsylvania they lived in smaller hamlets. The Hopewell Interaction Sphere aided in the exchange of both goods and ideas across the Eastern Woodlands (Neusius and Gross 2014). During the decline of the Hopewell culture around 1450 BP, trade networks reduced in size and the wide array of exotic goods became more difficult to obtain; however, groups continued to experiment with horticultural pursuits (PHMC 2017e).

Middle Woodland subsistence patterns continued to rely on deer, fish, birds, and some amphibians. While there is evidence of domesticated plants, Non-Hopewell culture Middle Woodland people appear to be dependent on harvesting of wild or semi-domesticated flora near regular hunting camp sites (Davis 2014a). Non-Hopewell Middle Woodland sites are often described as “nondescript in appearance” and pottery styles are considered to not be distinctive although a few sites have yielded ceramics with a net impressed design (PHMC 2017e). Datable features such as trash pits have aided in the understanding of subsistence patterns and suggest more permanent and less migratory groups (Davis 2014a; PHMC 2017e).

Late Woodland/Late Prehistoric. In southwestern Pennsylvania, cultural progression during the Late Woodland separates itself dramatically from the eastern side of the state and follows the path of other groups living within the Ohio River Valley in Ohio, West Virginia, and Indiana. The Late Woodland period (1500 B.P.–900 B.P.) in southwestern Pennsylvania is often referred to as the Late Prehistoric and Late Woodland and the terms are used interchangeably (Davis 2014a; PHMC 2017f). This brief period in Pennsylvania's history marks the termination of the Hopewell Interaction Sphere; this brief period also marks the emergence of Monongahela culture. Settlement patterning switched from Middle Woodland dispersed settlements to the centralized villages focused on agriculture in the Late Woodland/Late Prehistoric period (PHMC 2017f).

Point types associated with the Late Woodland period in southwestern Pennsylvania include Triangle, Backstrum side-notched, Jack's Reef corner notched, Raccoon notched, and Kiski corner notched points (Davis 2014a). While further east, these point types are mostly associated with the Middle Woodland, an examination of the PA CRGIS system by Mark McConaughy shows cultural horizons, such as Jack's Reef, occur later in the western portion of the state (McConaughy 2013). Jack's Reef, though not common, are often found in contexts with Raccoon notched points and Levanna triangle points. These points have been found in conjunction with Eastern Agriculture Crop plants, including early types of maize, and settlement patterning that suggests larger village populations (McConaughy 2013). By the end of the terminal Late Woodland/Late Prehistoric, Monongahela culture and intensive maize agriculture were hitting their stride together in southwestern Pennsylvania.

Terminal Late Prehistoric/Proto-Historic. During the Terminal-Late Prehistoric/ Proto-Historic periods (900 B.P.–320 B.P.) the area is marked by the occupation of the Monongahela. Monongahela culture stretched through northwestern Maryland, West Virginia, Ohio, and southwestern Pennsylvania (Hart 1993). The Monongahela culture history is divided into three periods: Early Monongahela (900 B.P.–700 B.P.), Middle Monongahela (700 B.P.–370 B.P.), and Late Monongahela (370 B.P.–320 B.P.) (Anderson 2002; Hart 1993). The Monongahela consisted of several groups linked together through similar cultural traits such as ceramic types, intensive maize agriculture, and social organization (Anderson 2002).

Early and Middle Monongahela settlement patterns include circular villages with stockades and vacant central plazas. As the Late Monongahela period spreads, these villages begin to contain flower petal structures for added storage, as well as the addition of specialized structures thought to represent communal activity spaces. These specialized structures included charnel houses and meeting houses. Although the Monongahela never made contact with Europeans, trade networks reaching up into the Great Lakes region with the Iroquois allowed for European goods to turn up on some Late Monongahela period sites, including glass beads (Anderson 2002; PHMC 2017g).

By the Late Monongahela period, burial practices change from simple, sandstone slab covered burial pits within the family home to elaborate spaces within the community charnel house with grave goods and signs of status (Anderson 2002; Hart 1993). Elaborate burial practices have been discovered around the Monongahela region on sites such as Sony Site (36WM0151) and Jones Site (36GR0004). However, these sites also retain the hallmark circular village and central plaza of common Monongahela sites (Anderson 2002; Davis 2014a).

Contact. Due to rising pressure from European settlers and explorers, the Iroquois Confederacy invaded the Ohio River Valley near the forks of the Ohio early in the 17th century chasing out the native inhabitants in an effort to eliminate trading competition (Dixon 2004). The Beaver Wars, or Iroquois Wars, would be waged in the Great Lakes region sporadically through the 17th and 18th centuries for the purpose of controlling the region's trade (Carr and Moeller 2015). For almost a century, the land was sparsely inhabited by small, roaming bands of Iroquois hunter gatherers (Dixon 2004).

Early Late Prehistoric and Contact Period Native American paths, most notably used by the Iroquois Confederacy, are well documented throughout Pennsylvania (Wallace 1965). The juncture of Native American paths has been identified as a significant locality for Native American populations in this region. These paths were so well plotted and used, that not until the invention of the combustion engine did travel around the state begin to veer away from their use (Wallace 1965). Several Native American paths through the area became highways for settlers and military forces alike.

As more European ships brought more settlers to colonize the new world, the disease they brought with them caused many tribes, such as the Lenape from Delaware, to resettle near what would one day be Pittsburgh (Dixon 2004). Along the way from the Delaware River Valley, the Lenape were joined by other tribes fleeing their native lands, including refugee bands of Mohicans, Shawnees, and Tuscaroras. By exploiting loosely based kinship ties, the groups soon melded together and found sanctuary on the banks of the Ohio River Valley (Dixon 2004).

Archaeological Context

CRDA8-Site5 (36GR0418) is located within Subbasin 20, Watershed E of the Ohio River Drainage System. The site is located along Boothe Run, a tributary stream of the Enlow Fork of Wheeling Creek, which is listed as the minor watershed stream. According to CRGIS, there are a total of 553 previously recorded archaeological sites within the watershed, including 109 historic sites. Included within these 553 previously recorded archaeological sites are a total of 1,234 datable components. These datable components are distributed chronologically and are presented in Table 1.

A total of 35 previously recorded archaeological sites are located within a one-mile radius of CRDA8-Site5 (36GR0418), including 13 precontact sites, 18 historic sites, and four multicomponent precontact and historic sites. Of these 35 sites, a total of five are located within a quarter mile of CRDA8-Site5 (36GR0418): Wise/Toland Site (36GR0339), CRDA8-Site3 (36GR0416), CRDA8-Site4 (36GR0417), CRDA8-Site6 (36GR0419), and CRDA8-Site7 (36GR0420). These five sites include an historic domestic site with an unknown prehistoric component, a prehistoric open habitation site, two surface scatters of unknown function with a less than 20 m radius, and a quarry. Only one of the five sites is considered eligible for inclusion on the NRHP: CRDA8-Site7 (Table 2).

Table 1

Datable Site Component Distribution Watershed E of the Ohio River (Subbasin 20)

Chronological Period	#	%
Unknown Precontact	388	31.44
Unknown Paleoindian	2	0.16
Early Paleoindian	0	0.00
Middle Paleo Indian	0	0.00
Late Paleoindian	0	0.00
Unknown Archaic	206	16.69
Early Archaic	34	2.76
Middle Archaic	56	4.54
Late Archaic	108	8.75
Transitional	5	0.41
Unknown Woodland	116	9.40
Early Woodland	65	5.27
Middle Woodland	89	7.21
Late Woodland	55	4.46
Proto-Historic	1	0.08
Historic	109	8.83

Table 2

Previously Recorded Archaeological Sites within a Quarter Mile of CRDA8-Site5 (36GR0418)

Site Number	Site Name	Site Type	Topographic Setting	NR Status
36GR0339	Wise/Toland Farm	Historic Domestic Site/Farmstead/Unknown Function Surface Scatter Less than 20M Radius	Hilltop	SHPO: Not Eligible
36GR0416	CRDA8-Site3	Open Habitation, Prehistoric	Stream Bench	SHPO: Not Eligible
36GR0417	CRDA8-Site4	Unknown Function Surface Scatter Less than 20M Radius	Stream Bench	SHPO: Not Eligible
36GR0419	CRDA8-Site6	Unknown Function Surface Scatter Less than 20M Radius	Floodplain	SHPO: Not Eligible
36GR0420	CRDA8-Site7	Quarry	Floodplain	Eligible

The Wise/Toland Site (36GR0339) was recorded as an historic domestic/ farmstead site dating from ca. 1850 to present. The site also contains an unknown prehistoric surface scatter consisting of a less than 20 m radius with unknown cultural affiliation. The historic component of the site consists of a total of two extant buildings, including a farmhouse and a summer kitchen, and four collapsed outbuildings. Wise/Toland Site (36GR0339) is considered not eligible for the NRHP.

CRDA8-Site3 (36GR0416) was recorded as an open habitation prehistoric site of both Terminal Late Archaic and Middle Woodland cultural affiliation based on two diagnostic points. Although three features were excavated, no diagnostic artifacts were recovered in association. CRDA8-Site3 (36GR0416) is not considered eligible for the NRHP based on redundancy of information.

Both CRDA8-Site4 (36GR0417) and CRDA8-Sit6 (36GR0419) were recorded as unknown prehistoric surface scatters consisting of a less than 20 m radius with unknown cultural affiliation. These two sites are both considered ineligible for the NHRP based on their lack of cultural features or anomalies, diagnostic artifacts, and charcoal.

CRDA8-Site7 (36GR0420) was recorded as a multicomponent Late Archaic, Transitional/Early Woodland and Middle Woodland lithic reduction/tool production campsite and quarry. A total of 29 diagnostic points were recovered from the site along with over 20,000 other chipped stone tool types, pieces of lithic debitage, lithic cores, and polished, ground, and pecked stone tools (PGP) tools. The artifacts were recovered from a buried A horizon. Based on the buried soil horizon, which contained intact archaeological remains, and the diagnostic artifacts, CRDA8-Site7 (36GR0420) is considered eligible for NHRP.

Chapter 3: Literature Review

General History of Use-Wear Analysis

The analysis of lithic use-wear began in the early nineteenth century when Nilsson noted while examining a chipped stone flake that it appeared to have been used as a tool (Olausson 1980). Using ethnographic analogy and working backwards, early use-wear pioneers were able to determine probable uses for the artifacts they were examining. It was not long before scientists such as Pfeiffer and White began to use replicative experiments to create use-wear patterns with known origins on lithic artifacts to create controlled studies (Olausson 1980). Early on it was noted that although you can create a wear pattern and identify it, the material used to create the observable edge damage was often not the only material that could create similar patterning.

By the second half of the twentieth century, both Tringham and Ranere were replicating use-wear patterns on a large scale with several variables factored in to aid in determining utilization patterning (Olausson 1980). Shortly after, Keeley and Newcomer began to run accuracy experiments. These experiments were conducted to ensure the conclusions that others in the field were coming to regarding the origins of the use-wear were correct (Newcomer and Keeley 1979). By looking at microwear polish, striations, and edge damage, functional tool uses were able to be determined (Newcomer and Kelley 1979). Time and time again they found that origin of the wear could be accurately determined (Olausson 1980). This series of experiments gave confidence to those who were skeptical of the application of use-wear determination in the real world.

As the science of lithic use-wear has progressed, a wider array of variables was studied. Analysts studied the way tools were used three dimensionally and kinetically, looking at the angle of use, how the tools were held, and under what range of motion the tool was utilized. Inquiries into categories such as action revealed motions such as chopping, sawing, graving, scraping, and planning (Olausson 1980). During this time, the effects of different material types on the lithic tools were examined more closely. Tringham headed myriad experiments thoroughly investigating materials of various hardness (e.g., antler, bone, skin, plants) and determined that under the correct magnification (200x) many material types left very distinct polishes (Olausson 1980; Wilmsen 1968).

The experiments conducted by Tringham and colleagues in which they systematically tested variables such as action, worked material, angle of the edge, and grip with a focus on use-wear patterns were based on micro-flaking rather than abrasion and the formation of striations or polish (Tringham et al. 1974). These tests produced results allowing researchers the ability to determine, with some certainty, how variables enacted upon the utilized tool and what sorts of traces would be left. They were able to conclude that form does follow function in most cases (Tringham et al. 1974). The methodology and results of the experiments conducted by Tringham and colleagues is often still referred to and used today.

Edge angle and edge morphology were also important topics. Olausson (1980) noted that to many, including White in the 1960s and Tringham in the 1970s, the angle of the tool and the shape of the worked tool edge should both factor greatly into the degree of damage a tool will exhibit during use. It was through replicative experiments that it was discovered that certain edge angles were best for certain tasks (Wilmsen 1968) and that the shape of that edge determines where the use affects the tool’s surface (Olausson 1980).

Classification and Typology

The terminology and classification of artifacts can vary from experiment to experiment and report to report. Andrefsky is commonly looked to nowadays as the definitive authority on lithic nomenclature and debitage typologies. For this project, I utilized the definitions laid out by Andrefsky in his 1998 work, *Lithics: Macroscopic Approaches to Analysis.*

For this project, I focused my energies towards determining the use and application of less complex expedient tools. Andrefsky (1998), who largely takes his definitions and typology from Binford, defines expedient tools, also referred to as informal tools, as a stone tool made with little to no production effort. These tools were often used for a single purpose and not retained by the maker for long term use. Expedient tools used in this project encompassed flake tools and unifacially worked flakes. Flake tools were defined as tools produced by using an unmodified edge of a flake, and a unifacial tool is characteristically purposefully pressure flaked along one side to produce a sharp usable edge (Andrefsky 1998).

In his discussions about the Nunamiut, Binford refers to these expedient tools as situational gear which consists of items that are produced for a specific use without forethought but rather as a response to a situation (Binford 1979). Using Binford’s definition of expedient tools, situational gear is not just produced from lithic material sources, but encompasses all tools produced from any material to perform a specific task at the spur of the moment (Binford 1979). For the purposes of this project, the term expedient tools will refer only to those produced from chipped stone.

I further limited this project by using only expedient tools produced on primary flakes, secondary flakes, and biface thinning flakes. Again, using Andrefsky's (1998:253) definition, a biface thinning flake was any flake considered to have been "removed during biface trimming and often contains a striking platform that is rounded or ground, indicating preparation." The primary flake and secondary flake definition subscribed to the triple cortex typology approach. This methodology uses the percentage of cortex remaining on the dorsal side of the flake to determine the order of its removal from the core resulting in primary, secondary, or tertiary categories (Andrefsky 1998). This project continued to utilize the triple cortex typology approach of identification as the original artifact inventory for the CRDA8-Site5 (36GR0418) utilized this method. For continuity in terminology throughout the project, the use of the triple cortex typology approach was sustained.

Further, flake size as a defining characteristic places several restrictions on debitage analysis. By using the size of a flake rather than other defining characteristics, such as the amount of cortex, the reduction stage can be lost (Pecora 2001). Primary flakes result from the initial reduction of a core, while secondary flakes result from the thinning or shaping of the core or tool blank. For the purposes of this project, secondary flakes contained 50 percent cortex or less present on the dorsal surface of the flake and will have been produced for the purpose of thinning a core or tool for use. Using this model, primary flakes by comparison contained 50 percent cortex or more present on the dorsal surface, and tertiary flakes have no cortex (Sullivan and Rozen 1985). By placing limitations on flake typology in the way of specific characteristics, future researchers will be more apt to successfully recreate similarly typed assemblage (Sullivan and Rozen 1989).

Action refers to the movement of the tool against the material being worked. This includes both the direction of the tool edge and the angle of the edge in relation to the worked material (Tringham et al. 1974). Action also includes the grip, referring to whether the tool is hand held or hafted, and the amount of pressure applied to the tool when it is in contact with the worked material. Direction can refer to unidirectional cutting, bidirectional sawing, planning/scraping, and boring (Tringham el at 1974).

It is important to note the distinction between use-wear and edge damage. Keeley (1980) and Whittaker (1994) do not distinguish between the two terms and use them interchangeably, while Odell (2003) appears to solely use the term use-wear and Moss (1983) defines edge damage as the environmental changes to the morphology of a flake. Regardless of which term is chosen, use-wear or edge damage, the concept of utilizing macroscopic means to determine tool function is a useful one for analysis. It has been proven that results collected from the macroscopic analysis can be supported by the use of microscopic means and/or aid in the determination of a polish’s or striation’s origin (Moss 1983).

In Glauberman's report completed for a site within the neighboring watershed to CRDA8-Site5 (36GR0418) entitled, *The Prosperity Site (36WH1408): Macroscopic Edge Damage (Use-Wear) Analysis,* he recognizes a difference between the two terms; however, noting the majority of the artifacts were collected from the surface or from a plowzone context he determined that most of the edges in his study would exhibit both use-wear and edge damage (Davis 2007; Glauberman 2007). This led him to use the term to encompass both wear types associated with both use and environmental damage. For the purposes of this project, use-wear refers to wear caused by human use and edge damage refers to all wear on the edges of the artifacts not necessarily associated with human use. CRDA8-Site5 (36GR0418) is a stratified site with an artifact bearing layer below the plowzone. While some natural edge damage is expected, it is believed that most edges exhibiting signs of wear will be due to use.

What Is Use-Wear Analysis?

Use-wear can primarily be detected in the form of micro-flaking/flake scars and scratches/micro abrasion produced on the edge of a tool due to use (Lawrence 1979). These scratches and micro-flaking patterns can be observed at low magnifications and can impart information such as the direction of use and the hardness or softness of material on which the tool was utilized (Whittaker 1994). Use-wear action can be described by occurring from two primary movements: perpendicular movement and parallel movement (Lawrence 1979).

If a tool is held perpendicular to the material it is working, which includes movements such as scraping, it will result in micro-flaking in a perpendicular arrangement to the used edge. If the scraper only has pressure applied during one direction of use, the micro-flaking will usually only occur on one side. Conversely, if the tool has pressure applied while being used in more than one direction, the tool will exhibit micro-flaking on both faces (Lawrence 1979). Additionally, if a tool is held parallel to the material it is working, which includes movements such as cutting, the micro-flaking will appear on both sides of the tool and be developed alongside or parallel to the cutting edge (Lawrence 1979).

The hardness or softness of the material being worked by the expedient tool can also alter the evidence of use. Softer materials are said to cause more polish and less flaking damage while harder materials show a more abrasive wear to the tools (Lawrence 1979). For example, phytoliths often leave a distinctive polish on tools used to process plant products. The sheen caused by the silica from flora produces a distinctive wear pattern on the edges of utilized tools (Kamminga 1979). Conversely, abrasive smoothing can be attributed to an array of different materials. Abrasive smoothing most often is exhibited through striations, edge rounding, and edge beveling and can be caused by both sands and mineral particles coming into contact with the tool after it is buried, as well as abrasive particles produced by the tool during its use (Kamminga 1979). Linear gouges or striations are not the only attribute that can be produced by environmental agents and human tool use; attributes like polish can appear from both as well (Del Bene 1979).

Two groupings of experimenters, Odell and Odell-Vereecken (1980) and Tringham and colleagues (1974) ran several experiments to determine the accuracy and validity of macroscopic use-wear analysis. The material hardness scale produced from this series of tests has remained a standard and includes the following five (5) categories: soft, soft to medium, medium, medium to hard, and hard (Odell and Odell-Vereecken 1980; Tringham et al. 1974). Materials that fall in the soft category include hide, flesh, muscle, and plant materials while materials that fall in the hard category include antler and hardwoods (Odell and Odell-Vereecken 1980; Tringham et al. 1974).

The amount of tool surface area available to utilize will also affect the appearance of the edge. Smaller, more concentrated use areas will condense the force of action and cause conchoidal flaking at the site of impact. Alternatively, a broad use area will spread the force of action across a greater area and result in a bending initiation break which terminates on the side of the tool furthest from the force of the action (Lawrence 1979). Edges are often described as being within one of four categories: straight, concave, convex, or complicated (Keeley 1980).

While edge angle does not automatically equate to a specific function, some general angle sets can be useful to determine where to begin looking for a task. Wilmsen (1968) suggests that acute angles (26 to 35 degrees) may imply cutting, while an angle between 35 and 45 degrees may suggest a whittling activity. It is, however the 45 to 56-degree angle grouping that is appropriate for many functions, including hide scraping, plant fiber shredding, and the cutting of bone (Wilmsen 1968). He further suggests that edge angles near 50 degrees are typically classed as side scrapers while those with edge angles ranging from 66 to 75 degrees are often categorized as end scrapers. Some, including Odell (1981), would debate the legitimacy of the correlation between edge angles and their uses in its entirety; however, Wilmsen believes that even if his hypotheses are proven to be false the ideas behind them can still lead to a deeper understanding of site function and tool utilization (Wilmsen 1968). Others, including Fritz (1974), agree with him. In a review of Wilmsen's work on typologies and the development of a group's culture, Fritz agrees that Wilmsen's concepts can be applied to similar cultures and with some development of theory can be utilized for dissimilar cultures as well (Fritz 1974).

Most macroscopic analysis of use-wear does not include magnification to examine microscopic elements, often leaving them overlooked (Odell 2003). Both Odell (2003) and Andrefsky (1998) feel that macroscopic examination of use-wear has limits but can aid in the determination of relative hardness of the material worked. Keeley devised seven (7) groupings for use-wear patterns that can be viewed macroscopically. These categories include: Large Deep Scalar (scale-shaped) Scars, Small Deep Scalar Scars, Large Shallow Scalar Scars, Small Shallow Scalar Scars, Large Stepped Scars, Small Stepped Scars, and Half-Moon Breakages (Keeley 1980:24). Micro-flaking on expedient tools within this project will be examined using the descriptions.

Categories used by Keeley (1980) for flake scar patterning as well as categories used by Tringham and colleagues (1974) and Odell and Odell-Vereecken (1980) for material hardness can then be logically combined in chart form to represent a reference of possible materials used to produce specific patterning at each level of relative hardness (Table 3; Davis et al. 2012).

Table 3

Micro-Flake Patterning and Relative Hardness

Material Worked (Relative Hardness)	Approximate Micro-Flake Pattern Type(s)	Possible Specific Material
Soft	Small Deep Scalar, Large Deep Scalar	Meat, Skin, Fat, Soft Vegetal Substances (e.g. Tubers, Stalks, Leaves)
Soft to Medium	Large Deep Scalar, Large Shallow Scalar, Small Deep Scalar, possibly some Stepped	Soft Woods (Conifers), Fresh Stalks
Medium	Large Deep Scalar, Large Shallow Scalar, Small Deep Scalar, Large or Small Stepped	Hard Woods (e.g. Oak), Soaked Antler and Bone
Medium to Hard	Large Deep Scalar, Large or Small Stepped, Small Deep Scalar	Hard Woods, Soaked Antler and Bone, Fresh Antler and Bone
Hard	Large Stepped, Small Stepped, few Large and Small Scalar	Antler and Bone (Dried), Some Dry Hard Woods

While there is the opportunity for micro-flaking and flake scar patterning to overlap across the different groupings of contact materials, according to Keeley (1980) the most effective way to mitigate like results is to experiment with a variety of actions on a variety of materials. Keeley also suggests that experiments should take place in natural settings to ensure the results are as close to those patterns produced on precontact implements as possible (Keeley 1980:9).

Debates and Disagreements

Many disputes were due to the lack of standardized definitions. Use-wear pioneers, including Olausson, Hayden, Kamminga, and Gould, felt that standard descriptions are imperative to the clarity of discussions about use-wear (Olausson 1980). Debates were sparked due to the misinterpretations of meanings and began to detract from moving the field forward (Olausson 1980). It has been noted that without standard descriptions and definitions, there is confusion about what results mean. While pigeonholes can seem to be extreme at points, unilaterally using a singular use-wear typology classification can drastically cut down on misinterpreted data (Whittaker 1994).

Odell (1981), through the exploration of ethnographic example, has determined that in many parts of the world the relationship between form and function is non-existent. He finds that, in most cases, the typology developed in a specific area is functionally irrelevant when attempting to classify some tools. Originally, Odell believed use-wear had the ability to reliably determine use when macroscopic and microscopic means are employed along with experimental blind tests (Odell 1981). Later, in his book *Lithic Analysis: Manuals in Archaeological Method,* Odell changes course and describes the results of replicative studies into the accuracy of use-wear function as “uniformly disappointing” and “an analytical approach that is not strong enough to be employed” (Odell 2003:140). He devotes only enough page space in his book to explain why he will not go into any further detail on the topic.

Some, including Odell, feel that the idea of using macroscopic means to study use-wear was counterproductive, subjective and full of observer error (Whittaker 1994);

however, Andrefsky (1998) notes that while macroscopy is not as reliable as microscopic techniques in examination, it is useful to identify characteristics such as relative material hardness and working edge angles. Keeley (1980), like Andrefsky, agrees that while there is room for error, to aid in the identification of a culture's primary economic activities, all avenues must be explored. This includes both micro and macro wear analysis.

Frison feels that the lack of definitive correlation between use-wear and specific task has not been realized, thus compromising the dependability of using flake tools as evidence of site function (Frison 1979). The model of using use-wear analysis on chipped stone tools to determine site function also does not account for increasingly perishable tool types, such as those made from bone (Frison 1979). Further, he feels that the discarded tool may appear very different than when it was originally used due to retouch and use and finds it within the realm of possibility that we could very well be drawing conclusions about the function of tools that were discarded in a non-functioning condition, thus hiding their true purpose from us (Frison 1968).

Likewise, Tringham has stated that through myriad use-wear studies it has been shown that form does not follow function where expedient tools are concerned. Attributes used to normally determine a tool's function without micro or macro wear analysis are nonexistent when typing expedient tools (Tringham et al. 1974). Binford, weighing in on the form versus function debate, concludes that some tools are manufactured, used, and discarded based on immediate need. These "function oriented" tools are not "future oriented" and therefore cannot be placed under the normative umbrella of a tool assemblage (Binford 1979). These expedient tools, made to be used and tossed away, will not take a predictable shape and an array of variability will be observed (Binford 1979). The form versus function issue means that site function based on expedient tools without microscopic or macroscopic wear analysis is currently very unreliable. The process as it stands would be open to observer bias and lack categorization based on data.

Human interaction is not the only agency that can create use-wear patterns on chipped stone tools. While not created from actual use, the patterns exhibited by outside forces, such as geologic agents (i.e., frost and water), chemicals in the soil, agriculture; plowing, and trampling can either produce or destroy evidence of use-wear (McBrearty et al. 1998; Whittaker 1994). Post depositional forces can add edge damage to an already utilized edge (Moss 1983). Moss conducted several studies focused on edge damage, including one that was based on drop height and another on the effects of a plow on the damage of a utilized edge. She found that all stages of an artifact’s life (manufacture, use, curation, deposition, and post-deposition) can be subjected to factors that result in edge damage (Moss 1983).

Studies have also been conducted on the effects of the trampling of lithic artifacts and show that, just as human trampling can diminish the appearance of use-wear on an artifact, animal trampling can create it (McBrearty et al. 1998). McBrearty and her team used the experiment to determine features, or characteristics, to aid in determining whether edge damage is due to non-human agency or human agency use-wear, including: the length, shape, and location of flake scars; abrasion caused by mechanical damage; and abrupt retouch thickness (McBrearty et al. 1998). Most notably, soil type played a large role in the type and frequency of edge damaged caused by non-human agency. Knowing how sediment grain size can affect wear on artifacts can aid in the determination of macroscopic use-wear versus edge damage (McBrearty et al. 1998).

Chapter 4: CRDA8-Site5 (36GR0418) Background

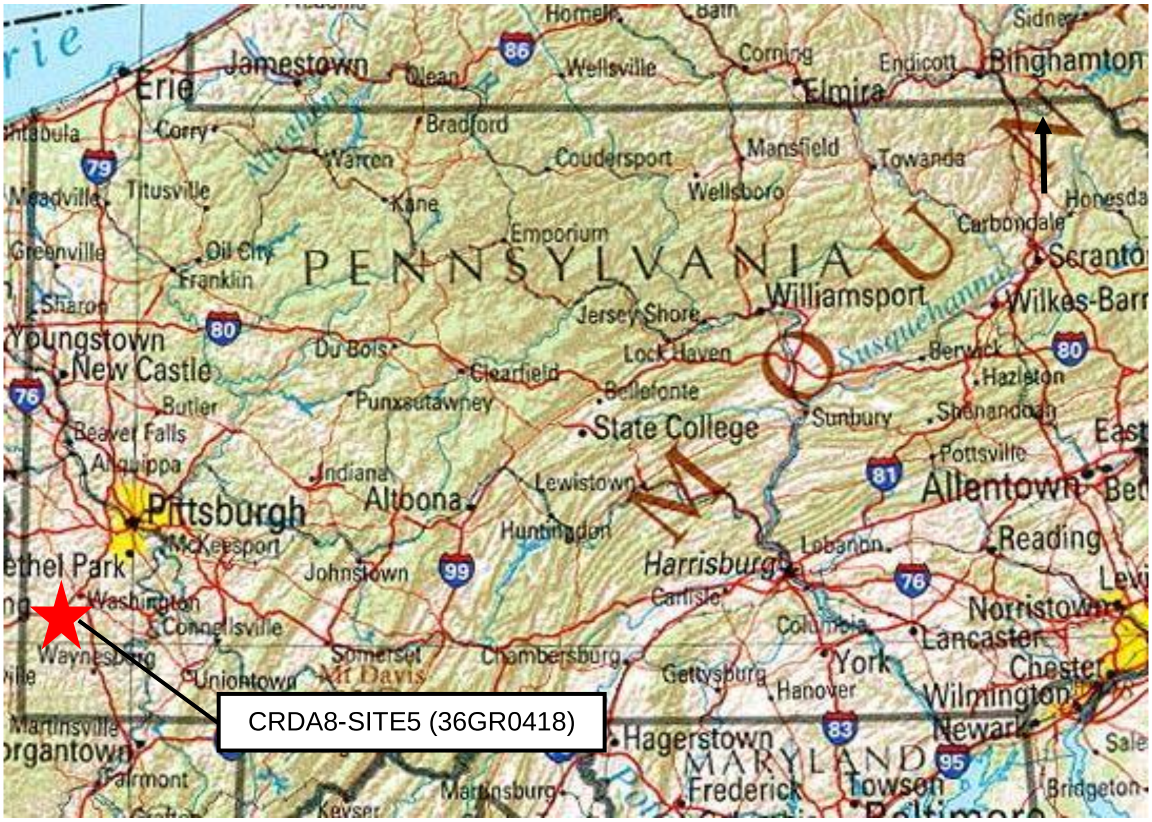
Beginning in the spring of 2013, as a result of the phase I archaeological compliance survey conducted by Christine Davis Consultants, Inc. (CDC) for the Bailey Central Mine Complex Coal Refuse Disposal Area (CRDA) 8 and Utilities Corridor in Morris and Richhill Townships, Greene County, Pennsylvania, a total of 23 archaeological sites were documented, including 19 newly identified sites and three re-identified sites (Davis 2014a). At the close of the phase I archaeological survey, five of the 23 sites encountered were potentially eligible for the National Register of Historic Places (NRHP) and further examined at the phase II archaeological survey level the following summer (Davis 2014b). One of the five sites recommended for a phase II archaeological survey was CRDA8-Site5 (36GR0418).

CRDA8-Site5 (36GR0418) was discovered during the phase I archaeological survey through systematic shovel testing with shovel test probes (STPs) conducted at 15 m intervals (Davis 2014a). Supplemental STPs were then conducted around the positive STPs to define the site boundaries and aid in the determination of site eligibility. The phase II archaeological survey methodology for the site involved the surface collection and the mechanical stripping of the plowzone (Ap soil horizon) in 10 m by 10 m blocks (Davis 2014b). The site was plowed and disked and the surface collection was conducted at 5 m intervals after a hard rain. At the close of the phase II archaeological survey for the Bailey Central Mine Complex CRDA 8 and Utilities Corridor project, it was determined that CRDA8-Site5 (36GR0418) and one other site were both considered eligible for the NRHP. Beginning in the fall of 2016 and continuing through spring of

2017, these two sites were further examined via a phase III data recovery which included additional plowzone stripping of 10 m by 10 m blocks, 1 m by 1 m unit excavation, and cultural feature excavations (Davis 2014b). Currently, the information collected during the phase III data recovery is being processed.

At the close of phase I and II archaeological survey investigations, CRDA8-Site5 (36GR0418) was recorded as a multicomponent archaeological site with an Early to Middle Woodland precontact component encompassing approximately 3,220 square (sq) m (34,657 sq feet (ft) or .8 acres (ac)). A historic component also was present; however, during the phase I archaeological survey the historic assemblage was determined to be field scatter or historic litter that was casually deposited over time which lacks depositional and artifactual integrity. The historic assemblage was determined to not contribute to the potential eligibility of the site (Davis 2014a).

CRDA8-Site5 (36GR0418) is located on the T0 terrace associated with Boothe Run and at an elevation of 1,163 ft above sea level (asl) approximately 60 m northeast of Boothe Run Road (S.R. 4014) (Figures 1 through 5). During the phase II archaeological survey, a buried Ab horizon was found to be located beneath the plowzone. Originally thought to be cultural features, it was discovered at the start of the phase II archaeological survey during the mechanical block stripping that the cultural features were artifact bearing topographic high points within a buried Ap horizon (Davis 2014b). The phase II archaeological survey was terminated, and a phase III data recovery was proposed when it was determined that the site was stratified and contained the potential for intact archaeological deposits.



CRDA8-SITE5 (36GR0418)

Figure 1

CRDA8-Site5 (36GR0418) Location (USGS 2001)

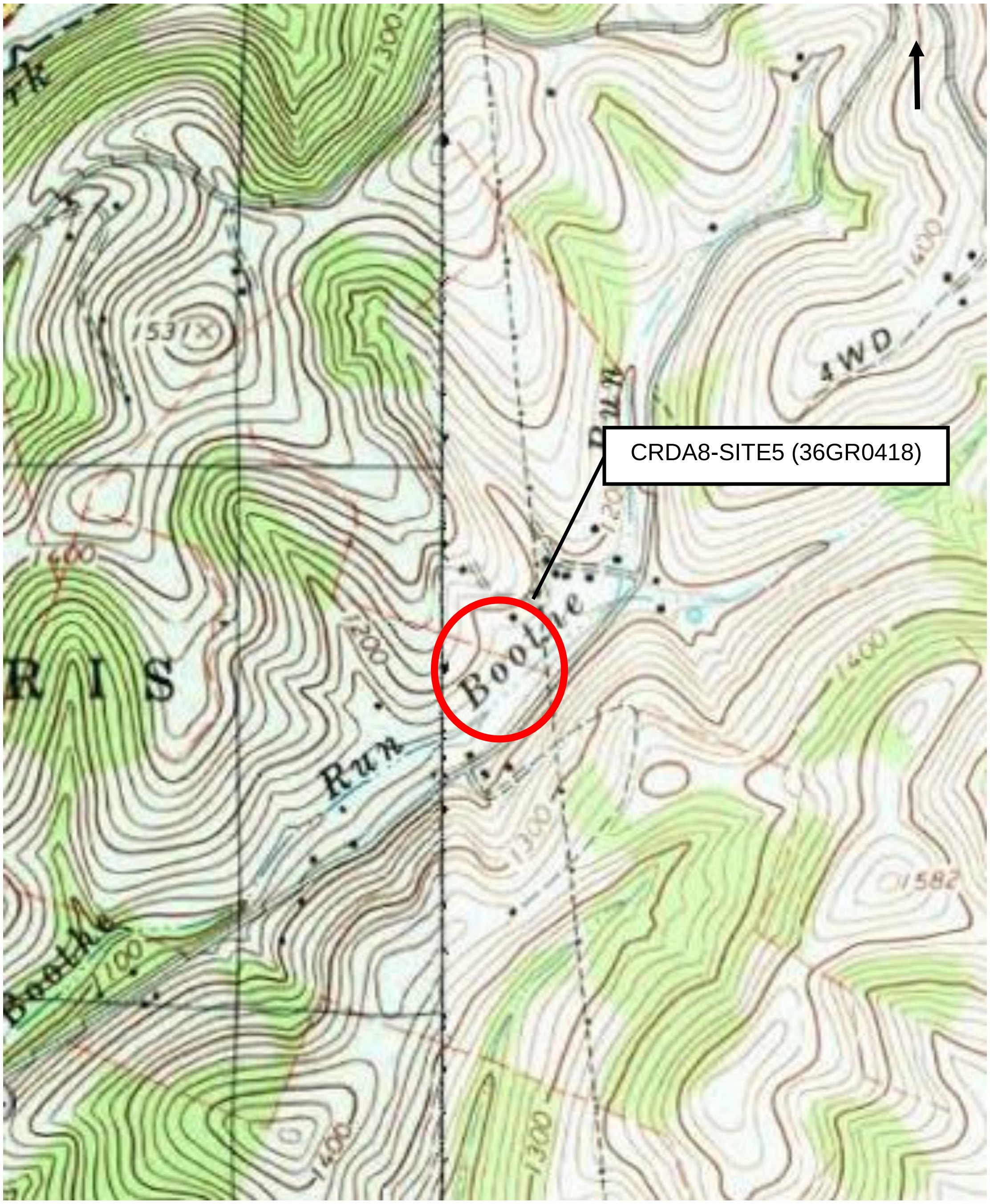


Figure 2

CRDA8-Site5 (36GR0418) Location (Wind Ridge, Rogersville, Claysville, and Prosperity PA 7.5" USGS Quadrangle Maps)

Figure 3

CRDA8-Site5 (36GR0418), looking southeast

Figure 4

CRDA8-Site5 (36GR0418) during surface collection, looking southeast

Figure 5

CRDA8-Site5 (36GR0418) during mechanical block stripping, looking southeast

A significant amount of data was processed to determine if there were any activity areas and if the site would remain a general lithic reduction site or if settlement patterns could have been established to further the site function determination. The artifact inventory for all three phases of the archaeological survey and data recovery consists of a total of 2,579 artifacts, including 2,442 precontact artifacts and 137 historic artifacts. All artifacts were recovered from positive STPs, the surface collection, stripped areas (SAs), 1 m by 1 m units, and cultural features. The precontact assemblage consisted of lithic debitage; lithic tool forms; PGP; and fire cracked rock (FCR); no precontact ceramics or other artifact types were recovered.

The conclusions within the phase III data recovery report for the CRDA8- Site5 (36GR0418) were that it functioned as an Early, Middle, and Late Woodland lithic reduction and tool production locus based on the recovery of abundant debitage and an array of chipped stone tool types at various stages of production. The site chronology was determined by 16 diagnostic projectile points. These points included: one Early Woodland Forest notched point, one Middle Woodland untyped point, and one Middle Woodland Lowe Flared Base side notched point were recovered along with 15 Late Woodland projectile points, including two Raccoon Creek side-notched points, six Kiski side-notched points, and five Backstrum points. An additional four projectile points were recovered but were too fractured to determine type (Davis 2018).

A total of 132 tools in 11 different forms were recovered from the site during the excavations and are presented in Table 4. Expedient tools were by far the most frequent chipped stone tool form found on the site and made up nearly half the tool type total at 41.7 percent (n = 55). During the phase I and II archaeological surveys, only three PGPs were recovered and marked the only worked precontact artifacts recovered outside the chipped stone lithic category. With the addition of several PGP tools in the phase III data recovery, bringing the total to 14 PGP tools, the site function had the potential to expand from solely a lithic reduction site to some form of processing site dependent on further use-wear analysis of the expedient tools.

Table 4

Chipped Stone Tools Recovered from CRDA8-Site5 (36GR0418)

CRDA8-Site5 (36GR0418)		
Artifact Types	**#**	**%**
biface	9	6.82
biface preform	11	8.33
bifacial tool fragment	10	7.58
bladelet	5	3.79
drill	1	0.76
flake knife	6	4.55
knife	1	0.76
point	21	15.91
preform	10	7.58
scraper	3	2.27
expedient tools	55	41.67
Total	**132**	**100**

Chapter 5: Research Design

Research Questions

Currently within Subbasin 20, Watershed E of the Ohio River Drainage System there are a total of 160 previously recorded archaeological sites dating within the Woodland period. Of these 160 Woodland sites, 81 sites (50.6 percent) fall into the categories of unknown site function with a radius of greater than 20 m (n = 6), open precontact sites with an unknown function (n = 65), and general lithic reduction sites (n = 10) (PHMC 2017a). The CRDA8-Site5 (36GR0418) has been placed into the general lithic reduction site category. Through this project, I aimed to answer the following questions:

- What new information about site function can be learned by conducting a macroscopic use-wear analysis on utilized flake tools from CRDA8-Site5 (36GR0418)?
- With additional lithic analysis, can a specific site function be applied to CRDA8-Site5 (36GR0418)?
- How do the inferred functions of the few groundstone tools recovered from the site compare to activities suggested by the chipped stone tools at CRDA8-Site5 (36GR0418)?

Methodology

The project took place in two phases: production and study of the experimental expedient tools and study of a sample of the expedient tools recovered from the CRDA8-Site5 (36GR0418).

Production **and study of the experimental expedient tools**. Once local chert material was procured it was knapped into expedient tool forms like those found on CRDA8- Site5 (36GR0418). They were then examined under a Flexzion 3rd Helping Hand Magnifier Tool with 3.5x and 12X magnification, an LED light 20x handheld magnifying glass, and a 100x Kena 3-in1 Digital Microscope to record the original flake shape and edge appearance prior to use using EduCam Plus software, version 202. Photographs of the unused flakes were taken using 100x Kena 3-in1 Digital Microscope and was lit using two Smith-Victor 10-inch photoflood lamps with 1600 lumen/2700K bulbs. Measurements before use were taken using a standard set of dialMax Swiss Precision 6"/ .1 mm poly calipers and included original length, width, and thickness of each flake. Any edge damage before use was also noted. The weight of each flake was taken using a digital scale, calculating weight in grams to the hundredth decimal place. In addition, the flake outlines were traced before their initial use and subsequently after each use to show the outline and attrition in a comparable 1:1 scale (Appendix A). The working edge was measured using a goniometer in degrees prior to their initial use and subsequently after each use to show how the edge has been modified.

The flakes were then worked using a controlled series of angles, motions, and on various material types. The experimental expedient tools were used on a total of 12 contact materials in an effort acquire different use patterns on materials of varying hardness and included: a local hard wood, a local soft wood, soaked bone, dry bone, fresh hide, rawhide, tanned leather, fresh meat, dried meat, sandstone, and two local plant material types utilized as food or for textile material during the Middle and Late

Woodland periods in Western Pennsylvania. Local plant types both available for to be utilized during the experimental portion of this project and utilized during the Middle and Late Woodland periods in Western Pennsylvania included goosefoot (*Chenopodium berlandieri* ssp. *Jonesianum)* for the dryland plant and cattails (*Typha angustifolia)* wetland plants, (McConaughy 2008). These materials provided soft and hard materials in which to apply both cutting/slicing and scraping motions. The materials were worked with both cutting/slicing and scraping motions at intervals of 50 strokes, 750 strokes, and 1,500 strokes. Angle of strokes and cuts were recorded as well as the time it took to accomplish the task.

One material type, the sandstone, was worked with a haphazard circular motion rather than a cutting or scraping motion. As a result of sandstone PGP artifacts being the only artifact type recovered from the site aside from chipped stone artifacts, the use-wear pattern created from contact between Tenmile chert and sandstone was determined to be of interest. Sandstone was added to the list on contact materials in the event any of the precontact artifact edges had come into contact with sandstone. A haphazard circular motion was chosen to replicate the behavior of the chipped stone lithic tool coming into contact with sandstone mistakenly while performing the tools intended task. Both the contact material and the use motion are meant to represent unintentional contact with the tool.

The experiment resulted in the production of a total of 23 experimental expedient tools. These tools were measured, recorded, and photographed before and after each of the three separate stroke intervals were performed. The information gathered from these 23 expedient tools was the baseline dataset for comparison with the precontact artifacts.

After each of the three stroke intervals (50, 750, and 1,500), the expedient tools were hand washed with hydrogen peroxide, followed by soap and water, dried, and placed into a bag with all information acquired during the use stage provided until analysis for that stroke interval was completed. Photographs of the use-wear was taken with EduCam Plus software, version 202 using the digital microscope and lit with the photoflood lamps was used as a baseline for use-wear identification. Measurements were taken again with the calipers and included length, width, thickness, and weight to compare the amount of attrition due to use. Measurements were also taken of the length of the used edge, the length and width of the flakes scars, the thickness of the utilized edge, and change in working edge angle. The type of flake scarring (i.e. feather termination, hinge termination, or step termination) was recorded along with the shape of the edge (i.e. straight, convex, concave, or complex). All information was recorded in a Microsoft Excel spreadsheet (Appendix B).

Study of chipped stone tools recovered from the CRDA8-Site5 (36GR0418). The 55 artifacts classified as expedient tools from CRDA8-Site5 (36GR0418) were first examined for patterned use-wear to determine human interaction and tool use versus environmental edge damage. Next, a sample of 35 expedient tools was randomly selected from the collection using a random number generator and examined.

For consistency, they were then examined with the same equipment as the experimental tools were—with a Flexzion 3rd Helping Hand Magnifier Tool with 3.5x and 12X magnification, an LED light 20x handheld magnifying glass, a 100x Kena 3-in1 Digital Microscope. Photographs of the use-wear were taken using the digital microscope with EduCam Plus software, version 202 and lit with the photoflood lamps.

Measurements taken with the calipers included length, width, and thickness of the flake. Measurements were also taken of the length of the used edge, the length and width of the flakes scars, and the thickness of the utilized edge. The type of flake scarring (i.e. feather termination, hinge termination, or step termination) was recorded along with the shape of the edge (i.e. straight, convex, concave, or complex).

Once all the information was recorded in an Excel spreadsheet, the two collections were compared using a series of statistical tests to examine similarities in the use-wear of both the experimental expedient tools and the precontact collection. The results were compared statistically to determine if there were any significant similarities or differences that can be used to interpret the archaeological sample based on patterns present in the experimental sample. Statistical tests varied depending on the nature of the data.

These precontact tool forms had their flake scar patterning compared using Table 2, which represents a reference of possible materials used to produce specific patterning at each level of relative hardness following categories used by Keeley (1980) for flake scar patterning in conjunction with the categories outlined by Tringham and colleagues (1974) and Odell and Odell-Vereecken (1980) for material hardness.

By utilizing both statistical data and Table 2 to determine what contact materials the chipped stone tools from CRDA8-Site5 (36GR0418) were likely being used on and comparing them to the use-wear patterns of the known baseline experimental expedient tool collection, a specific site function may be determined and the current interpretation of lithic data used to determine site function can be adequately evaluated.

Chapter 6: Results

Results of the Production and Study of the Experimental Expedient Tools

On their lunch breaks, several members of the CDC field crew hiked the neighboring area surrounding the site to procure cobbles and cores of lithic raw material to be brought back and knapped into the experimental expedient tools. By using a river cobble as a hammerstone, I knocked the flakes to be used as the expedient tools from the cores of Tenmile chert. Next, all 13 contact materials were collected and had their material hardness ranked (Table 5; Figures 6 and 7).

Use motion, while controlled, attempted to mimic precontact activities. Four contact material were acted upon in their native environments: hard wood, soft wood, dryland plants, and wetland plants. The cutting motion on the hard and soft woods consisted of the removal of smaller branches that could be used as arrow shafts; the scraping motion on these two materials consisted mostly of debarking and straightening/smoothing the branch in preparation for use as an arrow or spear shaft.

The goosefoot was found growing in an alley near the local co-op and harvested using both cutting and scraping motions in place. The cattails were harvested from within a wetland located in a human-made outwash, under a bridge within an urban area. The cattails were harvested towards the end of their growing season so as not to disturb the habitat and as little of the plant was used as possible. All other materials were able to undergo systematic testing within a controlled environment.

Table 5

Contact Materials

Material Worked	Material Acquired	Hardness	Numerical Hardness (1-5)
Local hard wood	Maple	Medium	3
Local soft wood	Pine	Soft to Medium	2
Soaked bone	White tail deer	Medium to Hard	3
Dry Bone	White tail deer	Medium to Hard	4
Fresh Hide	White tail deer	Soft	1
Rawhide	Whole goat	Medium to Hard	4
Tanned Hide	Lambskin	Medium	3
Fresh Meat	Filet and pork	Soft	1
Dried Meat	Dried meat dog treats	Medium	3
Wetland Plant	Cattails	Soft	1
Dryland Plant	Goosefoot	Soft	1
Sandstone	Sandstone cobble	Hard	5

Figure 6

Human-made wetland area used to harvest cattails

Figure 7

Raw Hide, Tanned Hide, Sandstone, Dried Meat, and Bone contact material

The sandstone and deer bones were collected from a stream bed and a local park, respectively. The fresh white tail deer hide was donated to the project by a friend who hunts while the tanned hide and raw hide were both purchased from an online store that sold naturally processed animal skins. The tanned hide was made from lambskin and the raw hide was made from goat. While I had access to fresh game hide, there was no access to fresh game meat. A steak filet was used for the first 750 strokes for both cutting and scraping motions but it was quickly determined it would not retain its consistency for the duration of the experiment; a pork tenderloin was utilized for the second half of the process. Both the steak filet and the pork tenderloin were purchased from the butcher counter at the local grocery store. The jerky-like dried meat was a dog treat purchased from a local grocery store.

One material, sandstone, was utilized in a haphazard circular motion meant to represent the sandstone's unintentional contact with the chipped stone tool. Due to the nature of the movement, the motion was achieved by hafting the expedient tool to a groundhog jaw bone with electrical tape. This allowed the tool to be removed from the bone handle quickly to be washed and examined and replaced for the next set of intervals. This represented the only hafted tool.

The test for cutting on the jerky-like dried meat dog treats was run twice. This produced a total of 24 experimental expedient tools rather than 23. The original flake chosen for the cutting motion used on dried meat was produced using Onondaga chert. The additional experimental expedient tool was produced using Ten Mile chert and was used to compare how the use wear patterning produced by cutting of dried meat differed on the two different chert types.

Of the 24 flakes created to be used as expedient tools in the replicated portion of the study, they are comprised of 12 utilized biface thinning flakes and 12 utilized secondary flakes. Each expedient tool contained only one utilized edge and each edge was only utilized on one material. Locally available Ten Mile chert was used for 95.83 percent (n = 23) of the replicated expedient tools. The remaining expedient tool was knapped from Onondaga chert.

All information, including length, width, thickness, weight, length of the utilized edge, the length and width of all flake scars, the thickness of the utilized edge, change in working edge angle, and the type of flake scarring was recorded along with the shape of the edge on data sheets and then transferred into a Microsoft Excel spreadsheet after each stroke interval (Appendix C and D).

Upon completion of 1500 strokes, all 24 experimental expedient tools were examined under the Kena 3-in1 Digital Microscope. The caliper tool within the EduCam Plus software, version 202 allowed for the classification and measurement of the length and width of all flake scars, where applicable (Figure 8). The raw data for each flake along with the average length and width for each flake scar type (feather, hinge, and step), as well as the average length and width for the whole flake are presented in Appendix E.

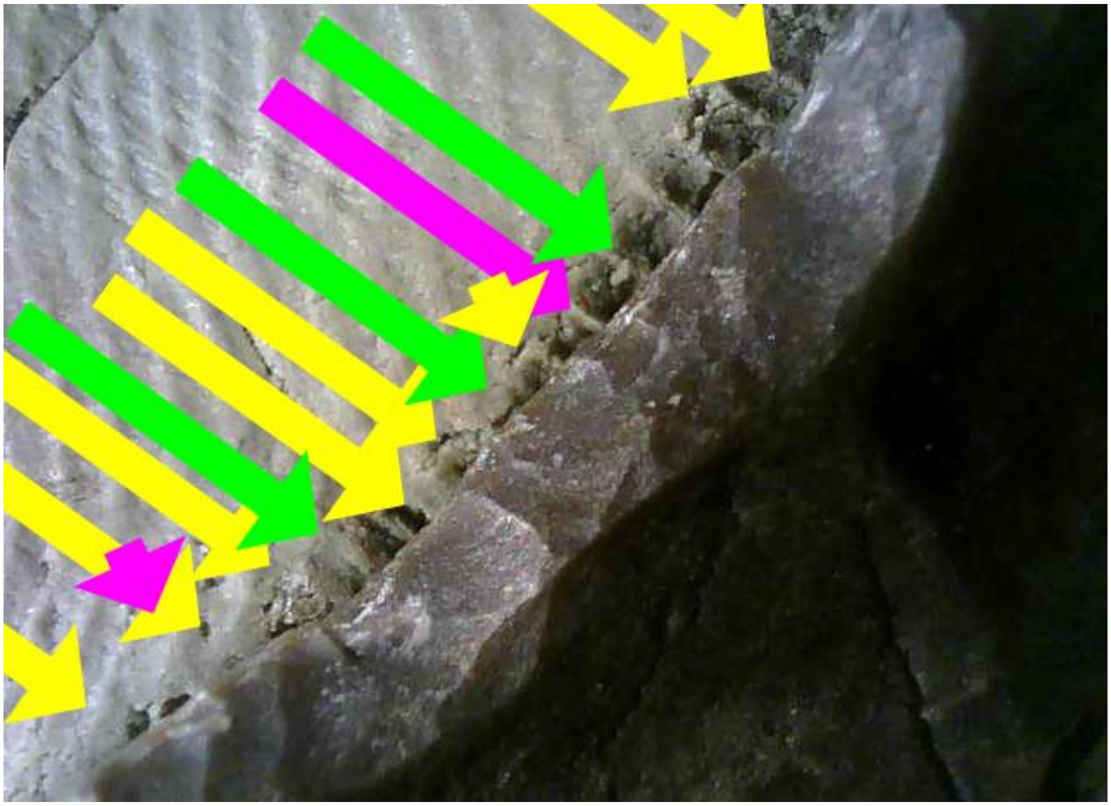


Figure 8

Section of Flake 20: Bone Scrape, Dorsal side under microscope indicating flake scars (Note: Yellow arrows indicate feather termination; Green arrows indicate step terminations; and Pink arrows indicate hinge terminations)

The most common edge morphology within the replicated expedient tool grouping after 1500 strokes was concave (Table 6). The second most common edge morphology was straight with a complex edge being close in frequency. The least common edge morphology was convex. During the 1500 stroke use, only three edges changed morphology. Flake 6: Soft wood/scraping motion, began with a convex edge morphology and ended with a concave morphology. Flake 13: Fresh hide/cutting motion, began with a straight edge morphology and ended with a complex morphology.

Flake 23: Sandstone/drilling motion, began with a complex edge morphology and ended with a convex morphology.

Table 6

Utilized Edge Morphology

Replicated Collection		
Utilized Edge Morphology	**#**	**%**
complex	4	16.67
concave	13	54.17
convex	2	8.32
straight	5	20.83

Several measurements were recorded throughout the process, however, two measurements taken were discovered to be least applicable for use with the precontact collection. Those measurements were weight and edge angle. While both were taken to assist in the visualization of how each tool changed over time with use, they cannot be applied to the precontact collection because the tools have already been used and the data about the tool before it was used cannot be obtained. In addition, these two measurements did not produce consistent results.

The weight of the expedient tools was measured after each use to the hundredth decimal place. The majority of flakes (n = 18; 75 percent) did not experience any weight attrition from the limited amount of use, while five tools experienced a small amount of weight loss, and one tool experienced weight gain (Table 7). All three tools that came into contact with dried meat experienced either weight gain or loss. Both the cutting and the scraping tools knapped from Ten Mile chert lost .03 oz (.85 g) while the cutting tool knapped from Onondaga chert gained .04 oz (1.13 g). Flake 4, which was used to cut hardwood, saw the most attrition with a weight loss of .04 oz (1.13 g). The scraping motion for both wetland plants and dryland plant both saw a loss of .01 oz (.28 g).

Table 7

Weight of Tools Before and After 1500 Strokes

Replicated Collection				
Flake Number	**Material Worked**	**Weight Before in oz (in g)**	**Weight After in oz (in g)**	**Loss/ Gain in oz (in g)**
1	Dried Meat	0.14 (3.97)	0.18 (5.10)	+0.04 (+1.13)
2	Dried Meat	0.07 (1.98)	0.04 (1.13)	-0.03 (-0.85)
4	Hardwood	0.18 (5.10)	0.14 (3.97)	-0.04 (-1.13)
7	Wetland Plant	0.04 (1.13)	0.03 (0.85)	-0.01 (-0.28)
9	Dryland Plant	0.04 (1.13)	0.03 (0.85)	-0.01 (-0.28)
24	Dried Meat	0.14 (3.97)	0.11 (3.12)	-0.03 (-0.85)

The edge angle of each expedient tool was measured using a goniometer at the beginning and subsequently at the end of each stroke interval. Consistency of edge angle degree gain or loss dependent on use motion or use angle could not be determined. Further, consistency of edge angle degree gain or loss dependent on contact material could not be determined. Based on the observed results, the loss or gain of edge angle did not occur consistently based on contact material across the first 3 levels of relative material hardness (Soft, Soft to Medium, and Medium) and/or motion and angle of use. Thus, the loss or gain of edge angle could not be considered a predictable trait dependent on relative material hardness of the material worked across the first 3 levels (Soft, Soft to Medium, and Medium). However, the loss or gain of edge angle did show consistency within the last to levels of relative material hardness worked (Medium to Hard and Hard) (Tables 8 through 12).

Table 8

Edge Angle Before and After on Tools Used Against Soft Materials (Hardness of 1)

Replicated Collection			
Flake Number	**Edge Angle Before in Degrees**	**Edge Angle After in Degrees**	**Edge Angle Loss/Gain**
7	10.5	7	-3.5
8	48.5	50.5	+2
9	10	10.75	+0.75
10	23.75	23.75	0
11	9.75	10.25	+0.5
12	21	22	+1
13	17.5	15	-2.5
14	35.5	39.5	+4
Mean			+0.28

Table 9

Edge Angle Before and After on Tools Used Against Soft to Medium Materials (Hardness of 2)

Replicated Collection			
Flake Number	**Edge Angle Before in Degrees**	**Edge Angle After in Degrees**	**Edge Angle Loss/ Gain**
5	26.25	17.5	-8.75
6	10.25	11.5	+1.25
Mean			-3.75

Table 10

Edge Angle Before and After on Tools Used Against Medium Materials (Hardness of 3)

Replicated Collection			
Flake Number	**Edge Angle Before in Degrees**	**Edge Angle After in Degrees**	**Edge Angle Loss/Gain**
1	30	20.33	-9.67
2	18.5	21.5	+3
3	5.25	5.25	0
4	22.25	20.75	-1.5
15	13.25	18.75	+5.5
16	2	3.75	+1.75
21	3.75	12.25	+8.5
22	41.33	54.5	+13.17
24	20.75	14	-6.75
Mean			+1.56

Table 11

Edge Angle Before and After on Tools Used Against Medium to Hard Materials (Hardness of 4)

Replicated Collection			
Flake Number	**Edge Angle Before in Degrees**	**Edge Angle After in Degrees**	**Edge Angle Loss/Gain**
17	4.5	16.75	+12.25
18	11	13.33	+2.33
19	12.75	34.5	+21.75
20	16.25	35.75	+19.5
Mean			+13.96

Table 12

Edge Angle Before and After on Tools Used Against Hard Materials (Hardness of 5)

Replicated Collection			
Flake Number	**Edge Angle Before in Degrees**	**Edge Angle After in Degrees**	**Edge Angle Loss/Gain**
23	9	22.66	+13.66
Mean			+13.66

In an effort to create expedient tools without bias, a number of flakes were simply struck off a core fragment of chert, placed into a bag, and chosen at random. No forethought was put into use motion and flake shape when assigning flake tools to their contact materials. Although the change in edge angle was measured during the experiment, the task each tool was assigned did not take into account whether the flake morphology would have been better suited for one task or the other. This resulted in cutting tools with steep edge angles that would have been better suited for scraping and vice versa. In addition to the results of the measured data being inconclusive about edge angle and relative material hardness, the desire to create unbiased tool samples created variable results for edge angle morphology. However, the variability that was created by the random selection may not have mimicked the decision-making process practiced by the precontact inhabitants of CRDA8-Site5 and therefore the values that have been recorded did not reflect the functionality similar tools from the site possess.

The length and width of each flake scar was recorded and the average length and width measurement per scar type (feather termination, step termination, and hinge termination), and the average length and width measurement per flake including all scar termination types were calculated (Appendix F).

In all cases but the Medium to Hard (4) hardness, the length and width measurement of all flake scar termination types are on average wider than they are long (Table 13). The average flake scar width and length for all termination types was equal for the relative hardness of 4 (Medium to Hard). Interestingly, the sandstone, which was chosen to represent a relative material hardness of 5 (Hard), simply ground down the edge of the tool and left no flake scarring due to the abrasive nature of the stone (Figure 9).

Table 13

Average Measurement of All Flake Scar Termination Types by Relative Material Hardness

Replicated Collection				
Relative Material Hardness	**Width N value**	**Flake Scar Width in mm (Avg +/- SD)**	**Length N value**	**Flake Scar Length in mm (Avg +/- SD)**
1	118	0.54 +/- 0.46	135	0.42 +/- 0.34
2	58	1.04 +/- 0.72	65	0.8 +/- 0.8
3	183	0.99 +/- 0.65	213	0.68 +/- 0.54
4	82	0.79 +/- 0.57	96	0..78 +/- 0.44
5	0	0	0	0

Figure 9

Flake 23: Sandstone (L to R) 0 Strokes Ventral and 1500 Strokes Ventral

When comparing the average length and width measurement of all flake scar termination types to the averages of each flake scar termination type by relative material hardness, the pattern of flake scars being wider than they are long continues for both feather terminations and hinge terminations but changes slightly for step terminations (Tables 14 through 16). The average width measurement and the average length measurement for both Soft material (1) and Medium to Hard materials (4) are within a couple hundredths of a millimeter (mm) of each other. These two relative hardness levels produce step termination flake scars that are almost as wide as they are long on average.

Table 14

Average Measurement of Feather Termination by Relative Material Hardness

Replicated Collection				
Relative Material Hardness	**Width N value**	**Flake Scar Width in mm (Avg +/- SD)**	**Length N value**	**Flake Scar Length in mm (Avg +/- SD)**
1	188	0.50 +/- 0.49	99	0.37 +/- 0.33
2	45	1.03 +/- 0.78	48	0.70 +/- 0.83
3	108	1.03 +/- 0.70	131	0.59 +/- 0.46
4	39	0.83 +/- 0.59	48	0.88 +/- 0.49
5	0	0	0	0

Table 15

Average Measurement of Step Termination by Relative Material Hardness

Replicated Collection				
Relative Material Hardness	**Width N value**	**Flake Scar Width in mm (Avg +/- SD)**	**Length N value**	**Flake Scar Length in mm (Avg +/- SD)**
1	19	0.57 +/- 0.36	21	0.55 +/- 0.32
2	8	0.81 +/- 0.37	11	1.05 +/- 0.87
3	53	0.92 +/- 0.47	58	0.80 +/- 0.67
4	22	0.81 +/- 0.64	26	0.73 +/- 0.33
5	0	0	0	0

Table 16

Average Measurement of Hinge Termination by Relative Material Hardness

Replicated Collection				
Relative Material Hardness	**Width N value**	**Flake Scar Width in mm (Avg +/- SD)**	**Length N value**	**Flake Scar Length in mm (Avg +/- SD)**
1	10	0.77 +/- .29	15	0.61 +/- 0.39
2	5	1.48 +/- 0.48	6	0.97 +/- 0.41
3	17	1.01 +/- 0.82	19	0.90 +/- 0.51
4	20	0.68 +/- 0.43	22	0.60 +/- 0.37
5	0	0	0	0

After the data were compiled, flake scar length and width measurements were uploaded into the PAST 3.18 program to determine which attributes measured on the experimental flakes were deemed to be significantly different, or functionally diagnostic enough to be applied to the precontact tools to aid in the determination of use. Statistical tests included bivariate plots with 95 percent confidence interval, box and dot plots of median and quartile vales, and one-way ANOVA.

First, bivariate plots were produced at a 95 percent confidence interval to determine if there were individual flakes that had a statistically significant difference of either length or width from the overall flake population. The bivariate plots consisted of all length and width flake scar measurement data excluding flakes with the measurement of zero, and included the average of all flake scars, the average of feather termination flake scars, the average of step termination flake scars, and the average of hinge termination flake scars. Two bivariate plots proved to be the most useful. The average of all flake scars and the average of feather termination flakes scars both showed that the flakes outside the confidence interval fell into two groups (Figure 10). Those above the 95 percent confidence interval were generally used on harder material (hardness 2-4) and those below were generally used on softer materials (hardness 1-3). The flakes falling within the 95 percent confidence interval included both harder and softer materials (hardness 1-4) with no clear grouping of flakes by hardness. This indicates that when precontact artifact edges are compared to the flakes located within the 95 percent confidence interval, other attributes deemed to be significantly different should carry more weight in the determination of the hardness of the contact material.

While this was the general trend, the material hardness of those above or below the confidence interval were exclusive to that area on the plot. The harder materials above the confidence interval on the bivariate plot for the average measurement of all flake scar types included raw hide (4), bone (4), soaked bone (3), dried meat (3), and soft wood (2). The softer materials below the confidence interval on the bivariate plot for the average measurement of all flake scar types included fresh hide (1), fresh meat (1), wetland plants (1), hardwood (3), dried meat (3), and tanned hide (3). The harder materials above the confidence interval on the bivariate plot for the average measurement of feather termination flake scars included raw hide (4), bone (4), soaked bone (3), dried meat (3), soft wood (2), and wetland plant (1). The softer materials below the confidence interval on the bivariate plot for the average measurement of feather termination flake scars included fresh hide (1), wetland plants (1), hard wood (3), soft wood (2), dried meat (3), and tanned hide (3) (Figure 10).

In addition, the flake scar measurements above the confidence interval were generally longer than they were wide (average length 1.05 mm and 0.89 mm wide) while below the confidence interval they were generally wider than they were long (average length .36 mm and .75 mm wide). These length to width ratios indicate that the replicated tools located above the 95 percent confidence interval were generally used on materials that were harder and that the replicated tools located below the 95 percent confidence interval were generally used on materials that were softer.

Box and dot plots were charted to show the median, interquartile range, and outlying measurements to show all ranges for both the length and the width of all flake scars. For these charts, use motion was discarded and all measurements for both use movements were combined. The goal of presenting this information was simply to look at overall trends in frequency data for flake scar length and width in order to identify any samples that were either significantly greater or less than the others. Overall, the box plots did not impart any definitive information about the experimental sample that would be useful to look for in the precontact collection but did confirm what the bivariate plots showed concerning a length and width ratio that was dependent on contact material hardness.

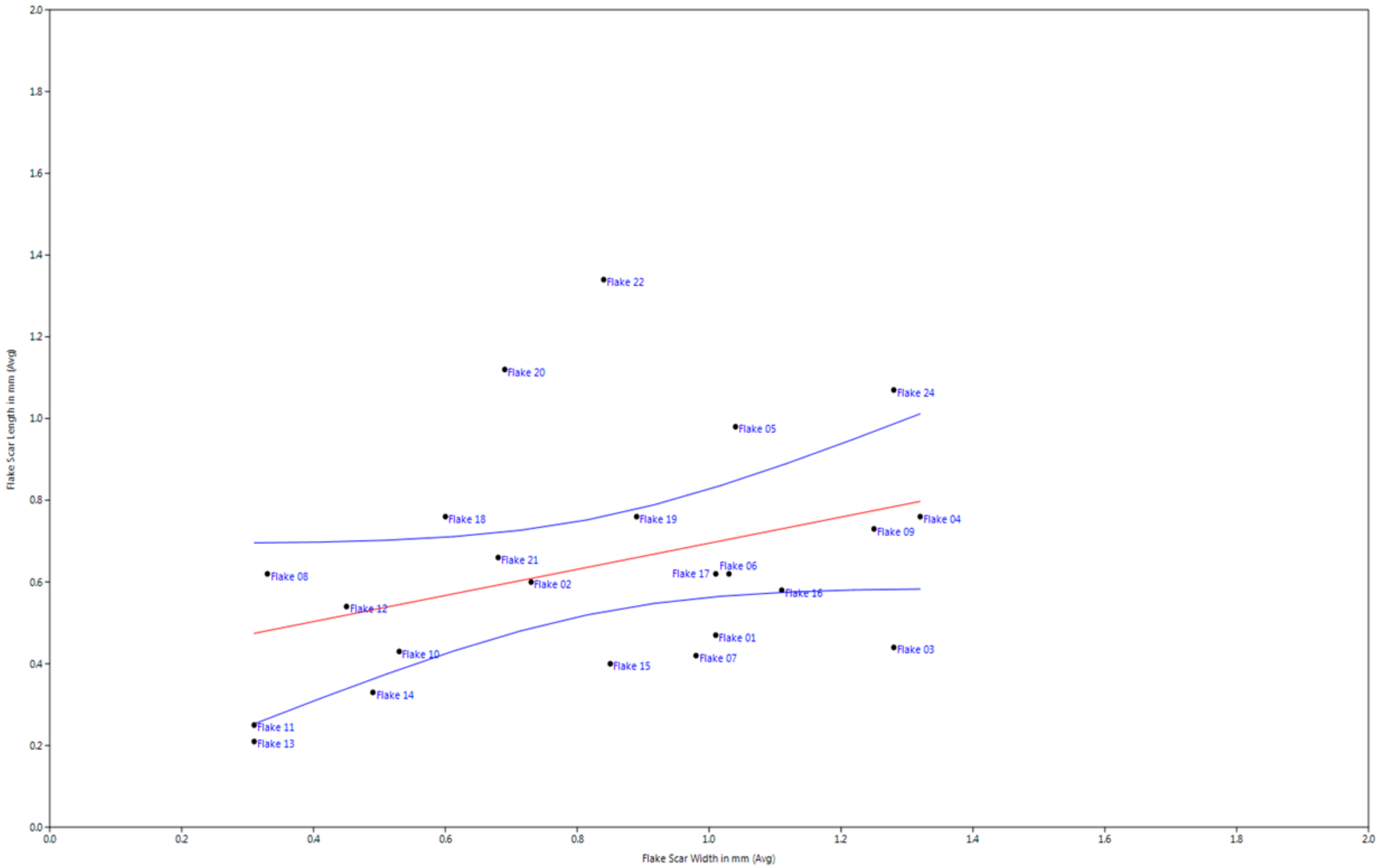
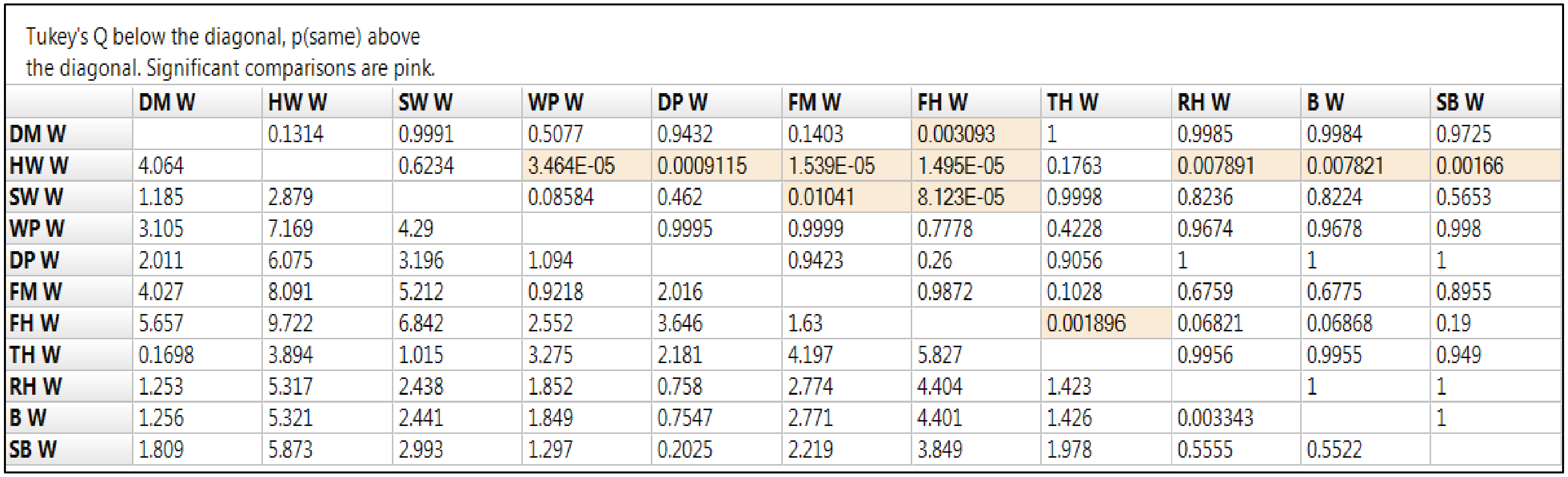


Figure 10

Termination type: All flake scars averaged; linear regression bivariate plot 95 percent confidence interval (Flake 23 removed due to 0 values)

Next, a one-way ANOVA (using Welch’s F test for unique variance) was run with a Tukey’s pairwise comparison for both flake scar length and width with respect to contact material type. The goal of this analysis was to determine if any samples diverged significantly from the others. The one-way ANOVA results for both length and width yielded high F ratios and significant *p* values which points to at least one population being significantly different than the rest. The F ratio was 8.635 for flake scar width and 7.848 for flake scar length. The *p* value was 0.0000000000007 for flake scar width and 0.00000000001 for flake scar length, both indicating extremely significant differences.

The Tukey’s pairwise comparison showed significant statistical differences concerning flake scar length for the bone and soaked bone, and flake scar width for hardwood (Figures 11 and 12, highlighted values). These three contact materials, as well as their relative hardness, were then added to the list of significant indicators to look for when examining the precontact collection.



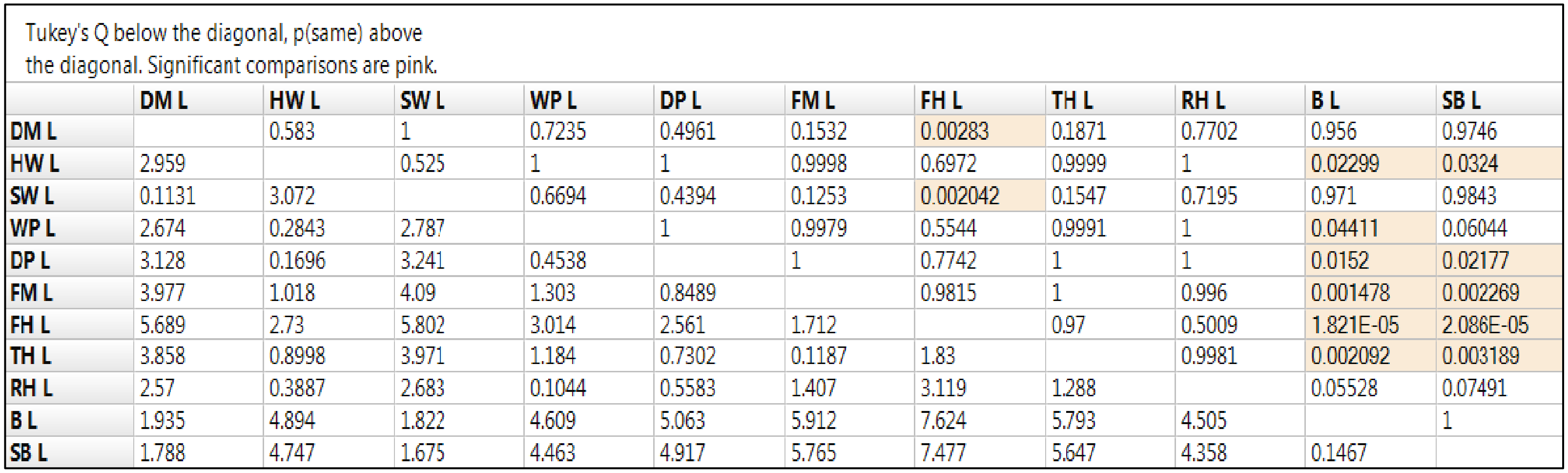
Tukey's Q below the diagonal, p(same) above the diagonal. Significant comparisons are pink.

	DM W	HW W	SW W	WP W	DP W	FM W	FH W	TH W	RH W	B W	SB W
DM W		0.1314	0.9991	0.5077	0.9432	0.1403	0.003093	1	0.9985	0.9984	0.9725
HW W	4.064		0.6234	3.464E-05	0.0009115	1.539E-05	1.495E-05	0.1763	0.007891	0.007821	0.00166
SW W	1.185	2.879		0.08584	0.462	0.01041	8.123E-05	0.9998	0.8236	0.8224	0.5653
WP W	3.105	7.169	4.29		0.9995	0.9999	0.7778	0.4228	0.9674	0.9678	0.998
DP W	2.011	6.075	3.196	1.094		0.9423	0.26	0.9056	1	1	1
FM W	4.027	8.091	5.212	0.9218	2.016		0.9872	0.1028	0.6759	0.6775	0.8955
FH W	5.657	9.722	6.842	2.552	3.646	1.63		0.001896	0.06821	0.06868	0.19
TH W	0.1698	3.894	1.015	3.275	2.181	4.197	5.827		0.9956	0.9955	0.949
RH W	1.253	5.317	2.438	1.852	0.758	2.774	4.404	1.423		1	1
B W	1.256	5.321	2.441	1.849	0.7547	2.771	4.401	1.426	0.003343		1
SB W	1.809	5.873	2.993	1.297	0.2025	2.219	3.849	1.978	0.5555	0.5522	

DM = dried meat; HW = hard wood; SW = soft wood; WP = wetland plant; DP = dryland plant; FM = fresh meat; FH = fresh hide; TH = tanned hide; RH = raw hide; B = bone; SB = soaked bone

Figure 11

Width: Tukey's pairwise comparison



Tukey's Q below the diagonal, p(same) above the diagonal. Significant comparisons are pink.

	DM L	HW L	SW L	WP L	DP L	FM L	FH L	TH L	RH L	B L	SB L
DM L		0.583	1	0.7235	0.4961	0.1532	0.00283	0.1871	0.7702	0.956	0.9746
HW L	2.959		0.525	1	1	0.9998	0.6972	0.9999	1	0.02299	0.0324
SW L	0.1131	3.072		0.6694	0.4394	0.1253	0.002042	0.1547	0.7195	0.971	0.9843
WP L	2.674	0.2843	2.787		1	0.9979	0.5544	0.9991	1	0.04411	0.06044
DP L	3.128	0.1696	3.241	0.4538		1	0.7742	1	1	0.0152	0.02177
FM L	3.977	1.018	4.09	1.303	0.8489		0.9815	1	0.996	0.001478	0.002269
FH L	5.689	2.73	5.802	3.014	2.561	1.712		0.97	0.5009	1.821E-05	2.086E-05
TH L	3.858	0.8998	3.971	1.184	0.7302	0.1187	1.83		0.9981	0.002092	0.003189
RH L	2.57	0.3887	2.683	0.1044	0.5583	1.407	3.119	1.288		0.05528	0.07491
B L	1.935	4.894	1.822	4.609	5.063	5.912	7.624	5.793	4.505		1
SB L	1.788	4.747	1.675	4.463	4.917	5.765	7.477	5.647	4.358	0.1467	

DM = dried meat; HW = hard wood; SW = soft wood; WP = wetland plant; DP = dryland plant; FM = fresh meat; FH = fresh hide; TH = tanned hide; RH = raw hide; B = bone; SB = soaked bone

Figure 12

Length: Tukey's pairwise comparison

Based on the information gathered from all the statistical tests, it appears both the harder contact materials (scraped raw hide [4], scraped bone [4], scraped soaked bone [3], scraped dried meat [3], and cut soft wood [2]) and softer contact materials (cut and scraped fresh hide [1], cut fresh meat [1], cut wetland plants [1], cut hardwood [3], cut dried meat [3], and cut tanned hide [3]) fall outside the 95 percent confidence interval for the sample as a whole. The range of contact materials included within the 95 percent confidence interval bivariate plot includes both harder and softer contact materials as well (scraped wetland plant [1], scraped fresh meat [1], cut and scraped dryland plant [1], scraped soft wood [2], scraped dried meat [3], scraped hard wood [3], scraped tanned hide [3], cut soaked bone [3], cut bone [4], and cut raw hide [4]) (see Figure 10).

Furthermore, the width of the flake scars generated from working hardwood and the length of flakes scars generated from working bone and soaked bone are significantly different (at a 95 percent confidence interval) from most of the remainder of the replicated sample such that they can be used as indicators to potentially identify similar materials worked by the user of the precontact artifacts. While these trends appear consistent, they are not absolute. The crossover between harder and softer materials in areas above, below, and within the 95 percent confidence interval is too great to say the materials, based on hardness alone, will produce one particular kind of flake scar or ratio of flake scar size.

Results of the Study of the Precontact Expedient Tools

During the artifact analysis completed by CDC for all artifacts recovered from the site during the phase I and II archaeological surveys and the phase III data recovery, several chipped stone tool forms including projectile points, point preforms, expedient tools, bifaces, and biface preforms were examined. Points were typed and measured, point preforms were studied to determine if they were diagnostic, and bifaces and biface preforms were grouped by morphology. The examination of the precontact expedient tools recovered from CRDA8-Site5 (36GR0418) began with macroscopic edge angle analysis to determine use-wear and morphology (Davis 2018).

Fifty-five expedient tools in total were recovered from CRDA8-Site5. All expedient tools were examined with a handheld magnifying glass and general morphological measurements were taken with calipers and recorded in centimeters (cm). General measurements included the maximal length of the expedient tool, the length of the expedient tool measured from the point of percussion following the percussion axis to the distal end, the width at the length midpoint, and the thickness at the length and width midpoints. Measurements were taken of the length of the utilized edge or edges. The handheld magnifying glass helped to determine the location of the edge damage and if the flake had scarring on the ventral side, the dorsal side, or both (Davis 2018).

A random number generator was utilized to choose a total of 35 expedient tools from the 55 within the precontact collection from CRDA8-Site5. Since the original set of 55 artifacts was collected based on the location of excavation units and not based on the artifact class, the sample itself does not necessarily represent a random selection of the artifact class. However, by randomly selecting a subsample from within this site sample, the attributes of the subsample can be statistically extrapolated out to the unsampled flake tools at the site (Drennan 2004). Of the 35 expedient tools selected, there was a total of 14 utilized biface thinning flakes and 21 utilized secondary flakes. A flake is defined as utilized if micro-flaking/flake scars and scratches/micro abrasions are produced on the edge of a tool due to human use (Lawrence 1979). From the 35 expedient tools, a total of 51 utilized edges were determined, including 22 flakes containing one utilized edge, 10 flakes containing two utilized edges, and three flakes containing three utilized edges. On CRDA-Site5, the most frequent edge morphology for the randomly selected expedient tools was straight followed by convex. The least common edge morphologies were complex and concave (Table 17).

Of the 35 randomly selected expedient tools, a total of 32 (91.4 percent) were knapped from Ten Mile chert. The remaining three expedient tools were knapped from Onondaga chert (n = 2; 5.71 percent) and Flint Ridge (n = 1; 2.89 percent).

Following the attribute analysis described above, the precontact collection of randomly selected tools was subjected to nearly the same analysis as the replicated collection. The length and width of each edge-damage flake scar was recorded. The average length and width measurement per scar type (feather termination, step termination, and hinge termination) and the average length and width measurement per expedient tool edge, which included all scar termination types, were calculated (Appendix G).

Table 17

Utilized Edge Morphology

CRDA8-Site5 (36GR418)		
Utilized Edge Morphology	**#**	**%**
complex	5	8.97
concave	5	23.08
convex	17	38.46
straight	24	29.49

Examining the average length and width measurement of all flake scar termination types in all cases results in flake scars that are generally wider than they are long (Table 18).

Table 18

Average Measurement of Flake Scars by Termination Types

CRDA8-Site5 (36GR418)				
Termination Type	**Width N Value**	**Flake Scar Width in mm (Avg +/- SD)**	**Length N Value**	**Flake Scar Length in mm (Avg +/- SD)**
All Types	846	1.04 +/- .42	981	.81 +/- .54
Feather	676	1.00 +/- .43	768	.83 +/- .59
Step	102	1.16 +/- .63	128	.96 +/- .87
Hinge	68	1.19 +/- .91	85	.93 +/- .90

The length and width of each individual flake scar was recorded and the average length and width measurement per scar type (feather termination, step termination, and hinge termination) and the average length and width measurement per flake including all scar termination types were calculated (Appendix H).

After the data were compiled, flake scar length and width measurements were uploaded into the PAST 3.18 program. Statistical tests included bivariate plots with 95 percent confidence interval, box and dot plots of median and quartile values, and a hierarchical cluster analysis (UPGMA with a Gower distance measure).

First, bivariate plots were produced at a 95 percent confidence interval to determine if there were individual utilized edges that had a statistically significant difference from the overall utilized edge population. The bivariate plots consisted of all length and width flake scar measurement data excluding flakes with the measurement of zero, and included the average of all flake scars, the average of feather termination flakes scars, the average of step termination flakes scars, and the average of hinge termination flakes scars. The bivariate plot consisting of the average of all flake scars, like the bivariate plot for the replicated collection, showed that the flakes outside the confidence interval fell into two groups (Figure 13). Through analogy, it can be surmised that those edges that were above the 95 percent confidence interval were generally used on harder material (hardness 2-4), those below were generally used on softer materials (hardness 1-3), and those within were used on soft and hard materials (hardness 1-4) (Table 19).

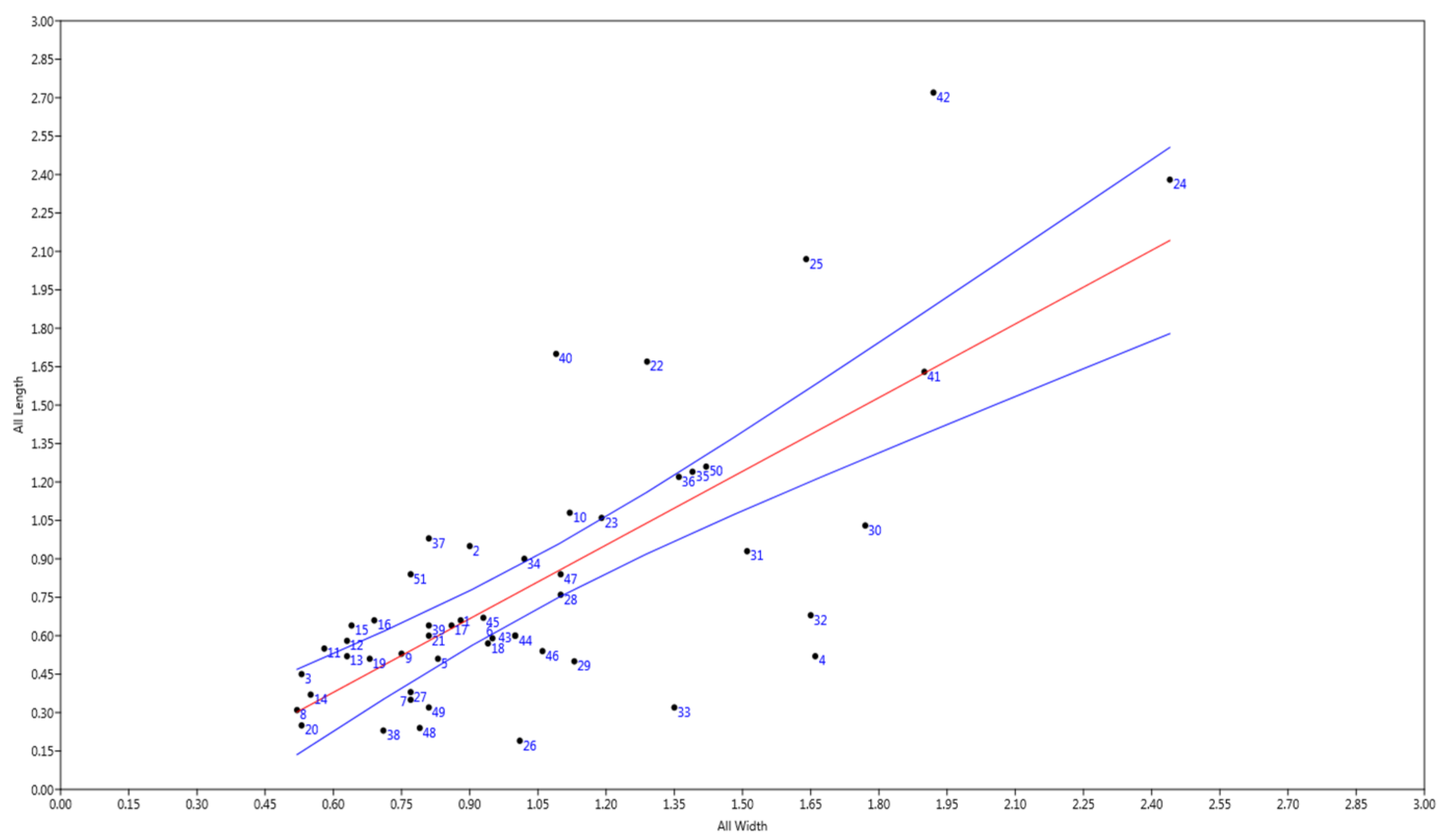


Figure 13

Artifact Edges: All Flake Scars Averaged; Linear Regression Bivariate Plot 95 Percent Confidence Interval

Table 19

Utilized Edges Above, Below, and Within the 95 Percent Confidence Interval

CRDA8-Site5 (36GR418)		
95 Percent Confidence Interval Location	**Utilized Edge Number**	**Relative Hardness**
Above	2, 10, 11, 12, 15, 16, 22, 25, 34, 37, 40, 42, and 51	2-4
Within	1, 3, 5, 8, 9, 13, 14, 17, 19, 20, 21, 23, 24, 28, 35, 36, 39, 41, 45, 47, and 50	1-4
Below	4, 7, 18, 26, 27, 29, 30, 31, 32, 33, 38, 43, 44, 46, 48, and 49	1-3

Box and dot plots were charted to show the median, interquartile range, and outlying measurements to show all ranges for both the average length and the average width of all flake scars (Figures 14 and 15). In the replicated study, the flake scar width measurements for hardwood and the flake scar length measurements for bone and soaked bone were significantly different according to the results of the one-way ANOVA (using Welch’s F test for unequal variance) run with a Tukey’s pairwise comparison. Based on this observation, the flake scar widths recorded on each utilized artifact edge were compared to the flake scar widths recorded on the replicated tools used with the hardwood contact material. Likewise, the flake scar length recorded on each utilized artifact edge was compared to the length of all flake scars recorded on the replicated tools used on soaked bone and bone.

The boxplot for the flake scar width (see Figure 14) indicates that the width of flake scars on several utilized edges from the precontact collection falls below the lower quartile for the replicated hard wood tools. The utilized edges that fall below the lower quartile contain flake scars that are generally narrower than those found on the replicated hard wood tools and include artifact edges 3 and 19. Based on trends indicated on the bivariate plots produced at a 95 percent confidence interval for the average of all flake scars for the replicated tools, artifact edges with a narrower flake scar measurement would indicate that the material it was worked against would have been softer than hard wood.

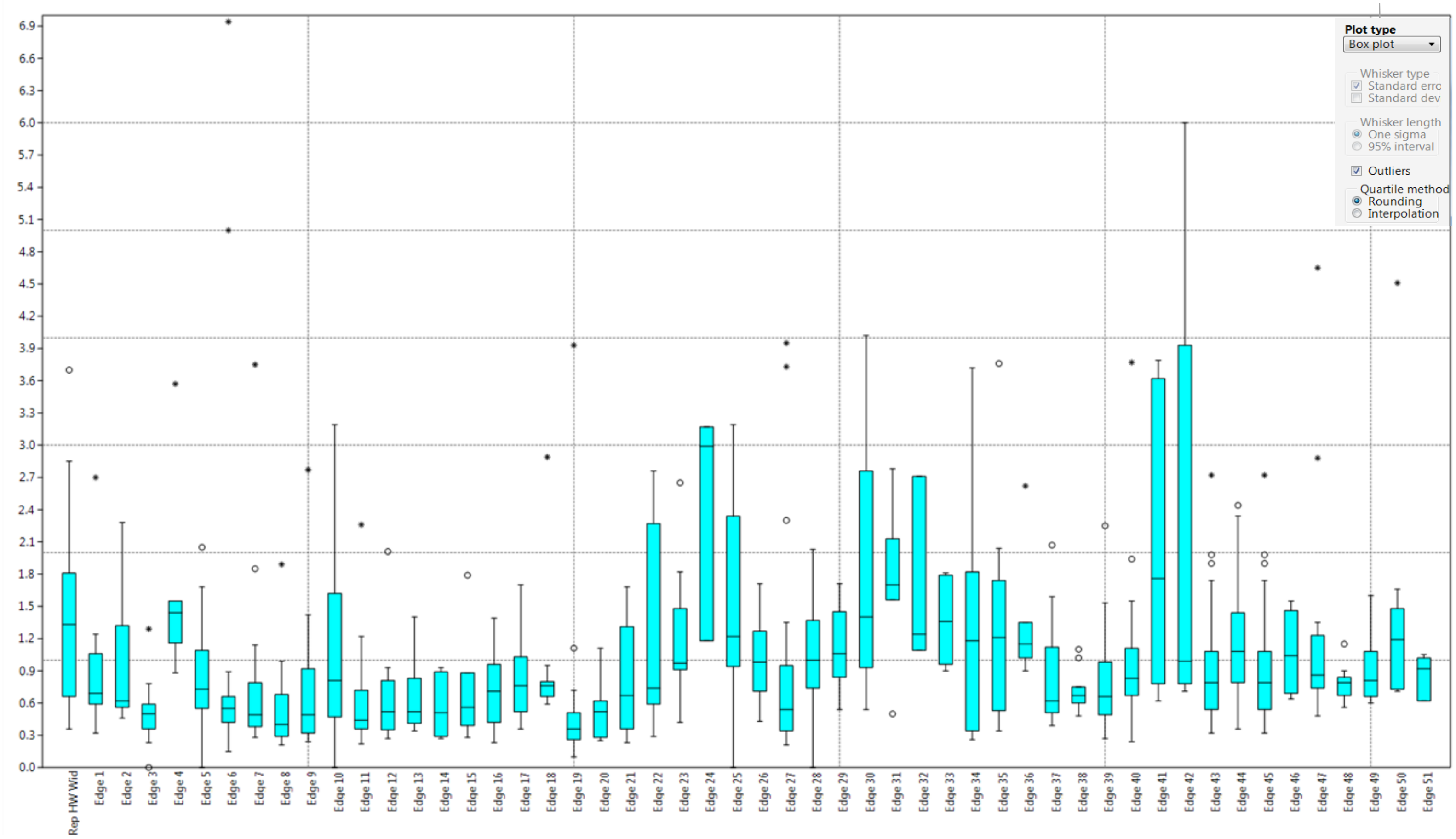


Figure 14

Boxplot of Replicated Hardwood Width Measures Compared with All Artifacts

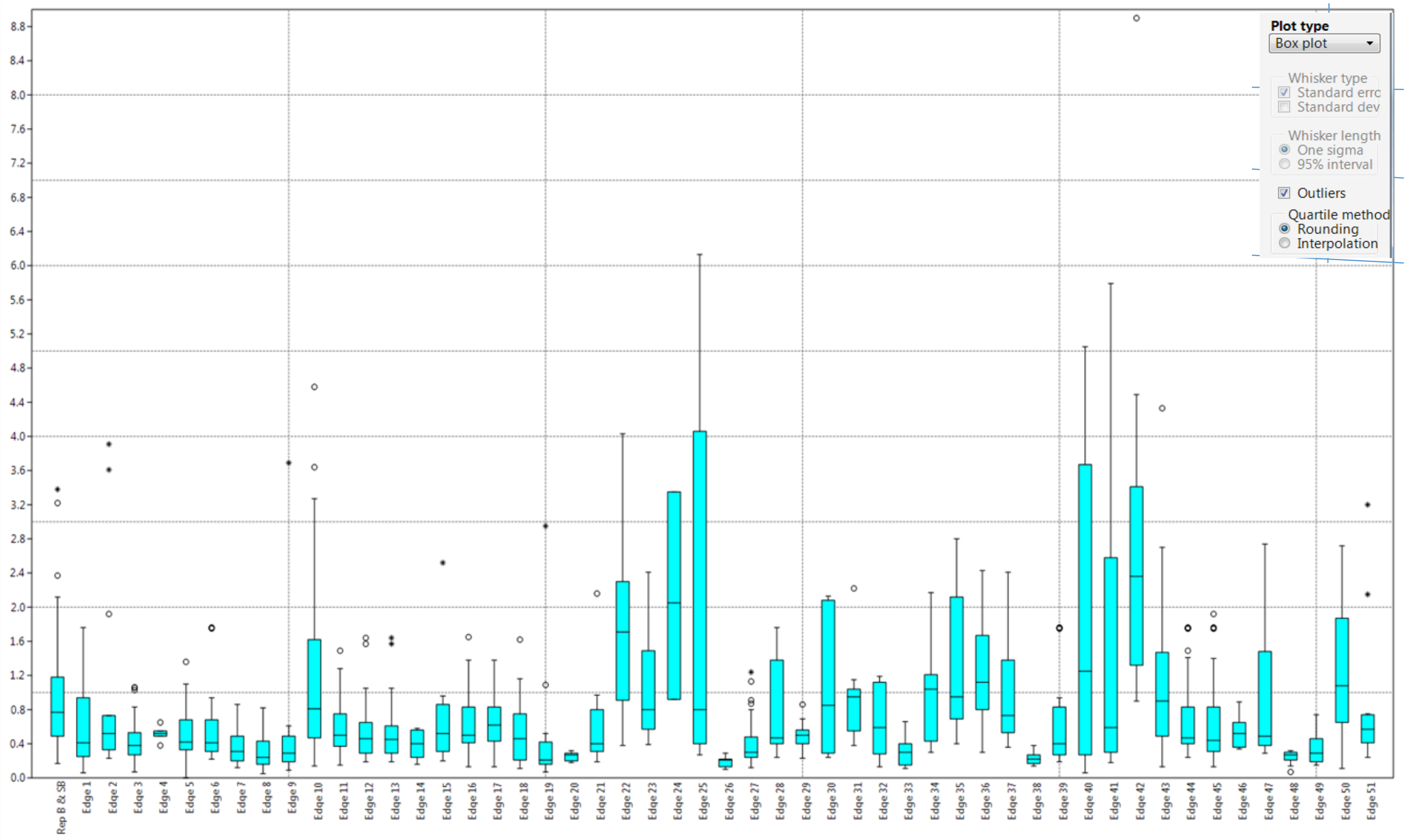


Figure 15

Boxplot of Replicated Bone and Soaked Bone Length Measures Compared with All Artifacts

Similarly, the boxplot for the flake scar length (see Figure 14) indicates that the length of flake scars on several artifact edges from the precontact collection fall below the lower quartile for the replicated bone and soaked bone tools. These utilized edges contain flake scars that are generally shorter than those found on the replicated bone and soaked bone tools and include utilized edges: 7, 8, 9, 19, 20, 26, 27, 28, 33, 38, 48, and 49. Based on trends indicated on the bivariate plots produced at a 95 percent confidence interval for the average of all flake scars for the replicated tools, artifact edges with a shorter flake scar measurement would indicate that the material it was worked against would be softer than soaked bone and bone.

A Hierarchical Cluster Analysis (UPGMA) was run using a Gower distance measure for all 24 of the replicated tools (with the exception of tool number 23 due to lack of flake scarring) and all 51 utilized artifact edges recorded from the precontact collection. The cluster analysis was produced using the average flake scar length and width for all flake scar types and all four edge morphologies (Figure 16). A Hierarchical Cluster Analysis (UPGMA) groups items together on a cladistic diagram which calculates their relative similarity by measuring their Gower distance. The Gower distance measure was selected as it can handle mixed data sets (e.g., ratio, presence/absence, categorical). The distance is placed along the y-axis while the items, in this instance the replicated tools and utilized artifact edges, are placed along the x-axis. The added cumulative distance measured to connect the two most unrelated

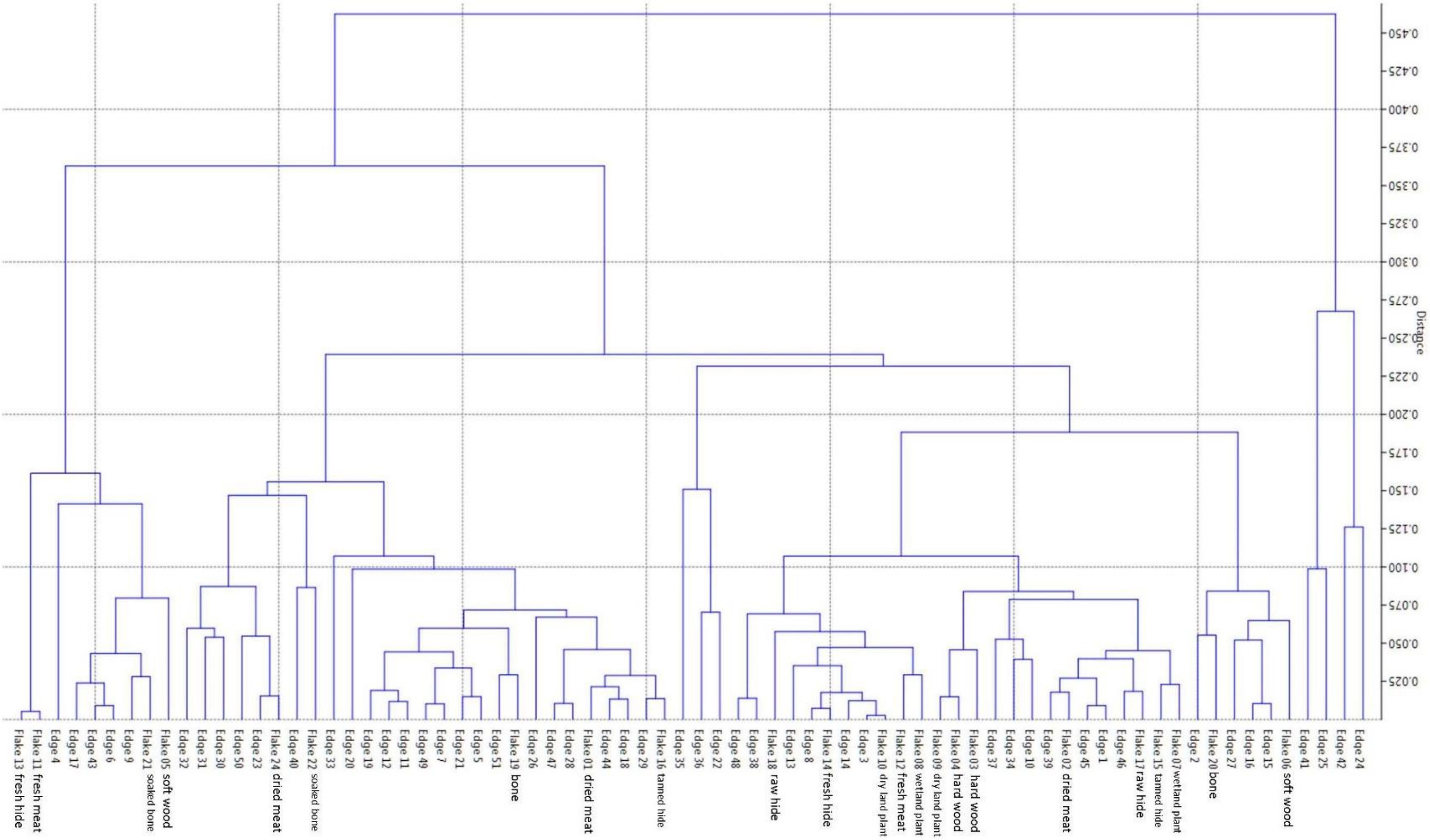


Figure 16

Hierarchical Cluster Analysis (UPGMA, Gower Distance Measure) For All Replicates (Except 23) and Artifact Edges (All 51); Using Average Flake Scar Length and Width (All Flake Scar Types) and Edge Shape (Coded 1-4) branches out and back along the y-axis is referred to as the maximum possible distance “MPD” (Muñiz 2014). The MPD measure is not intended to be compared to an absolute threshold but is instead provided as a relative measure of similarity. For example, a low MPD value indicates items that are similar, while the highest MPD value indicates items that are as dissimilar as possible given the current sample values (Muñiz 2014).

The maximum possible distance to measure the greatest dissimilarity for the total sample (including both the replicated collection and the collection of utilized artifact edges from CRDA8-Site5) is .92. Using a distance measure of .105 to establish a cutoff for defining branches that are more similar to themselves than they are to their neighbors, results in a total of 14 branches. Several factors were considered when determining cladistic groups of similarity that created each branch, which included:

- The known hardness (1-5) of the contact materials used against the replicated tools
- The known cutting or scraping motion of the replicated tools
- Whether the tool or artifact edge was above or below the 95 percent confidence interval for its respective bivariate plot
- The position of the utilized artifact edge as compared to the lower quartile of hardwood, soaked bone, and bone on the boxplots for length and width
- Visual confirmation of Keeley’s (1980) flake scar patterning and placing them into categories used by Tringham and colleagues (1974) and Odell and Odell-Vereecken (1980) for material hardness (see Table 3)

Branch 1 (on the right) consists of two replicated flakes that were used on known contact materials: fresh meat and fresh hide (see Figure 16; Table 20). The cumulative distance measure for this branch is .21 or 22.8 percent of MPD. Branch 2 consists of one utilized edge, Edge 4. This branch has been cut off from branches that would have given some information to aid in determining which material was worked with.

Branch 3 consists of two replicated flakes and four artifact edges. The flakes that were used on known contact materials include soft wood and soaked bone (see Figure 16; see Table 20). Both of these contact materials were acted upon using a cutting motion. The flake used on soaked bone fell within the 95 percent confidence interval and the flake used on soft wood fell above the 95 percent confidence interval on the bivariate plot. One artifact edge, Edge 43, fell below the 95 percent confidence interval on the bivariate plot, while the remaining three artifact edges, 6, 9, and 17, were located within the 95 percent confidence interval. Artifact Edge 9 was located below the lower quartile for bone and soaked bone for flake scar length on the box plots. This indicates that the length of flake scars on Artifact Edge 9 were shorter than those that appeared on bone and soaked bone and therefore utilized on a material with a softer material hardness than bone and soaked bone. These edges likely acted upon materials with a hardness between 2 and 3. The cumulative distance measure for this branch is .15 or 16.3 percent of MPD.

Table 20

Fourteen Branches of the Hierarchical Cluster Analysis

Branch Number	Replicated Tools Included on Branch	Artifact Edges Included on Branch	Known Contact Materials within Branch	Material Hardness of Branch
1	11, 13	n/a	fresh meat and fresh hide	1
2	n/a	4	n/a	unknown
3	5, 21	6, 9, 17, 43	soft wood, soaked bone	2-3
4	24	23, 30, 31, 32, 50	dried meat	3
5	22	40	soaked bone	3
6	1, 16, 19	5, 7, 11, 12, 18, 19, 20, 21, 26, 28, 29, 33, 44, 47, 49, 51	dried meat, tanned hide, bone	2-3
7	n/a	22, 35, 36	n/a	3-4
8	n/a	38, 48	n/a	3
9	18	n/a	raw hide	4
10	8, 10, 12, 14	3, 8, 13, 14	dryland plant, wetland plant, fresh meat, fresh hide	1
11	3, 4, 9	n/a	hard wood, dry land plant	1-3
12	2, 7, 15, 17	1, 10, 34, 37, 39, 45, 46	wetland plant, dried meat, tanned hide, raw hide	3
13	6, 20	2, 15, 16, 27	soft wood, bone	3-4
14	n/a	24, 25, 41, 42	unknown	3

Branch 4 consists of one known flake and five artifact edges. Flake 24 was used on dried meat in a scraping motion (see Figure 16; see Table 20). The flake used on dried meat fell above the 95 percent confidence interval on the bivariate plot. Three of the five artifact edges, 30, 31, and 32, fell below the 95 percent confidence interval on the bivariate plot, while Artifact Edges 23 and 50 were located within the 95 percent confidence interval. Artifact Edge 23 was knapped using Flint Ridge which may have accounted for its position within the confidence interval. Flakes located below the 95 percent confidence interval within the replicated collection and replicated flakes located within the 95 percent confidence interval within the right central portion of the plot were generally used on materials with a hardness of 3. It was noted during the visual inspection of the utilized edges that Artifact Edge 30 appeared to have been used on a harder material. These edges likely acted upon materials with a hardness of 3. The cumulative distance measure for this branch is .19 or 17.5 percent of MPD.

Branch 5 consists of one known flake and one artifact edge. Flake 22 was used on soaked bone in a scraping motion (see Figure 16; see Table 20). The flake used on soaked bone fell above the 95 percent confidence interval on the bivariate plot. Artifact Edge 40 fell above the 95 percent confidence interval on the bivariate plot as well. It was noted during the visual inspection of the artifact edges that Artifact Edge 40 appeared to have been used in a scraping motion on a harder material. Flakes from the replicated collection that retained nearly the same characteristics as those observed on the precontact utilized artifact edge were used on harder materials used in a scraping motion. On the bivariate plot, the replicated tools located within a similar plot area were acted upon materials with a hardness 3. This edge acted upon materials with a hardness of 3. The cumulative distance measure for this branch is .19 or 17.5 percent of MPD.

Branch 6 consists of three replicated flakes and 16 utilized artifact edges. The flakes that were used on known contact materials included dried meat, tanned hide, and bone (see Figure 16; see Table 20). The flake used on dried meat fell below the 95 percent confidence interval on the bivariate plot, while the flakes used on tanned hide and bone fell within the 95 percent confidence interval. Three artifact edges, 11, 12, and 51, fell above the 95 percent confidence interval on the bivariate plot; seven utilized artifact edges: 7, 18, 26, 29, 33, 44, and 49, fell below the 95 percent confidence interval; and six utilized artifact edges: 5, 19, 20, 21, 28, and 47, fell within the 95 percent confidence interval. Artifact Edges 7, 26, 29, 33, and 49 were located below the lower quartile for bone and soaked bone for flake scar length on the box plots. Artifact Edge 19 was located below the lower quartile for hard wood for flake scar width on the box plots. Artifact Edge 20 was located below the lower quartile for both bone and soaked bone for flake scar length and for hard wood for flake scar width on the box plots. This indicates that the width of flake scars on Artifact Edge 19 were thinner than those that appeared on hard wood and therefore utilized on a material with a softer material hardness than hard wood. This also indicates that the length of flake scars on Artifact Edge 20 were shorter than those that appeared on bone and soaked bone and therefore utilized on a material with a softer material hardness than bone and soaked bone. In addition, flakes located above, below, and within the 95 percent confidence interval within the replicated collection within the central portion of the plot were generally used on materials with a hardness between 1 and 4. The known contact materials within this group, however, contain a hardness of 3 and 4. It was noted during the visual inspection of the artifact edges, that Artifact Edge 47 appeared to have been used in a scraping motion and Artifact Edge 19 was utilized against a softer material in a cutting motion. Flakes from the replicated collection that retain similar characteristics as the precontact utilized edges on the bivariate plot acted upon materials with a hardness between 2 and 3. The cumulative distance measure for this branch is .21 or 22.8 percent of MPD.

Branch 7 consists of three artifact edges. One of the three utilized artifact edges, Artifact Edge 22, fell above the 95 percent confidence interval on the bivariate plot, while utilized artifact edges 35 and 36 fell within the 95 percent confidence interval (see Figure 16; see Table 20). Flakes located above the 95 percent confidence interval within the replicated collection and replicated flakes located within the 95 percent confidence interval within the right portion of the plot were generally used on materials with a hardness between 3 and 4. It was noted during the visual inspection of the utilized edges that Artifact Edge 22 appeared to have been used in a scraping motion on a harder material. Based on the location of these edges on the precontact bivariate plot and the visual inspection, these three edges likely acted upon materials with a hardness between 3 and 4. The cumulative distance measure for this branch is .3 or 32.6 percent of MPD.

Branch 8 consists of two artifact edges, Artifact Edges 38 and 48 (see Figure 16; see Table 20). This branch has been cut off from branches that would have given some information to aid in determining a material worked. Both Artifact Edges 38 and 48 are located below the 95 percent confidence interval on the bivariate plot. Both Artifact Edges 38 and 48 are located below the lower quartile for bone and soaked bone for flake scar length on the box plots. This indicates that the length of flake scars on Artifact Edges 38 and 48 were shorter than those that appeared on bone and soaked bone and therefore utilized on a material with a softer material hardness than bone and soaked bone. Flakes from the replicated collection that retain similar characteristics as the precontact utilized edges on the bivariate plot acted upon materials with a hardness of 3. The precontact utilized edges most likely acted upon materials with a hardness of 3. The cumulative distance measure for this branch is .15 or 16.3 percent of MPD.

Branch 9 consists of one replicated flake that was used on a known contact material: raw hide (see Figure 16; see Table 20). The cumulative distance measure for this branch is .12 or 13 percent of MPD.

Branch 10 consists of four replicated flakes and four artifact edges. The flakes that were used on known contact materials included: dryland plant, wetland plant, fresh hide, and fresh meat (see Figure 16; see Table 20). All four replicated flakes were utilized in a scraping motion. The flake used on fresh hide fell below the 95 percent confidence interval on the bivariate plot, while the flakes used on dryland plant, wetland plant, and fresh meat fell within the 95 percent confidence interval. All four artifact edges, 3, 8, 13, and 14, fell within the 95 percent confidence interval on the bivariate plot. Artifact Edge 8 was located below the lower quartile for bone and soaked bone for flake scar length on the box plots. Artifact Edge 3 was located below the lower quartile for hard wood for flake scar width on the box plots. This indicates that the length of flake scars on Artifact Edges 3 and 8 were shorter than those that appeared on bone and soaked bone and therefore utilized on a material with a softer material hardness than bone and soaked bone. This also indicates that the length of flake scars on Artifact Edge 3 were thinner than those that appeared on hard wood and therefore utilized on a material with a softer material hardness than hard wood. In addition, flakes located below the 95 percent confidence interval within the replicated collection were generally used on materials with a hardness of 1. The precontact utilized edges most likely acted upon materials with a hardness of 1. The cumulative distance measure for this branch is .1 or 10.8 percent of MPD, which represents the most similar group of objects in the HCA.

Branch 11 consists of three replicated flakes that were used on known contact materials: hard wood and dryland plant (see Figure 16; see Table 20). The cumulative distance measure for this branch is .1 or 10.8 percent of MPD which ties for having the lowest dissimilarity measure.

Branch 12 consists of four known flakes and seven artifact edges. The flakes that were used on known contact materials included: wetland plant, dried meat, tanned hide, and raw hide (see Figure 16; see Table 20). The flakes used on wetland plant and tanned hide fell below the 95 percent confidence interval on the bivariate plot, while the flakes used on dried meat and raw hide fell within the 95 percent confidence interval.

One utilized artifact edge, Artifact Edge 46, fell below the 95 percent confidence interval on the bivariate plot; three utilized artifact edges, 10, 34, and 37, fell above the 95 percent confidence interval; and three utilized artifact edges, 1, 45, and 49, fell within the 95 percent confidence interval. Flakes from the replicated collection that retain similar characteristics as the precontact utilized edges on the bivariate plot acted upon materials with a hardness of 3. The cumulative distance measure for this branch is .16 or 17.3 percent of MPD.

Branch 13 consists of two known flakes and four artifact edges. The flakes that were used on known contact materials included: soft wood and bone (see Figure 16; see Table 20). Both replicated flakes were utilized in a scraping motion. The flake used on soft wood fell below the 95 percent confidence interval on the bivariate plot, while the flakes used on bone fell above the 95 percent confidence interval. Three artifact edges, 2, 15, and 16, fell below the 95 percent confidence interval on the bivariate plot, while one utilized artifact edge, Artifact Edge 27, fell within the 95 percent confidence interval. Artifact Edge 27 was located below the lower quartile for bone and soaked bone for flake scar length on the box plots. This indicates that the length of flake scars on Artifact Edge 27 were shorter than those that appeared on bone and soaked bone and therefore utilized on a material with a softer material hardness than bone and soaked bone. In addition, flakes located above, below, and within the 95 percent confidence interval within the replicated collection and replicated flakes located within the 95 percent confidence interval within the central portion of the plot were generally used on materials with a hardness between 3 and 4. Flakes from the replicated collection that retain similar characteristics as the precontact utilized edges on the bivariate plot acted upon materials with a hardness between 3 and 4. The cumulative distance measure for this branch is .18 or 19.6 percent of MPD.

Branch 14 consists of four utilized edges. Two of the four utilized artifact edges, 24 and 41, fell within the 95 percent confidence interval on the bivariate plot, while Artifact Edges 25 and 42 fell above the 95 percent confidence interval (see Figure 16; see Table 20). It was noted during the visual inspection of the utilized edges that Artifact Edge 42 appeared to have been used in a scraping motion on a harder material. Based on the location of these edges on the precontact bivariate plot when compared to flakes plotted in similar location on the replicated bivariate plot and the visual inspection, these four edges acted upon materials with a hardness of 3. The cumulative distance measure for this branch is .54 or 58.7 percent of MPD and represents the greatest degree of dissimilarity for the entire sample.

Summary of Results

Twenty-four experimental expedient tools were created by utilizing lithic flakes against 13 contact materials with various use motions totaling 1500 strokes per tool. Upon completion of the replications, all 24 experimental expedient tools were examined under a digital microscope. Flake scars created from use were then measured with the caliper tool within the EduCam Plus software, version 202 and quantified. After the data were compiled using the PAST 3.18 program, statistical tests were completed to determine defining characteristics which could be applied to the precontact collection from CRDA8-Site5 (36GR0418).

Using a random number generator, a total of 35 expedient tools were chosen from the 55 expedient tools recovered from CRDA8-Site5 to represent a statistical sample of this artifact class from the site. From the 35 expedient tools, 51 utilized edges in total were identified including: 22 flakes containing one utilized edge, 10 flakes containing two utilized edges, and three flakes containing three utilized edges. The 35 expedient tools and 51 utilized artifact edges underwent the same measurement methodology as the experimental replicated flake tools and similar statistical tests were run based on the statistically significant factors determined during the experimental phase of the project. From the data collected, it was determined that Medium (3), both by itself and within a hardness range, was by far the most utilized contact material worked by flake tools at CRDA8-Site5 (36GR0418) (Table 21). A total of 19 artifact edges (37.25 percent) was determined to have been used on a contact material with a hardness of 3 which include: fresh hard woods, dried meats, and some soaked bone and antler. An additional seven utilized edges (13.7 percent) were determined to have been used on a contact material with a hardness of 3 or 4. Medium (3) and Medium to Hard (4) materials include: fresh and dried hard woods, dried meats, soaked and dried bone and antler, and raw hide.

No flake tool artifacts were determined to be utilized against materials that were Soft to Medium (2) alone; however, 20 edges (39.21 percent) were determined to have been worked against material containing a hardness range of 2 to 3.

Table 21

Material Hardness and Precontact Utilized Artifact Edges

Material Worked (Relative Hardness)	Possible Specific Material	Edges within Each Grouping
Soft (1)	Meat, Skin, Fat, Soft Vegetal Substances E.g. Tubers, Stalks, Leaves	3, 8, 13, 14
Soft to Medium (2) and Medium (3)	Soft Woods (Conifers), Fresh Stalks, Hard Woods (e.g. Oak), Soaked Antler and Bone	5, 6, 7, 6, 11, 12, 17, 18, 19, 20, 21, 26, 28, 29, 33, 43, 44, 47, 49, 51
Medium (3)	Hard Woods (e.g. Oak), Soaked Antler and Bone	1, 10, 23, 24, 25, 30, 31, 32, 34, 37, 38, 39, 40, 41, 42, 45, 46, 48, 50
Medium (3) and Medium to Hard (4)	Hard Woods (e.g. Oak), Soaked Antler and Bone, Fresh Antler and Bone	2, 15, 16, 22, 27, 35, 36
Unknown Hardness	n/a	4

A total of four artifact edges (7.8 percent) were determined to be used on a contact material with a hardness of 1. Soft (1) materials include meat, skin, fat, soft vegetal substances such as tubers, stalks, and leaves. Finally, one artifact edge did not provide sufficient information to conclusively determine the material hardness they were used against.

It was noted during the visual inspection of the artifacts that one additional edge originally not recorded as a utilized edge was worked against sandstone and was subsequently labeled Artifact Edge 52 (Surface Collected artifact FS#57, Catalog Number 12.55) (Figure 17). The two edges that were recorded on this expedient tool included Edges 4 and 5. One of these two edges, Edge 5, was determined to have been used against a material ranging in hardness from 2 to 3 while the contact utilized against the second edge, Edge 4, remains unknown.

Figure 17

Sandstone Ground Edge, Edge 52, On Surface Collected Artifact FS#57

When the artifacts were analyzed by individual expedient tools rather than by singular artifact edge, it was discovered that the tools with multiple utilized edges had their edges used on contact materials or with overlapping material hardness ranges that were the same (Table 22). Only in the instance of the single artifact with Artifact Edges 4, 5, and 52 was this false. Artifact Edges 4, 5, and 52 were utilized on an unknown material hardness, a hardness range of 2 to 3, and a hardness of 5, respectively. Four expedient tools, including those recovered from the east half of SA 1, Feature 1 (0-14 cm), Unit N106 E140, and Unit N113 E133 contained multiple edges with the same determined contact material hardness or range of hardness.

One meter by one meter units were only hand excavated on the southwestern portion of the stream. When the hardness range of the expedient tools recovered from the units are plotted on a map, it appears an activity area centered around contact materials with a hardness of 3 (Medium) and 4 (Medium to Hard) with only a few items worked against contact materials with a hardness of 2 (Soft to Medium). Unfortunately, when expedient tools collected from stripped areas and features within the area of the units are added to the map, the range of the potential activity area expands to include tools utilized against soft (1) items and several more items worked against contact materials with a hardness of 2 (Soft to Medium) (Figures 18 and 19). Items worked against contact materials with a hardness of 1 (Soft) are not centralized either.

At the macroscopic level of use wear investigation, it is not prudent to determine if certain specific activities, such as the preparation of fresh meat or hides, wooden shaft production, or the production of bone tools, were being conducted in any one area; however, the results of the current study provide some intriguing suggestions that may be further explored by analyzing other artifact classes, faunal remains, and features. When additional artifact classes, including worked and butchered bone and ceramic objects, are found in association with tools that can be studied macroscopically in contexts, such as features, the range of activities can be narrowed down.

Table 22

Relative Hardness of Edges Per Precontact Expedient Tool

Cat #	Spec #	Provenience	Strat	Level	Utilized Edge Morphology	Edges	Relative Material Hardness
5		STP 17-5			convex; concave	1, 2	3, 3-4
12	16	FS 17			convex	3	1
12	55	FS 57			complex; straight	4, 5, 52	unknown, 2-3, 5
12	57	FS 59			complex	6	2-3
12	63	FS 65			straight	7	2-3
12	64	FS 66			convex	8	1
12	65	FS 67			complex	9	2-3
14		East half of SA 1	II		convex	10	3
14		East half of SA 1	II		straight; straight	11, 12	2-3, 2-3
14		East half of SA 1	II		convex	13	1
14		East half of SA 1	II		convex; concave	14,15	1, 3-4
15		Stripped Area 2			concave; complex	16, 17	3-4, 2-3
17		Stripped Area 4			straight	18	2-3
18		Feature 1		0-14 cm	straight; straight; straight	19, 20, 21	2-3, 2-3, 2-3
18		Feature 1		0-14 cm	convex	22	3-4
21		Feature 3		0-10 cm	straight	23	3
39		N105 E139	II	10-20 cm	convex	24	3
41		N105 E140	II	10-20 cm	straight	25	3
44		N105 E141	II	20-25 cm	straight	26	2-3
45		N106 E138	II	0-10 cm	concave; straight; straight	27, 28, 29	3-4, 2-3, 2-3
47		N106 E139	II	0-10 cm	straight	30	3
49		N106 E140	II	0-10 cm	straight; straight	31, 32	3, 3
50		N106 E140	II	10-20 cm	straight	33	2-3
57		N107 E137	II	0-10 cm	convex; concave	34, 35	3
61		N107 E138	II	10-16 cm	convex	36	3-4
63		N107 E139	II	10-20 cm	convex	37	3
75		N108 E140	II	10-20 cm	convex	38	3
83		N110 E138	III	10-20 cm	convex	39	3
90		N113 E133	III	12-22 cm	straight; straight; convex	40, 41, 42	3, 3, 3
91		N113 E135		0-10 cm	complex; straight	43, 44	2-3, 2-3
96		N113 E139	II	10-20 cm	convex	45	3
101		N114 E136		0-10 cm	convex	46	3
123		N121 E126	III	14-24 cm	straight; convex	47, 48	2-3, 3
129		Feature 12 N		0-10 cm	straight; straight	49, 50	2-3, 3
135		Feature 14 W		0-10 cm	straight	51	2-3

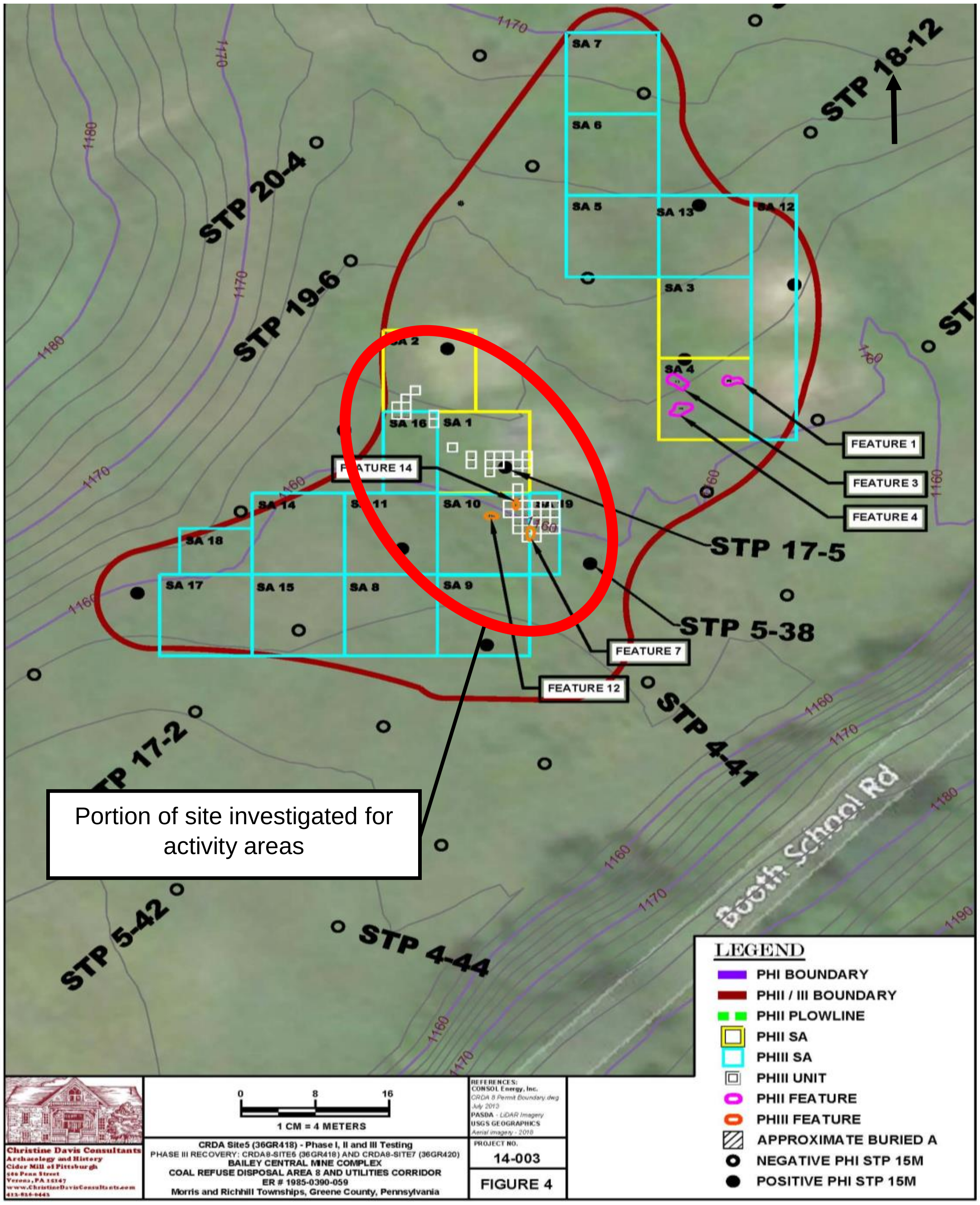


Figure 18

Testing Locations at the Close of the Phase III Data Recovery Indicating the Portion of Site Investigated for Potential Activity Areas (Basemap Courtesy of Brandon Davis, CDC 2018)

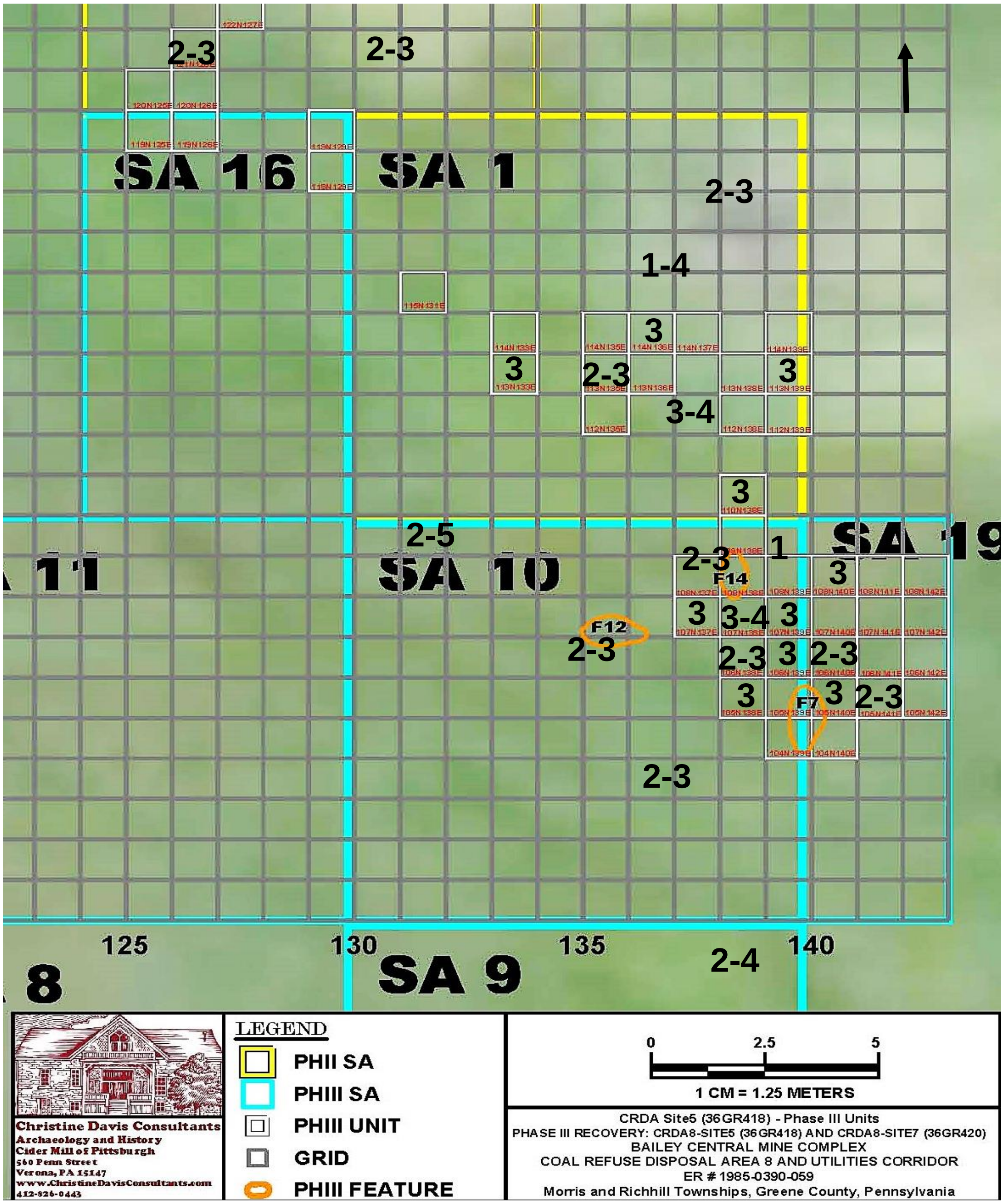


Figure 19

Expedient Tools Located Within the Southwestern Portion of the Site and the Relative Hardness of the Material They Were Used Against (Basemap Courtesy of Brandon Davis, CDC 2018)

Chapter 7: Research Questions, Future Research, and Conclusions

Research Questions

Research Question 1:

- What new information about site function can be learned by conducting a macroscopic use-wear analysis on utilized flake tools from CRDA8-Site5 (36GR0418)?

By conducting additional use-wear analysis on the utilized flake tools recovered from CRDA8-Site5 (36GR0418), it is apparent that more than just lithic rejuvenation was occurring, but it is difficult to determine exactly what that activities were without a large array of artifact types and/or more in-depth microscopic polish and abrasive wear study. Though it cannot be said specifically what the additional activities being conducted were, a few generalized conclusions as to additional site activity can be made.

It can be said that the occupants of CRDA8-Site5 were potentially creating bone tips or handles and wooden shafts for the tools they were creating and rejuvenating on the site by the high number of artifact edges that came into contact with materials with a hardness ranging from 2 through 4. It appears the occupants of the site also processed a meal by the low number of artifact edges that came into contact with materials with a hardness of 1.

A total of four utilized edges came into contact with items with a material hardness that was soft (1). The experimental tools associated with hardness level 1 were only utilized against four contact materials, including fresh meat, fresh hide, wetland plants, and dryland plants in this study; however, items with a material hardness of 1 (Soft) also include fat, and soft vegetal substances (e.g., tubers, stalks, leaves). It can be surmised from this data, that while the occupants worked on their tools, they also more than likely ate.

Research Question 2:

- With additional lithic analysis, can a specific site function be applied to CRDA8-Site5 (36GR0418)?

The current site function based on the conclusions within the phase III data recovery report for the CRDA8- Site5 (36GR0418) is that it functioned as an Early, Middle, and Late Woodland lithic reduction and tool production locus. This determination was based on the recovery of 16 diagnostic projectile points. These points included: one Early Woodland Forest notched point, one Middle Woodland untyped point, and one Middle Woodland Lowe Flared Base side notched point that were recovered along with 15 Late Woodland projectile points, including two Raccoon Creek side-notched points, six Kiski side-notched points, and five Backstrum points.

While there was evidence to support CRDA8-Site5 remaining a lithic reduction and tool production locus, there was no evidence generated by the additional examination of the expedient tools to place the site into an additional category or a more specific category based on the options currently available on the PA SHPO site form. The occupants did not utilize the site long enough to generate more than a few features, which did not contain enough charcoal for dating. In addition to the features, a total of 2,442 artifacts were recovered. Of the 2,442 artifacts recovered, 99.43 percent of the artifact inventory consisted of chipped stone lithic artifacts, including 2,234 lithic debitage fragments (91.48 percent), 62 core fragments (2.54 percent), and 132 chipped stone tools (5.41 percent) (Davis 2018). At a lithic reduction and tool production locus, we can expect a high percentage of recovered artifacts to be lithic debitage created by knapping tool forms from lithic cores.

The majority of the artifact edges were shown to have been used against a contact material ranging from Soft to Medium (2) through Medium to Hard (4). Four of the utilized edges, however, suggest items with a material hardness of 1 (Soft) were acted upon at the site as well. These edges suggest a meal consisting of local flora or fauna was consumed during their stay.

Research Question 3:

- How do the inferred functions of the few groundstone tools recovered from the site compare to activities suggested by the chipped stone tools at CRDA8-Site5 (36GR0418)?

A total 2,442 precontact artifacts was recovered from CRDA8-Site5 (36GR0418). Those 2,442 precontact artifacts included, 2,234 pieces lithic debitage, 62 lithic core fragments, 132 chipped stone tools, and 14 polished, ground, and pecked stone tools (PGPs).

Lithic anvils are generally expedient groundstone tools used during knapping and tool production, with a flat or tabular shape being one of the few requirements (Adams 2002). Lithic anvils rest on the ground and consist of impact fractures and gouges because of lithic core placement during flake removal (Adams 2002). In contrast, lithic mortars contain cupules created on the surface of the mortar due to impact fractures caused by percussion activities (Adams 2002).

Hammerstones can range in size from a smaller cobble which can be utilized by a single hand to a larger cobble which requires both hands to utilize. The impact fractures to the cobble are created by forceful strokes during the chipped stone tool manufacturing process. Hammerstones are often used to replace an antler billet or in conjunction with lithic anvils and lithic mortars (Adams 2002)

Fire drill hearths make up the bottom portion of a fire-starting kit and consist of lithic material, either cobble or tabular, and contain one or more cupules on the surface. These cupules are created by spinning a hafted chert or flint drill on the drill hearth to create sparks (Adams 2002).

The PGP artifacts included a total of 13 objects (92.86 percent) utilized to aid in the production of stone tools (Table 23). The remaining PGP artifact was a single fire drill hearth, utilized to help start a fire.

Three of the six features recorded at CRDA8-Site5, (Features 3, 12, and 14) contained four PGPs including, two lithic anvils, one lithic mortar, and a fire drill hearth (Davis 2018). The remaining 10 PGPs were recovered from stripped areas and 1 m by 1 m units and included hammerstones, lithic anvils, and lithic mortars.

Table 23

PGPs by Type

CRDA8-Site5 (36GR418)		
Artifact Types	**#**	**%**
lithic, PGP	**14**	**100**
fire drill hearth	1	7.14
hammerstones	3	21.43
lithic anvils	8	57.14
lithic mortars	2	14.29
Total	**14**	**100**

A total of nine PGPs were recovered from contexts that included expedient tools, and five of those nine were recovered from contexts that included additional chipped stone tool types. The five PGPs that were not recovered from contexts with expedient tools were not recovered from contexts that included additional chipped stone tool types either. These five tools included a lithic mortar, two hammerstones, and two lithic anvils.

When examining the ratio of PGPs utilized to aid in the creation of chipped stone tools (n = 13; 92.84 percent) and PGPs with other uses (n = 1; 7.14 percent), the PGP tools support the site's general activity of producing and maintaining chipped stone tools at a short-term campsite, while sharing a meal.

Future Research Questions and Comments

Future Research Question 1:

- Is the pattern created on fletching materials similar to others of the same material hardness? What would the use-wear on a tool used for this purpose look like?

As feathers were not a contact material utilized in this study, it cannot be said if the arrow shafts that may have been processed on the lithic rejuvenation site were fletched, but an expedient tool would be all that is required to process turkey feathers for fletching. This line of thinking can also be applied to several other contact material types not included in this initial experimental study, including various tree nuts, animal sinew, and softer lithic materials (i.e., soapstone or kaolin). The replicated tool that was utilized against sandstone produced such a dramatic result, I wonder if a softer lithic material would produce a similar result. Additionally, would the hard shell of a tree nut produce a use-wear pattern similar to bone?

Future Research Question 2:

- How would further macroscopic study on the 20 remaining expedient tools as well as less formed tools (i.e., bladelet, flake knives, and scraper) affect the results of this study? Would the results change or continue to support the current site type conclusions?

The lack of artifact-rich features with datable charcoal and additional artifact types, such as faunal remains or ceramics, suggests that the further study of the 20 remaining expedient tools, the six flake knives, the five bladelets, and the three scrapers, would be the best clue as to what was occurring on the site. From the examination of these additional items, a distinct activity area that includes a better understanding of feature purpose and use may present itself.

Future Research Comment 1:

- The Hardness Scale

There was quite a bit of overlap in the hardness scale utilized for this project. Some contact materials were listed on more than one level of hardness. While I did not feel that would be an issue at the beginning of this project, I do feel the overlap muddied the results in the end. I would advise future researchers to create a more concrete scale of material hardness. The majority of the artifact edges at the completion of this project resulted in a range of potential material hardness rather than a singular potential material hardness. By creating a more effective hardness scale with less overlap in materials, the project's results could produce a more definitive range of potential material hardness with fewer material types.

Future Research Comment 2:

- Randomly Selecting Artifacts for the Creation of Replicated Expedient Tools

As stated earlier in *Section 6.1: Results of the Production and Study of the Experimental Expedient Tools,* in an effort to create expedient tools without bias, a number of flakes were simply struck off a core fragment of chert, placed into a bag, and chosen at random. As Binford describes it, an expedient tool is a piece of situational gear which is produced for a specific use without forethought as a response to a situation (Binford 1979). With no forethought going into which flake was being chosen for each task, I believed I was embracing the spirit of an expedient tool. I cannot say whether this affected the outcome of the experimental portion of this project.

As the flakes were not chosen for their purpose by sight or hand feel, I cannot determine if the edge angle data collected would be different had that been the case. Would a more scraper-like flake doing a task involving a scraping motion rather than trying to do the job of a knife have created different flake scar patterns? Conversely, would a more knife-like flake doing a task involving a cutting motion rather than trying to do the job of a scraper created different flake scar patterns?

I do not know the intent of the original user of these precontact expedient tools, so I cannot say for certain if picking them randomly was in-line with their thought process or not. This means the values that have been recorded for each experimental expedient tool may not reflect the same general edge morphology of functionally similar tools that the site possesses.

Conclusions

This thesis project was utilized to examine the use of expedient tools through macroscopic means to determine what activities were being enacted on CRDA8-Site5 (36GR0418), a site which was more broadly categorized as an Early, Middle, and Late Woodland lithic reduction and tool production locus. Although the hope for this project was to allow me to provide a more specific site description with a range of activities that occurred at the site, the data did not change the site’s functional designation and place it into a more defined site type. While the overarching goal was not achieved, many other important data were able to be examined and interpreted.

A baseline collection of identifiable use-wear patterns was produced and utilized to determine which attributes measured on the experimental flakes were deemed significantly different, or functionally diagnostic enough to be applied to precontact tools to aid in the determination of their use. During this project, the baseline collection was then compared to a random sample of 35 precontact expedient tools from CRDA8-Site5

(36GR0418) and utilized to determine if a range of activities other than flint knapping was occurring at the site.

In the end, the negative result of this project concerning the inability to provide a more specific site description does not mean the data generated were not useful to this specific project or to the application of the results on another precontact collection in a future. While most of the data generated from this project supported the evidence that CRDA8-Site5 was, in fact, nothing more than a lithic reduction and tool production locus, it also showed a human aspect of daily life: sharing a meal. It cannot be said for certain what the meal shared among the occupants included (as there are no faunal or ethnobotanical remains) but it can be said that they most likely ate.

Once a baseline collection such as this is created and the database of identifiable use-wear patterns exists, the information can be utilized to aid in further analysis of expedient tools. By allowing more analysis to occur on expedient tools, the ability to confirm previous conclusions about site function as well as more acutely define site activities presents itself.

The ability to compare the replicated and precontact collections allowed me to identify what sort of general activity was occurring on the site during its precontact occupation. Although the desired result did not occur, the original conclusions about site function based on the presence of PGPs and large amount of lithic debitage were confirmed. In addition, a glimpse into the range of activities that occurred at CRDA8-Site5 showing daily life have been revealed.

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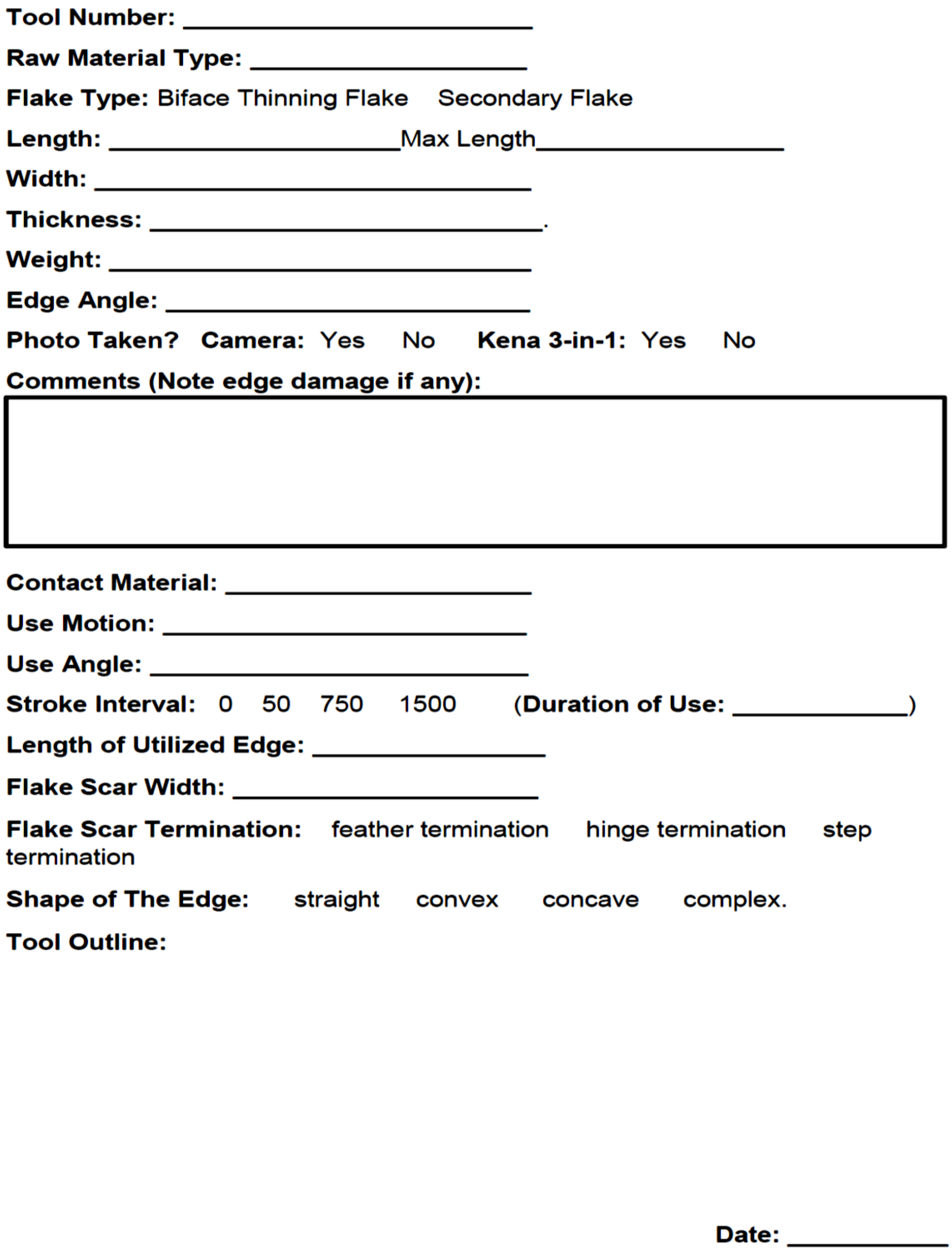
Appendix A: Sample Experimental Expedient Tool Information Collection Sheet



Tool Number: ______________________

Raw Material Type: __________________

Flake Type: Biface Thinning Flake Secondary Flake

Length: ___________________Max Length________________

Width: ____________________________

Thickness: _________________________.

Weight: ___________________________

Edge Angle: ________________________

Photo Taken? Camera: Yes No **Kena 3-in-1:** Yes No

Comments (Note edge damage if any):

Contact Material: ____________________

Use Motion: _______________________

Use Angle: ________________________

Stroke Interval: 0 50 750 1500 (**Duration of Use:** ___________)

Length of Utilized Edge: _______________

Flake Scar Width: ____________________

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: straight convex concave complex.

Tool Outline:

Date: __________

Appendix B: Sample Excel Data Collection Sheet

Tool Number/ Provenience	Raw Material Type	Flake Type	Length in mm	Width in mm	Thickness in mm	Weight in g	Edge Angle in degrees	Length of Utilized Edge in mm	Flake Scar Width in mm	Flake Scar Termination	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)

Appendix C: Experimental Expedient Tool Information Collection Sheet

Tool Number: 1

Raw Material Type: Onondaga

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 3.18 cm Max length :4.07

Width: 2.96 cm

Thickness: .69 cm

Weight: 4 g .14 oz

30 **Edge Angle:** 22 23 36 39

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: dried meat

Use Motion: Cut

Use Angle:

Stroke Interval: [✓ 0] 50 750 1500 **(Duration of Use:** 0 **)**

Length of Utilized Edge: N/A

Flake Scar Width: N/A

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: [✓ straight] convex concave complex.

Tool Outline:

Date: 9/7/17

Tool Number: 1

Raw Material Type: Onondaga

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 3.18 ML 4.07

Width: 2.96

Thickness: .69.

Weight: 4 g .14oz

29.25 **Edge Angle:** 19 23 36 39

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: dried meat

Use Motion: cut

Use Angle: 90

Stroke Interval: 0 [✓ 50] 750 1500 **(Duration of Use:** 1 minute **)**

Length of Utilized Edge: 2.29 cm

Flake Scar Width: —

Flake Scar Termination: [✓ feather termination] hinge termination step termination

Shape of The Edge: [✓ straight] convex concave complex.

Tool Outline:

Date: 9/7/17

Tool Number: 1

Raw Material Type: Onondaga

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 3.18 ML 4.07

Width: 2.45

Thickness: .69

Weight: 4g .14 oz

27.5 **Edge Angle:** 25 25 27 33

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: dried meat

Use Motion: cut

Use Angle: 90

Stroke Interval: 0 50 [✓ 750] 1500 **(Duration of Use:** 12:44 **)**

Length of Utilized Edge: 2.97

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] hinge termination step termination

Shape of The Edge: [✓ straight] convex concave complex.

Tool Outline:

Date: 9/7

Tool Number: Flake 1

Raw Material Type: Onondaga

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 3.18 **Max Length** 4.07

Width: 2.4

Thickness: .69

Weight: 5g .18 oz (2?)

20.33 **Edge Angle:** 18 20 23

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: dried meat

Use Motion: cut

Use Angle: 90

Stroke Interval: 0 50 750 [✓ 1500] **(Duration of Use:** 11:56 **)**

Length of Utilized Edge: 3.87

Flake Scar Width:

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: [✓ straight] convex concave complex.

Tool Outline:

Date: 9/21

Tool Number: Flake 2

Raw Material Type: Tennille

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 1.89 **Max Length** 2.31

Width: 1.73

Thickness: .62.

Weight: 2 g .07oz

18.5 **Edge Angle:** 19 26

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: dried meat

Use Motion: Scrape

Use Angle:

Stroke Interval: [✓ 0] 50 750 1500 **(Duration of Use:** N/A**)**

Length of Utilized Edge:

Flake Scar Width:

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/11

Tool Number: Flake 2

Raw Material Type: Tewilo

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 1.89 **Max Length** 2.31

Width: 1.08

Thickness: .62

Weight: 1g .04oz

17 **Edge Angle:** 14 20

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

W 30.87 W 28.07
H 24.02 H 20.10

Contact Material: dried meat

Use Motion: Scrape

Use Angle: 45°

Stroke Interval: 0 [✓ 50] 750 1500 **(Duration of Use:** :58 **)**

Length of Utilized Edge: 1.52

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/21

Tool Number: Flake 2

Raw Material Type: Tenmile

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 1.87 **Max Length** 2.31

Width: 1.68

Thickness: .62.

Weight: 1g .04oz

17.3 **Edge Angle:** 20 17 15

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

W 77.23 W 59.82
L 77.49 L 75.69

Contact Material: dried meat

Use Motion: Scrape

Use Angle: 45°

Stroke Interval: 0 50 [✓ 750] 1500 **(Duration of Use:** 8:45 **)**

Length of Utilized Edge: 1.52

Flake Scar Width: ______

Flake Scar Termination: [✓ feather termination] hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/24

Tool Number: Flake 2

Raw Material Type: Tenmile

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 1.85 **Max Length** 2.3

Width: 1.63

Thickness: .62.

Weight: 1g .04 oz

21.5 **Edge Angle:** 23 19 20 24

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

L 46.24
W 75.27

Contact Material: dried mat

Use Motion: Scrape

Use Angle: 45°

Stroke Interval: 0 50 750 [✓ 1500] **(Duration of Use:** 8:55 **)**

Length of Utilized Edge: 1.6

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] hinge termination [✓ step termination]

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/26

Tool Number: 3

Raw Material Type: Tenmile

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 1.9 Max Length 3.10

Width: 1.75

Thickness: .48

Weight: 2g .07 oz

Edge Angle: 6 5 4 6

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: hardwood

Use Motion: Cut

Use Angle: —

Stroke Interval: [✓ 0] 50 750 1500 **(Duration of Use:** N/A **)**

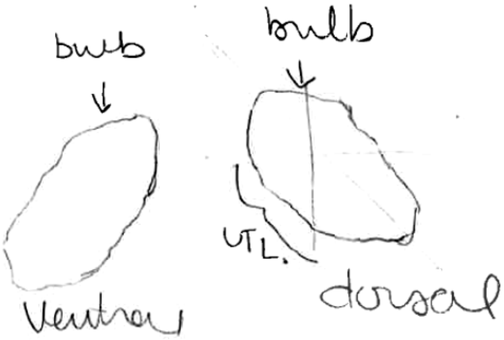
Length of Utilized Edge: —

Flake Scar Width: —

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:



Date: 9/9

Tool Number: Flake 3

Raw Material Type: Tennile

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 1.83 ML 3.10

Width: 1.73

Thickness: .48

Weight: 2 g .07oz

Edge Angle: 62\25

Photo Taken? **Camera:** [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

W 84.31 px
L 48.83 px?

Contact Material: hardwood

Use Motion: cut

Use Angle: 90°

Stroke Interval: 0 [✓ 50] 750 1500 **(Duration of Use:** :42 **)**

Length of Utilized Edge: 2.15

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] [✓ hinge termination] step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/10

Tool Number: Flake 3

Raw Material Type: Tenille

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 1.8 **Max Length** 3.07

Width: 1.7

Thickness: .48.

Weight: 2g .07oz

4 **Edge Angle:** 40 4 24

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

FT: 123.17px
231.31 px
HT: W 88.81 px
L 31.00 px

Contact Material: hardwood

Use Motion: cut

Use Angle: 90°

Stroke Interval: 0 50 [✓ 750] 1500 **(Duration of Use:** 9:56 **)**

Length of Utilized Edge: 3.06

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] [✓ hinge termination] [✓ step termination]

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/11

Tool Number: Flake 3

Raw Material Type: [illegible]

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 1.78 **Max Length** 3.06

Width: 1.67

Thickness: .48.

5.25 **Weight:** 2g .07 oz

Edge Angle: 55 45

Photo Taken? Camera: Yes No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

HINGE
W 131.41
H 81.88

Feather
W 98.74
H 30.00

Contact Material: hardwood

Use Motion: Cut

Use Angle: 90°

Stroke Interval: 0 50 750 [✓ 1500] **(Duration of Use:** 12:39 **)**

Length of Utilized Edge: 3.06

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] [✓ hinge termination] [✓ step termination]

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/21

Tool Number: Flake 4

Raw Material Type: Tennille

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.47 MAXL: 2.99

Width: 2.46

Thickness: .69

Weight: 5g .18 oz

Edge Angle: 20 20 29 20

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: hardwood

Use Motion: Scrape

Use Angle: N/A

Stroke Interval: [✓ 0] 50 750 1500 **(Duration of Use:** N/A **)**

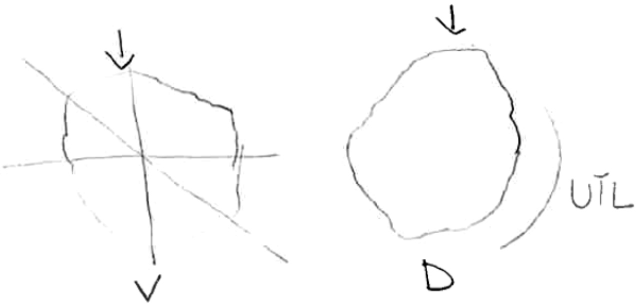
Length of Utilized Edge: —

Flake Scar Width: —

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:



Date: 9/9

Tool Number: Flake 4

Raw Material Type: Tenmile

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.47 **Max Length** 2.94

Width: 2.42

Thickness: .49

Weight: 4g .14oz

Edge Angle: 17 25 35 21

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

W 56.36 px
L 78.60 px

Contact Material: hardwood

Use Motion: scrape

Use Angle: 45°

Stroke Interval: 0 [✓ 50] 750 1500 **(Duration of Use:** :51 **)**

Length of Utilized Edge: 2.0

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/9

Tool Number: Flake 4

Raw Material Type: [illegible]

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.47 **Max Length** 2.99

Width: 2.42

Thickness: .69.

Weight: 4g .14 oz

21 **Edge Angle:** 15 15 30 24

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Dorsal
L 3920 px
W 221.89 px

Ventral
L 28.60
W 83.87

Contact Material: hardwood

Use Motion: Scrape

Use Angle: 45°

Stroke Interval: 0 50 [✓ 750] 1500 **(Duration of Use:** 10:49 **)**

Length of Utilized Edge: 2.17

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] [✓ hinge termination] step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/11

Tool Number: Flake 4

Raw Material Type: Temile

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.47 Max Length 2.99

Width: 2.42

Thickness: .69.

Weight: 4g .14oz

20.75 **Edge Angle:** 20 17 22 24

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

W 92.57 px
L 95.34

Contact Material: hardwood

Use Motion: Scrape

Use Angle: 45°

Stroke Interval: 0 50 750 [✓ 1500] **(Duration of Use:** 11:11 **)**

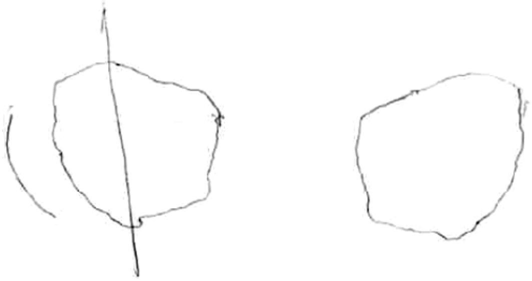
Length of Utilized Edge: 2.18

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] [✓ hinge termination] [✓ step termination]

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:



Date: 9/24

Tool Number: Flake 5

Raw Material Type: Tenmile

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 2.34 ML: 2.59

Width: 2.21

Thickness: .56

Weight: 2 g .07 oz

Edge Angle: 22 26 24 33

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: Softwood.

Use Motion: Cut

Use Angle:

Stroke Interval: [✓ 0] 50 750 1500 **(Duration of Use:** N/A **)**

Length of Utilized Edge:

Flake Scar Width:

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: straight convex concave [✓ complex.]

Tool Outline:

Date: 9/9

Tool Number: Flake 5

Raw Material Type: Tenmile

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 2.32 MaxL: 2.55

Width: 2.15

Thickness: .56

Weight: 2 .07oz

Edge Angle: 24 20 18 25

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

W 38.9 px
L 85.15 px

Contact Material: soft wood

Use Motion: cut

Use Angle: 90

Stroke Interval: 0 [✓ 50] 750 1500 **(Duration of Use:** 2:00 **)**

Length of Utilized Edge: 2.01

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] hinge termination step termination

Shape of The Edge: straight convex concave [✓ complex.]

Tool Outline:

Date: 9/9

Tool Number: Flake 5

Raw Material Type: Tumile

Flake Type: [✓ Biface Thinning] Flake Secondary Flake

Length: 2.32 **Max Length** 2.55

Width: 2.06

Thickness: .56.

Weight: 2 g .07oz

16.5 **Edge Angle:** 15 15 20 16

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Dorsal	Ventral
L 50.21	L 56.82
W 54.75	W 154.33

Contact Material: soft wood

Use Motion: cut

Use Angle: 90˚

Stroke Interval: 0 50 [✓ 750] 1500 **(Duration of Use:** 10:08 **)**

Length of Utilized Edge: 2.18

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] [✓ hinge termination] step termination

Shape of The Edge: straight convex concave [✓ complex.]

Tool Outline:

Date: 9/10

Tool Number: Flake 5

Raw Material Type: Tecovas

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 2.29 **Max Length** 2.55

Width: 2.04

Thickness: .56

Weight: 2g .07 oz

Edge Angle: 21 17 15 17

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** Yes No

175

Comments (Note edge damage if any):

W 54.20
L 70.43

Contact Material: softwood

Use Motion: cut

Use Angle: 90°

Stroke Interval: 0 50 750 [✓ 1500] **(Duration of Use:** 10:49 **)**

Length of Utilized Edge: 2.18

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] [✓ hinge termination] [✓ step termination]

Shape of The Edge: straight convex concave [✓ complex]

Tool Outline:

Date: 9/24

Tool Number: Flake 6

Raw Material Type: Tenmile

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 3.00 ML : 3.13

Width: 2.26

Thickness: .8

Weight: 4 g .14 oz

Edge Angle: 11 11 9 10

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: softwood

Use Motion: Scrape

Use Angle:

Stroke Interval: [✓ 0] 50 750 1500 **(Duration of Use:** N/A **)**

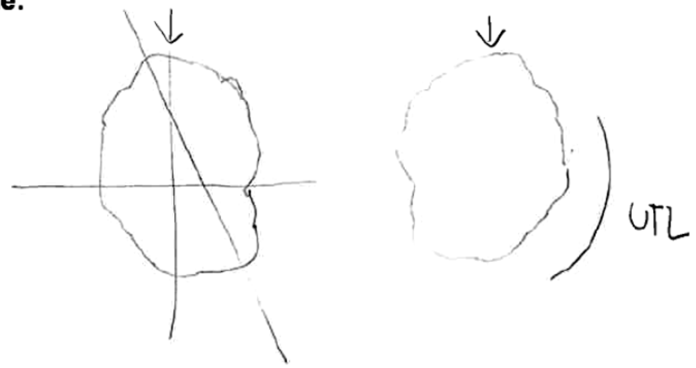
Length of Utilized Edge:

Flake Scar Width:

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:



Date: 9/9

Tool Number: Flake 6

Raw Material Type: [illegible]

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 300 ML 3:13

Width: 2.15

Thickness: .8

Weight: 4g .14oz

Edge Angle: 10 13 11 10

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

W 23.77 px
L 22.09

Contact Material: softwood

Use Motion: Scrape

Use Angle: 45

Stroke Interval: 0 [✓ 50] 750 1500 **(Duration of Use:** 1:19 **)**

Length of Utilized Edge: 2.64

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/9

Tool Number: Flake 6

Raw Material Type: [illegible]

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.95 **Max Length** 3.10

Width: 2.16

Thickness: .8

Weight: 4 g .14 oz

10.5 **Edge Angle:** 10 12 9 10

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** Yes No

Comments (Note edge damage if any):

Dowel

L 59.41

W 124.02

Contact Material: soft wood

Use Motion: Scrape

Use Angle: 45°

Stroke Interval: 0 50 [✓ 750] 1500 **(Duration of Use:** 9:19 **)**

Length of Utilized Edge: 2.63

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] [✓ hinge termination] step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

V

D

Date: 9/11

Tool Number: Flake 6

Raw Material Type: Tenwille

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.88 **Max Length** 2.99

Width: 2.16

Thickness: .8

Weight: .4 g .14 oz

Edge Angle: 12 12 13 9

11.5

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** Yes No

Comments (Note edge damage if any):

W 87.20
L 27.02

Contact Material: Softwood

Use Motion: Scrape

Use Angle: 45°

Stroke Interval: 0 50 750 [✓ 1500] **(Duration of Use:** 8:49 **)**

Length of Utilized Edge: 2.63

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] [✓ hinge termination] step termination

Shape of The Edge: straight convex [✓ concave] complex.

Tool Outline:

Date: 9/24

Tool Number: Flake 7

Raw Material Type: Tenmile

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 2.39 **Max Length** 2.4

Width: 1.65

Thickness: .42

Weight: 1 g .04oz

10.25 **Edge Angle:** 11 12 10 9

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: dryland Plant

Use Motion: Cut

Use Angle:

Stroke Interval: [✓ 0] 50 750 1500 **(Duration of Use:** N/A **)**

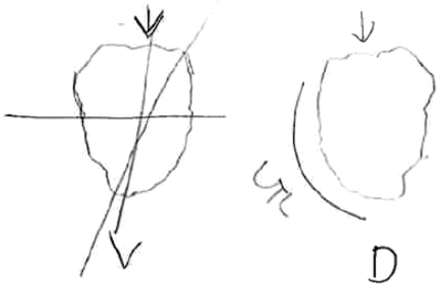
Length of Utilized Edge: —

Flake Scar Width: —

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:



Date: 9/11

Tool Number: Flake 7

Raw Material Type: Tenmile

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 2.39 **Max Length** 2.4

Width: 1.65

Thickness: .42.

Weight: 1g [illegible]

10.5 **Edge Angle:** 14 10 9 9

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: dryland plant

Use Motion: Cut

Use Angle: 90°

Stroke Interval: 0 [✓ 50] 750 1500 **(Duration of Use:** 1:16 **)**

Length of Utilized Edge: 2.23

Flake Scar Width: N/A

Flake Scar Termination: feather termination hinge termination step termination N/A

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

chenopodium album

Date: 9/24

Tool Number: Flake 7

Raw Material Type: Tennille

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 2.39 **Max Length** 2.4

Width: 1.64

Thickness: .42.

Weight: 1g .04 oz

10 **Edge Angle:** 11 10 9 10

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

W 67.74
L 35.81

Contact Material: dryfered Plant

Use Motion: Cut

Use Angle: 90

Stroke Interval: 0 50 [✓ 750] 1500 **(Duration of Use:** 9:12 **)**

Length of Utilized Edge: 2.23

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

9:12 cut
6:04 scrape

Date: 9/26

Tool Number: Flake 7

Raw Material Type: Tenillo

Flake Type: [✓ Biface Thinning Flake] Secondary Flake

Length: 2.37 Max Length 2.38

Width: 1.65

Thickness: .42.

Weight: 1g .03oz

7 **Edge Angle:** 10 8 55

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

W 30.89
L 8.06

Contact Material: dryland Plant

Use Motion: Cut

Use Angle: 90°

Stroke Interval: 0 50 750 [✓ 1500] **(Duration of Use:** 9:03 **)**

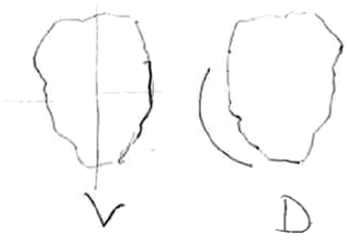
Length of Utilized Edge: 2.23

Flake Scar Width:

Flake Scar Termination: feather termination [✓ hinge termination] step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:



Date: Oct 8

Tool Number: Flake 8

Raw Material Type: Tenmile

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.41 **Max Length** 3.07

Width: 1.88

Thickness: .44.

Weight: 4 g .14 oz

48.5 **Edge Angle:** 50 47 47 50

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: dry/hard plant

Use Motion: Scrape

Use Angle:

Stroke Interval: [✓ 0] 50 750 1500 **(Duration of Use:** N/A)

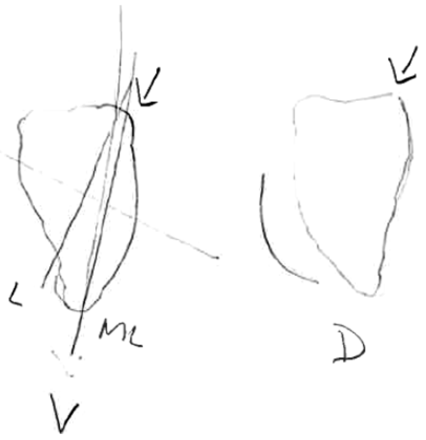
Length of Utilized Edge: \

Flake Scar Width: \

Flake Scar Termination: feather termination hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:



Date: 9/11

Tool Number: Flake 8

Raw Material Type: Tenmile

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.41 **Max Length** 3.07

Width: 1.88

Thickness: .64.

Weight: .4 g .14oz

49 **Edge Angle:** 50 47 47 52

Photo Taken? Camera: Yes No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

Contact Material: dryland plants

Use Motion: scrape

Use Angle: 45°

Stroke Interval: 0 [✓ 50] 750 1500 **(Duration of Use:** :44 **)**

Length of Utilized Edge: 1.86

Flake Scar Width: N/A

Flake Scar Termination: feather termination hinge termination step termination N/A

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:


V


D

Date: 9/24

Tool Number: Flake 8

Raw Material Type: Tenmiles

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.41 **Max Length** 3.07

Width: 1.88

Thickness: .64.

Weight: 4g .14oz

49.25 **Edge Angle:** 50 47 50 50

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** [✓ Yes] No

Comments (Note edge damage if any):

L	32.45	35.00	32.25
W	27.78	13.00	26.83

Contact Material: Drywood

Use Motion: Scrape

Use Angle: 45°

Stroke Interval: 0 50 [✓ 750] 1500 **(Duration of Use:** 6:04 **)**

Length of Utilized Edge: 1.85

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] hinge termination step termination

Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:

Date: 9/26

Tool Number: Flake 8

Raw Material Type: Tenniel

Flake Type: Biface Thinning Flake [✓ Secondary Flake]

Length: 2.41 **Max Length** 3.07

Width: 1.88

Thickness: .64

Weight: 4g .14oz

50.5 **Edge Angle:** 45 54 50 53

Photo Taken? Camera: [✓ Yes] No **Kena 3-in-1:** Yes No

Comments (Note edge damage if any):

W ~~45.79~~ 11.66
L 34.48

Contact Material: dryland plant

Use Motion: Scrape

Use Angle: 45°

Stroke Interval: 0 50 750 [✓ 1500] **(Duration of Use:** 6:23 **)**

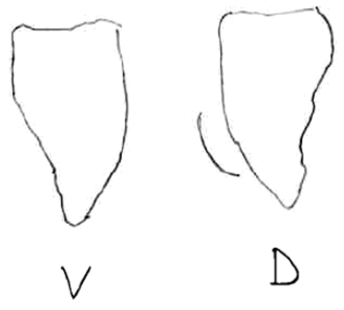
Length of Utilized Edge: 1.85

Flake Scar Width:

Flake Scar Termination: [✓ feather termination] hinge termination [✓ step termination]

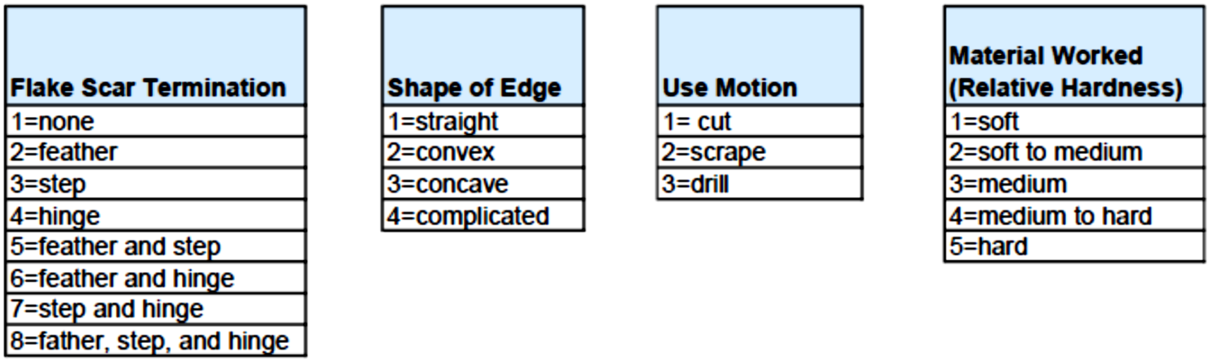
Shape of The Edge: straight [✓ convex] concave complex.

Tool Outline:



Date: 10/8

Appendix D: Experimental Expedient Tool Excel Data Collection Sheet for Stokes 0, 50, 750, and 1500



Flake Scar Termination
1=none
2=feather
3=step
4=hinge
5=feather and step
6=feather and hinge
7=step and hinge
8=father, step, and hinge

Shape of Edge
1=straight
2=convex
3=concave
4=complicated

Use Motion
1= cut
2=scrape
3=drill

Material Worked (Relative Hardness)
1=soft
2=soft to medium
3=medium
4=medium to hard
5=hard

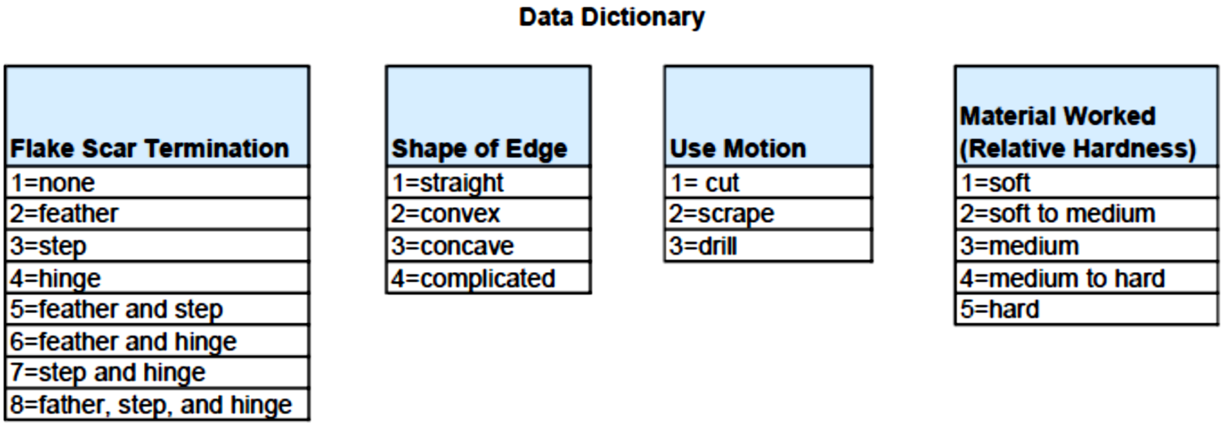
Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length	Width in cm	Thickness in cm	Weight in oz	Edge Angle in degrees	Length of Utilized Edge in cm	Flake Scar Termination	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)
Flake 01	Onondaga	biface thinning flake	3.08	4.07	2.96	0.69	0.14	30	0	1	1	dried meat	1	90	0	3
Flake 02	Tenmile	secondary flake	1.89	2.31	1.73	0.62	0.07	18.5	0	1	2	dried meat	2	45	0	3
Flake 03	Tenmile	biface thinning flake	1.9	3.1	1.75	0.48	0.07	5.25	0	1	2	hard wood	1	90	0	3
Flake 04	Tenmile	biface thinning flake	2.47	2.99	2.46	0.69	0.18	22.25	0	1	2	hard wood	2	45	0	3
Flake 05	Tenmile	biface thinning flake	2.34	2.59	2.21	0.56	0.07	26.25	0	1	4	soft wood	1	90	0	2
Flake 06	Tenmile	secondary flake	3	3.13	2.26	0.8	0.14	10.25	0	1	2	soft wood	2	45	0	2
Flake 07	Tenmile	biface thinning flake	2.39	2.4	1.65	0.42	0.04	10.5	0	1	2	wetland plant	1	90	0	1
Flake 08	Tenmile	secondary flake	2.41	3.07	1.88	0.64	0.14	48.5	0	1	2	wetland plant	2	45	0	1
Flake 09	Tenmile	biface thinning flake	1.92	2.39	2.1	0.25	0.04	10	0	1	2	dryland plant	1	90	0	1
Flake 10	Tenmile	secondary flake	1.84	3.17	2.45	0.78	0.14	23.75	0	1	2	dryland plant	2	45	0	1
Flake 11	Tenmile	biface thinning flake	2.25	2.25	1.53	0.28	0.03	9.75	0	1	4	fresh meat	1	90	0	1
Flake 12	Tenmile	secondary flake	4.22	4.72	2.06	1.87	0.28	21	0	1	2	fresh meat	2	45	0	1
Flake 13	Tenmile	secondary flake	2.64	2.76	1.18	0.34	0.03	17.5	0	1	2	fresh hide	1	90	0	1
Flake 14	Tenmile	secondary flake	3.71	3.72	2	1.09	0.21	35.5	0	1	2	fresh hide	2	45	0	1
Flake 15	Tenmile	secondary flake	1.83	2.02	1.43	0.61	0.03	13.25	0	1	2	tanned hide	1	90	0	3
Flake 16	Tenmile	secondary flake	1.59	1.98	1.51	0.33	0.03	2	0	1	1	tanned hide	2	45	0	3
Flake 17	Tenmile	biface thinning flake	1.4	2.06	1.88	0.37	0.03	4.5	0	1	2	raw hide	1	90	0	4
Flake 18	Tenmile	biface thinning flake	2.1	2.32	1.23	0.27	0.03	11	0	1	2	raw hide	2	45	0	4
Flake 19	Tenmile	biface thinning flake	1.7	2.24	1.53	0.29	0.03	12.75	0	1	1	bone	1	90	0	4
Flake 20	Tenmile	secondary flake	3.17	3.42	1.19	0.79	0.11	16.25	0	1	3	bone	2	45	0	4
Flake 21	Tenmile	biface thinning flake	1.65	1.91	1.74	0.41	0.03	3.75	0	1	4	soaked bone	1	90	0	3
Flake 22	Tenmile	secondary flake	3.68	3.82	1.6	1.07	0.21	41.33	0	1	1	soaked bone	2	45	0	3
Flake 23	Tenmile	secondary flake	1	2.32	2.1	0.4	0.03	9	0	1	4	sandstone	3	various	0	5
Flake 24	Tenmile	biface thinning flake	1.45	2.87	2.47	0.77	0.14	20.75	0	1	1	dried meat	1	90	0	3

Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length	Width in cm	Thickness in cm	Weight in oz	Edge Angle in degrees	Length of Utilized Edge in cm	Flake Scar Termination	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)
Flake 01	Onondaga	biface thinning flake	3.18	4.07	2.96	0.69	0.14	29.25	2.29	2	1	dried meat	1	90	50	3
Flake 02	Tenmile	secondary flake	1.89	2.31	1.68	0.62	0.04	17	1.52	2	2	dried meat	2	45	50	3
Flake 03	Tenmile	biface thinning flake	1.9	3.1	1.73	0.48	0.07	4.25	2.15	6	2	hard wood	1	90	50	3
Flake 04	Tenmile	biface thinning flake	2.47	2.99	2.42	0.69	0.14	24.5	2	2	2	hard wood	2	45	50	3
Flake 05	Tenmile	biface thinning flake	2.34	2.59	2.21	0.56	0.07	19.25	2.01	2	4	soft wood	1	90	50	2
Flake 06	Tenmile	secondary flake	3	3.13	2.15	0.8	0.14	11	2.64	2	2	soft wood	2	45	50	2
Flake 07	Tenmile	biface thinning flake	2.39	2.4	1.65	0.42	0.04	10.5	2.23	1	2	wetland plant	1	90	50	1
Flake 08	Tenmile	secondary flake	2.41	3.07	1.88	0.64	0.14	49	1.86	1	2	wetland plant	2	45	50	1
Flake 09	Tenmile	biface thinning flake	1.92	2.39	2.1	0.25	0.04	9.25	2.25	1	2	dryland plant	1	90	50	1
Flake 10	Tenmile	secondary flake	1.84	3.17	2.45	0.78	0.14	25.25	2.07	1	2	dryland plant	2	45	50	1
Flake 11	Tenmile	biface thinning flake	2.25	2.25	1.53	0.28	0.03	8.25	2.1	1	4	fresh meat	1	90	50	1
Flake 12	Tenmile	secondary flake	4.22	4.72	2.06	1.87	0.28	22.25	2.23	1	2	fresh meat	2	45	50	1
Flake 13	Tenmile	secondary flake	2.64	2.76	1.18	0.34	0.03	17.5	1.93	1	4	fresh hide	1	90	50	1
Flake 14	Tenmile	secondary flake	3.71	3.72	2	1.09	0.21	35.5	2.26	1	2	fresh hide	2	45	50	1
Flake 15	Tenmile	secondary flake	1.83	2.02	1.43	0.61	0.03	12.75	1.27	2	2	tanned hide	1	90	50	3
Flake 16	Tenmile	secondary flake	1.58	1.98	1.51	0.33	0.03	2	1.5	1	1	tanned hide	2	45	50	3
Flake 17	Tenmile	biface thinning flake	1.4	2.06	1.87	0.37	0.03	7	1.46	1	2	raw hide	1	90	50	4
Flake 18	Tenmile	biface thinning flake	2.1	2.32	1.23	0.27	0.03	12.75	1.05	2	2	raw hide	2	45	50	4
Flake 19	Tenmile	biface thinning flake	1.7	2.24	1.53	0.29	0.03	16.25	1.61	2	1	bone	1	90	50	4
Flake 20	Tenmile	secondary flake	3.17	3.42	1.17	0.79	0.11	23.5	2.34	8	3	bone	2	45	50	4
Flake 21	Tenmile	biface thinning flake	1.65	1.91	1.74	0.41	0.03	5	1.4	2	4	soaked bone	1	90	50	3
Flake 22	Tenmile	secondary flake	3.68	3.82	1.6	1.07	0.21	45.66	1.55	4	1	soaked bone	2	45	50	3
Flake 23	Tenmile	secondary flake	1	2.29	2.07	0.4	0.03	9.33	1.3	1	4	sandstone	3	various	50	5
Flake 24	Tenmile	biface thinning flake	1.45	2.87	2.47	0.77	0.14	19.75	2	2	1	dried meat	1	90	50	3

Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length	Width in cm	Thickness in cm	Weight in oz	Edge Angle in degrees	Length of Utilized Edge in cm	Flake Scar Termination	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)
Flake 01	Onondaga	biface thinning flake	3.18	4.07	2.45	0.69	0.14	27.5	2.97	2	1	dried meat	1	90	750	3
Flake 02	Tenmile	secondary flake	1.87	2.31	1.68	0.62	0.04	17.3	1.52	2	2	dried meat	2	45	750	3
Flake 03	Tenmile	biface thinning flake	1.8	3.07	1.7	0.48	0.07	4	3.06	8	2	hard wood	1	90	750	3
Flake 04	Tenmile	biface thinning flake	2.47	2.99	2.42	0.69	0.14	21	2.17	6	2	hard wood	2	45	750	3
Flake 05	Tenmile	biface thinning flake	2.32	2.55	2.06	0.56	0.07	16.5	2.18	6	4	soft wood	1	90	750	2
Flake 06	Tenmile	secondary flake	2.95	3.1	2.16	0.8	0.14	10.5	2.63	6	2	soft wood	2	45	750	2
Flake 07	Tenmile	biface thinning flake	2.39	2.4	1.65	0.42	0.04	10	2.23	2	2	wetland plant	1	90	750	1
Flake 08	Tenmile	secondary flake	2.41	3.07	1.88	0.64	0.14	47.75	1.85	2	2	wetland plant	2	45	750	1
Flake 09	Tenmile	biface thinning flake	1.92	2.39	2.1	0.25	0.04	12.5	2.26	2	2	dryland plant	1	90	750	1
Flake 10	Tenmile	secondary flake	1.84	3.17	2.45	0.78	0.14	22.25	2.12	2	2	dryland plant	2	45	750	1
Flake 11	Tenmile	biface thinning flake	2.25	2.25	1.53	0.28	0.03	9	2.1	1	4	fresh meat	1	90	750	1
Flake 12	Tenmile	secondary flake	4.22	4.72	2.06	1.87	0.28	22.75	2.23	1	2	fresh meat	2	45	750	1
Flake 13	Tenmile	secondary flake	2.64	2.76	1.18	0.34	0.03	22.5	1.93	2	4	fresh hide	1	90	750	1
Flake 14	Tenmile	secondary flake	3.71	3.72	1.98	1.09	0.21	39.5	2.26	5	2	fresh hide	2	45	750	1
Flake 15	Tenmile	secondary flake	1.83	2.02	1.41	0.61	0.03	14	1.51	6	2	tanned hide	1	90	750	3
Flake 16	Tenmile	secondary flake	1.57	1.98	1.51	0.33	0.03	3.75	1.63	2	1	tanned hide	2	45	750	3
Flake 17	Tenmile	biface thinning flake	1.4	2.06	1.87	0.37	0.03	22	1.67	3	2	raw hide	1	90	750	4
Flake 18	Tenmile	biface thinning flake	2.1	2.32	1.23	0.27	0.03	11.75	1.04	6	2	raw hide	2	45	750	4
Flake 19	Tenmile	biface thinning flake	1.7	2.24	1.51	0.29	0.03	38.66	1.67	5	1	bone	1	90	750	4
Flake 20	Tenmile	secondary flake	3.17	3.42	1.15	0.79	0.11	34	2.34	5	3	bone	2	45	750	4
Flake 21	Tenmile	biface thinning flake	1.65	1.9	1.72	0.41	0.03	8.5	1.5	5	4	soaked bone	1	90	750	3
Flake 22	Tenmile	secondary flake	3.68	3.82	1.6	1.07	0.21	46	1.55	5	1	soaked bone	2	45	750	3
Flake 23	Tenmile	secondary flake	1	2.31	2.05	0.4	0.03	13.25	1.27	1	2	sandstone	3	various	750	5
Flake 24	Tenmile	biface thinning flake	1.45	2.87	2.47	0.77	0.14	25	2	5	1	dried meat	1	90	750	3

Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length	Width in cm	Thickness in cm	Weight in oz	Edge Angle in degrees	Length of Utilized Edge in cm	Flake Scar Termination	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)
Flake 01	Onondaga	biface thinning flake	3.18	4.07	2.45	0.69	0.18	20.33	3.87	8	1	dried meat	1	90	1500	3
Flake 02	Tenmile	secondary flake	1.85	2.3	1.63	0.62	0.04	21.5	1.6	5	2	dried meat	2	45	1500	3
Flake 03	Tenmile	biface thinning flake	1.78	3.06	1.67	0.48	0.07	5.25	3.06	8	2	hard wood	1	90	1500	3
Flake 04	Tenmile	biface thinning flake	2.47	2.99	2.42	0.69	0.14	20.75	2.18	8	2	hard wood	2	45	1500	3
Flake 05	Tenmile	biface thinning flake	2.29	2.55	2.04	0.56	0.07	17.5	2.18	8	4	soft wood	1	90	1500	2
Flake 06	Tenmile	secondary flake	2.88	2.99	2.16	0.8	0.14	11.5	2.63	6	3	soft wood	2	45	1500	2
Flake 07	Tenmile	biface thinning flake	2.37	2.38	1.65	0.42	0.03	7	2.23	6	2	wetland plant	1	90	1500	1
Flake 08	Tenmile	secondary flake	2.41	3.07	1.88	0.64	0.14	50.5	1.85	5	2	wetland plant	2	45	1500	1
Flake 09	Tenmile	biface thinning flake	1.92	2.39	2.09	0.25	0.03	10.75	2.25	6	2	dryland plant	1	90	1500	1
Flake 10	Tenmile	secondary flake	1.84	3.17	2.45	0.78	0.14	23.75	2.12	2	2	dryland plant	2	45	1500	1
Flake 11	Tenmile	biface thinning flake	2.25	2.25	1.53	0.28	0.03	10.25	2.1	2	4	fresh meat	1	90	1500	1
Flake 12	Tenmile	secondary flake	4.22	4.72	2.06	1.87	0.28	22	2.23	2	2	fresh meat	2	45	1500	1
Flake 13	Tenmile	secondary flake	2.64	2.76	1.18	0.34	0.03	15	1.94	2	4	fresh hide	1	90	1500	1
Flake 14	Tenmile	secondary flake	3.68	3.72	1.98	1.09	0.21	39.5	2.26	8	2	fresh hide	2	45	1500	1
Flake 15	Tenmile	secondary flake	1.81	2.02	1.39	0.61	0.03	18.75	1.51	6	2	tanned hide	1	90	1500	3
Flake 16	Tenmile	secondary flake	1.54	1.98	1.51	0.33	0.03	3.75	1.62	2	1	tanned hide	2	45	1500	3
Flake 17	Tenmile	biface thinning flake	1.4	2.06	1.86	0.37	0.03	16.75	1.69	5	2	raw hide	1	90	1500	4
Flake 18	Tenmile	biface thinning flake	2.1	2.3	1.23	0.27	0.03	13.33	1.06	6	2	raw hide	2	45	1500	4
Flake 19	Tenmile	biface thinning flake	1.7	2.22	1.5	0.29	0.03	34.5	1.69	8	1	bone	1	90	1500	4
Flake 20	Tenmile	secondary flake	3.17	3.42	1.02	0.79	0.11	35.75	2.45	8	3	bone	2	45	1500	4
Flake 21	Tenmile	biface thinning flake	1.62	1.89	1.69	0.41	0.03	12.25	1.5	8	4	soaked bone	1	90	1500	3
Flake 22	Tenmile	secondary flake	3.66	3.82	1.6	1.07	0.21	54.5	1.54	6	1	soaked bone	2	45	1500	3
Flake 23	Tenmile	secondary flake	1	2.31	1.99	0.4	0.03	22.66	1.3	1	2	sandstone	3	various	1500	5
Flake 24	Tenmile	biface thinning flake	1.45	2.87	2.47	0.77	0.11	14	2	5	1	dried meat	1	90	1500	3

Appendix E: Experiment Expedient Tool Excel Data Collection Sheets Containing All Flake Scar Averages



Data Dictionary

Flake Scar Termination
1=none
2=feather
3=step
4=hinge
5=feather and step
6=feather and hinge
7=step and hinge
8=father, step, and hinge

Shape of Edge
1=straight
2=convex
3=concave
4=complicated

Use Motion
1= cut
2=scrape
3=drill

Material Worked (Relative Hardness)
1=soft
2=soft to medium
3=medium
4=medium to hard
5=hard

Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length	Width in cm	Thickness in cm	Weight in oz	Edge Angle in degrees	Length of Utilized Edge in cm	Flake Scar Width in mm (Avg)	Flake Scar Length in mm (Avg)	Flake Scar Termination	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)
Flake 01	Onondaga	biface thinning flake	3.18	4.07	2.45	0.69	0.18	20.33	3.87	1.01	0.47	8	1	dried meat	1	90	1500	3
Flake 01 F	Onondaga	biface thinning flake	3.18	4.07	2.45	0.69	0.18	20.33	3.87	1.07	0.43	8	1	dried meat	1	90	1500	3
Flake 01 S	Onondaga	biface thinning flake	3.18	4.07	2.45	0.69	0.18	20.33	3.87	1.45	0.54	8	1	dried meat	1	90	1500	3
Flake 01 H	Onondaga	biface thinning flake	3.18	4.07	2.45	0.69	0.18	20.33	3.87	0.63	1.21	8	1	dried meat	1	90	1500	3
Flake 02	Tenmile	secondary flake	1.85	2.3	1.63	0.62	0.04	21.5	1.6	0.73	0.6	5	2	dried meat	2	45	1500	3
Flake 02 F	Tenmile	secondary flake	1.85	2.3	1.63	0.62	0.04	21.5	1.6	0.71	0.56	5	2	dried meat	2	45	1500	3
Flake 02 S	Tenmile	secondary flake	1.85	2.3	1.63	0.62	0.04	21.5	1.6	0.84	0.66	5	2	dried meat	2	45	1500	3
Flake 02 H	Tenmile	secondary flake	1.85	2.3	1.63	0.62	0.04	21.5	1.6	0.68	0.68	5	2	dried meat	2	45	1500	3
Flake 03	Tenmile	biface thinning flake	1.78	3.06	1.67	0.48	0.07	5.25	3.06	1.28	0.44	8	2	hard wood	1	90	1500	3
Flake 03 F	Tenmile	biface thinning flake	1.78	3.06	1.67	0.48	0.07	5.25	3.06	1.04	0.24	8	2	hard wood	1	90	1500	3
Flake 03 S	Tenmile	biface thinning flake	1.78	3.06	1.67	0.48	0.07	5.25	3.06	0.85	0.85	8	2	hard wood	1	90	1500	3
Flake 03 H	Tenmile	biface thinning flake	1.78	3.06	1.67	0.48	0.07	5.25	3.06	0.58	0.86	8	2	hard wood	1	90	1500	3
Flake 04	Tenmile	biface thinning flake	2.47	2.99	2.42	0.69	0.14	20.75	2.18	1.32	0.76	8	2	hard wood	2	45	1500	3
Flake 04 F	Tenmile	biface thinning flake	2.47	2.99	2.42	0.69	0.14	20.75	2.18	1.45	1.03	8	2	hard wood	2	45	1500	3
Flake 04 S	Tenmile	biface thinning flake	2.47	2.99	2.42	0.69	0.14	20.75	2.18	1.1	0.5	8	2	hard wood	2	45	1500	3
Flake 04 H	Tenmile	biface thinning flake	2.47	2.99	2.42	0.69	0.14	20.75	2.18	3.7	0.44	8	2	hard wood	2	45	1500	3
Flake 05	Tenmile	biface thinning flake	2.29	2.55	2.04	0.56	0.07	17.5	2.18	1.04	0.98	8	4	soft wood	1	90	1500	2
Flake 05 F	Tenmile	biface thinning flake	2.29	2.55	2.04	0.56	0.07	17.5	2.18	1.05	0.91	8	4	soft wood	1	90	1500	2
Flake 05 S	Tenmile	biface thinning flake	2.29	2.55	2.04	0.56	0.07	17.5	2.18	0.85	1.19	8	4	soft wood	1	90	1500	2
Flake 05 H	Tenmile	biface thinning flake	2.29	2.55	2.04	0.56	0.07	17.5	2.18	1.5	0.78	8	4	soft wood	1	90	1500	2
Flake 06	Tenmile	secondary flake	2.88	2.99	2.16	0.8	0.14	11.5	2.63	1.03	0.62	6	3	soft wood	2	45	1500	2
Flake 06 F	Tenmile	secondary flake	2.88	2.99	2.16	0.8	0.14	11.5	2.63	1.01	0.52	6	3	soft wood	2	45	1500	2
Flake 06 S	Tenmile	secondary flake	2.88	2.99	2.16	0.8	0.14	11.5	2.63	0.72	0.66	6	3	soft wood	2	45	1500	2
Flake 06 H	Tenmile	secondary flake	2.88	2.99	2.16	0.8	0.14	11.5	2.63	1.46	1.07	6	3	soft wood	2	45	1500	2
Flake 07	Tenmile	biface thinning flake	2.37	2.38	1.65	0.42	0.03	7	2.23	0.98	0.42	6	2	wetland plant	1	90	1500	1
Flake 07 F	Tenmile	biface thinning flake	2.37	2.38	1.65	0.42	0.03	7	2.23	1.08	0.35	6	2	wetland plant	1	90	1500	1
Flake 07 S	Tenmile	biface thinning flake	2.37	2.38	1.65	0.42	0.03	7	2.23	0.73	0.58	6	2	wetland plant	1	90	1500	1
Flake 07 H	Tenmile	biface thinning flake	2.37	2.38	1.65	0.42	0.03	7	2.23	1.12	0.4	6	2	wetland plant	1	90	1500	1
Flake 08	Tenmile	secondary flake	2.41	3.07	1.88	0.64	0.14	50.5	1.85	0.33	0.62	5	2	wetland plant	2	45	1500	1
Flake 08 F	Tenmile	secondary flake	2.41	3.07	1.88	0.64	0.14	50.5	1.85	0.4	0.7	5	2	wetland plant	2	45	1500	1
Flake 08 S	Tenmile	secondary flake	2.41	3.07	1.88	0.64	0.14	50.5	1.85	0.35	0.54	5	2	wetland plant	2	45	1500	1
Flake 08 H	Tenmile	secondary flake	2.41	3.07	1.88	0.64	0.14	50.5	1.85	0	0	5	2	wetland plant	2	45	1500	1
Flake 09	Tenmile	biface thinning flake	1.92	2.39	2.09	0.25	0.03	10.75	2.25	1.25	0.73	6	2	dryland plant	1	90	1500	1
Flake 09 F	Tenmile	biface thinning flake	1.92	2.39	2.09	0.25	0.03	10.75	2.25	1.2	0.66	6	2	dryland plant	1	90	1500	1
Flake 09 S	Tenmile	biface thinning flake	1.92	2.39	2.09	0.25	0.03	10.75	2.25	0	0	6	2	dryland plant	1	90	1500	1
Flake 09 H	Tenmile	biface thinning flake	1.92	2.39	2.09	0.25	0.03	10.75	2.25	0.83	0.67	6	2	dryland plant	1	90	1500	1
Flake 10	Tenmile	secondary flake	1.84	3.17	2.45	0.78	0.14	23.75	2.12	0.53	0.43	2	2	dryland plant	2	45	1500	1
Flake 10 F	Tenmile	secondary flake	1.84	3.17	2.45	0.78	0.14	23.75	2.12	0.5	0.41	2	2	dryland plant	2	45	1500	1
Flake 10 S	Tenmile	secondary flake	1.84	3.17	2.45	0.78	0.14	23.75	2.12	0.67	0.49	2	2	dryland plant	2	45	1500	1
Flake 10 H	Tenmile	secondary flake	1.84	3.17	2.45	0.78	0.14	23.75	2.12	0.49	0.45	2	2	dryland plant	2	45	1500	1

Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length	Width in cm	Thickness in cm	Weight in oz	Edge Angle in degrees	Length of Utilized Edge in cm	Flake Scar Width in mm (Avg)	Flake Scar Length in mm (Avg)	Flake Scar Termination	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)
Flake 11	Tenmile	biface thinning flake	2.25	2.25	1.53	0.28	0.03	10.25	2.1	0.31	0.19	2	4	fresh meat	1	90	1500	1
Flake 11 F	Tenmile	biface thinning flake	2.25	2.25	1.53	0.28	0.03	10.25	2.1	0.31	0.19	2	4	fresh meat	1	90	1500	1
Flake 11 S	Tenmile	biface thinning flake	2.25	2.25	1.53	0.28	0.03	10.25	2.1	0	0	2	4	fresh meat	1	90	1500	1
Flake 11 H	Tenmile	biface thinning flake	2.25	2.25	1.53	0.28	0.03	10.25	2.1	0	0	2	4	fresh meat	1	90	1500	1
Flake 12	Tenmile	secondary flake	4.22	4.72	2.06	1.87	0.28	22	2.23	0.45	0.54	2	2	fresh meat	2	45	1500	1
Flake 12 F	Tenmile	secondary flake	4.22	4.72	2.06	1.87	0.28	22	2.23	0.45	0.54	2	2	fresh meat	2	45	1500	1
Flake 12 S	Tenmile	secondary flake	4.22	4.72	2.06	1.87	0.28	22	2.23	0	0	2	2	fresh meat	2	45	1500	1
Flake 12 H	Tenmile	secondary flake	4.22	4.72	2.06	1.87	0.28	22	2.23	0	0	2	2	fresh meat	2	45	1500	1
Flake 13	Tenmile	secondary flake	2.64	2.76	1.18	0.34	0.03	15	1.94	0.31	0.21	2	4	fresh hide	1	90	1500	1
Flake 13 F	Tenmile	secondary flake	2.64	2.76	1.18	0.34	0.03	15	1.94	0.31	0.21	2	4	fresh hide	1	90	1500	1
Flake 13 S	Tenmile	secondary flake	2.64	2.76	1.18	0.34	0.03	15	1.94	0.31	0	2	4	fresh hide	1	90	1500	1
Flake 13 H	Tenmile	secondary flake	2.64	2.76	1.18	0.34	0.03	15	1.94	0	0	2	4	fresh hide	1	90	1500	1
Flake 14	Tenmile	secondary flake	3.68	3.72	1.98	1.09	0.21	39.5	2.26	0.49	0.33	8	2	fresh hide	2	45	1500	1
Flake 14 F	Tenmile	secondary flake	3.68	3.72	1.98	1.09	0.21	39.5	2.26	0.32	0.3	8	2	fresh hide	2	45	1500	1
Flake 14 S	Tenmile	secondary flake	3.68	3.72	1.98	1.09	0.21	39.5	2.26	0.78	0.59	8	2	fresh hide	2	45	1500	1
Flake 14 H	Tenmile	secondary flake	3.68	3.72	1.98	1.09	0.21	39.5	2.26	0.81	0.49	8	2	fresh hide	2	45	1500	1
Flake 15	Tenmile	secondary flake	1.81	2.02	1.39	0.61	0.03	18.75	1.51	0.85	0.4	6	2	tanned hide	1	90	1500	3
Flake 15 F	Tenmile	secondary flake	1.81	2.02	1.39	0.61	0.03	18.75	1.51	1.08	0.4	6	2	tanned hide	1	90	1500	3
Flake 15 S	Tenmile	secondary flake	1.81	2.02	1.39	0.61	0.03	18.75	1.51	0.71	0.42	6	2	tanned hide	1	90	1500	3
Flake 15 H	Tenmile	secondary flake	1.81	2.02	1.39	0.61	0.03	18.75	1.51	0.59	0.33	6	2	tanned hide	1	90	1500	3
Flake 16	Tenmile	secondary flake	1.54	1.98	1.51	0.33	0.03	3.75	1.62	1.11	0.58	2	1	tanned hide	2	45	1500	3
Flake 16 F	Tenmile	secondary flake	1.54	1.98	1.51	0.33	0.03	3.75	1.62	0.85	0.59	2	1	tanned hide	2	45	1500	3
Flake 16 S	Tenmile	secondary flake	1.54	1.98	1.51	0.33	0.03	3.75	1.62	1.26	0.58	2	1	tanned hide	2	45	1500	3
Flake 16 H	Tenmile	secondary flake	1.54	1.98	1.51	0.33	0.03	3.75	1.62	0	0	2	1	tanned hide	2	45	1500	3
Flake 17	Tenmile	biface thinning flake	1.4	2.06	1.86	0.37	0.03	16.75	1.69	1.01	0.62	5	2	raw hide	1	90	1500	4
Flake 17 F	Tenmile	biface thinning flake	1.4	2.06	1.86	0.37	0.03	16.75	1.69	1.18	0.6	5	2	raw hide	1	90	1500	4
Flake 17 S	Tenmile	biface thinning flake	1.4	2.06	1.86	0.37	0.03	16.75	1.69	0.85	0.71	5	2	raw hide	1	90	1500	4
Flake 17 H	Tenmile	biface thinning flake	1.4	2.06	1.86	0.37	0.03	16.75	1.69	0.74	0.51	5	2	raw hide	1	90	1500	4
Flake 18	Tenmile	biface thinning flake	2.1	2.3	1.23	0.27	0.03	13.33	1.06	0.6	0.76	6	2	raw hide	2	45	1500	4
Flake 18 F	Tenmile	biface thinning flake	2.1	2.3	1.23	0.27	0.03	13.33	1.06	0.92	0.79	6	2	raw hide	2	45	1500	4
Flake 18 S	Tenmile	biface thinning flake	2.1	2.3	1.23	0.27	0.03	13.33	1.06	0.49	0.79	6	2	raw hide	2	45	1500	4
Flake 18 H	Tenmile	biface thinning flake	2.1	2.3	1.23	0.27	0.03	13.33	1.06	0.55	0.72	6	2	raw hide	2	45	1500	4
Flake 19	Tenmile	biface thinning flake	1.7	2.22	1.5	0.29	0.03	34.5	1.69	0.89	0.79	8	1	bone	1	90	1500	4
Flake 19 F	Tenmile	biface thinning flake	1.7	2.22	1.5	0.29	0.03	34.5	1.69	0.74	0.79	8	1	bone	1	90	1500	4
Flake 19 S	Tenmile	biface thinning flake	1.7	2.22	1.5	0.29	0.03	34.5	1.69	0.95	0.79	8	1	bone	1	90	1500	4
Flake 19 H	Tenmile	biface thinning flake	1.7	2.22	1.5	0.29	0.03	34.5	1.69	1.49	0.72	8	1	bone	1	90	1500	4
Flake 20	Tenmile	secondary flake	3.17	3.42	1.02	0.79	0.11	35.75	2.45	0.76	1.12	8	3	bone	2	45	1500	4
Flake 20 F	Tenmile	secondary flake	3.17	3.42	1.02	0.79	0.11	35.75	2.45	0.8	1.24	8	3	bone	2	45	1500	4
Flake 20 S	Tenmile	secondary flake	3.17	3.42	1.02	0.79	0.11	35.75	2.45	0.69	0.67	8	3	bone	2	45	1500	4
Flake 20 H	Tenmile	secondary flake	3.17	3.42	1.02	0.79	0.11	35.75	2.45	0.69	1.02	8	3	bone	2	45	1500	4

Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length	Width in cm	Thickness in cm	Weight in oz	Edge Angle in degrees	Length of Utilized Edge in cm	Flake Scar Width in mm (Avg)	Flake Scar Length in mm (Avg)	Flake Scar Termination	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)
Flake 21	Tenmile	biface thinning flake	1.62	1.89	1.69	0.41	0.03	12.25	1.5	0.68	0.66	8	4	soaked bone	1	90	1500	3
Flake 21 F	Tenmile	biface thinning flake	1.62	1.89	1.69	0.41	0.03	12.25	1.5	0.67	0.68	8	4	soaked bone	1	90	1500	3
Flake 21 S	Tenmile	biface thinning flake	1.62	1.89	1.69	0.41	0.03	12.25	1.5	0.66	0.64	8	4	soaked bone	1	90	1500	3
Flake 21 H	Tenmile	biface thinning flake	1.62	1.89	1.69	0.41	0.03	12.25	1.5	0.81	0.61	8	4	soaked bone	1	90	1500	3
Flake 22	Tenmile	secondary flake	3.66	3.82	1.6	1.07	0.21	54.5	1.54	0.84	1.34	6	1	soaked bone	2	45	1500	3
Flake 22 F	Tenmile	secondary flake	3.66	3.82	1.6	1.07	0.21	54.5	1.54	0.74	0.73	6	1	soaked bone	2	45	1500	3
Flake 22 S	Tenmile	secondary flake	3.66	3.82	1.6	1.07	0.21	54.5	1.54	0.71	1.53	6	1	soaked bone	2	45	1500	3
Flake 22 H	Tenmile	secondary flake	3.66	3.82	1.6	1.07	0.21	54.5	1.54	1.08	1.2	6	1	soaked bone	2	45	1500	3
Flake 23	Tenmile	secondary flake	1	2.31	1.99	0.4	0.03	22.66	1.3	0	0	1	2	sandstone	3	various	1500	5
Flake 23 F	Tenmile	secondary flake	1	2.31	1.99	0.4	0.03	22.66	1.3	0	0	1	2	sandstone	3	various	1500	5
Flake 23 S	Tenmile	secondary flake	1	2.31	1.99	0.4	0.03	22.66	1.3	0	0	1	2	sandstone	3	various	1500	5
Flake 23 H	Tenmile	secondary flake	1	2.31	1.99	0.4	0.03	22.66	1.3	0	0	1	2	sandstone	3	various	1500	5
Flake 24	Tenmile	biface thinning flake	1.45	2.87	2.47	0.77	0.11	14	2	1.28	1.07	5	1	dried meat	1	90	1500	3
Flake 24 F	Tenmile	biface thinning flake	1.45	2.87	2.47	0.77	0.11	14	2	1.33	1.07	5	1	dried meat	1	90	1500	3
Flake 24 S	Tenmile	biface thinning flake	1.45	2.87	2.47	0.77	0.11	14	2	1.28	1.07	5	1	dried meat	1	90	1500	3
Flake 24 H	Tenmile	biface thinning flake	1.45	2.87	2.47	0.77	0.11	14	2	1.15	1.04	5	1	dried meat	1	90	1500	3

Appendix F: Experimental Expedient Tool Raw Data Charts

FLAKE 01		
Termination	Width (mm)	Length (mm)
Feather	0.54	0.26
Feather	1.21	0.28
Feather	1.29	0.36
Feather	1.34	0.44
Feather	1.27	0.36
Feather		0.49
Feather		0.60
Feather	0.96	0.80
Feather	0.03	0.91
Feather	0.32	0.68
Feather		0.77
Feather	0.56	0.60
Feather	1.77	0.77
Feather	1.26	0.51
Feather	1.58	0.23
Feather	1.87	0.34
Feather	4.20	0.19
Step	0.92	0.55
Step	0.52	0.52
Hinge	0.63	1.21

FLAKE 01		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.01	0.47
Feather	1.07	0.43
Step	0.72	0.54
Hinge	0.63	1.21

FLAKE 02		
Termination	Width (mm)	Length (mm)
Feather	1.06	1.02
Feather		0.61
Feather	0.74	0.53
Feather		1.15
Feather	1.31	1.12
Feather	1.42	0.16
Feather	0.46	0.41
Feather	0.50	0.32
Feather	0.31	0.25
Feather		0.13
Feather	0.90	0.39
Feather	0.34	0.31
Feather	0.39	0.25
Feather		0.28
Feather	0.74	0.40
Feather	0.48	0.28
Feather		0.25
Feather		0.34
Feather	0.94	0.31
Feather	0.72	0.68
Feather	1.01	0.72
Feather	0.40	0.32
Feather	0.36	0.35
Feather	0.34	0.38
Feather	0.48	0.59
Feather	0.47	0.78
Feather	0.34	0.47
Feather	0.56	0.58
Feather	0.63	0.74
Feather	0.79	1.16
Feather	1.29	0.93
Feather		0.85
Feather	0.63	0.93
Feather	0.31	1.03
Feather	0.77	0.96
Feather		0.59
Feather	1.95	0.63
Step	0.77	0.59
Step	0.71	0.88
Step	1.61	0.46
Step		0.78
Step	0.65	0.37
Step		1.12
Step		0.83
Step	0.47	0.93
Hinge	0.68	0.82
Hinge		1.66

FLAKE 02		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.73	0.60
Feather	0.71	0.56
Step	0.84	0.66
Hinge	0.68	1.24

FLAKE 03		
Termination	Width (mm)	Length (mm)
Feather		0.23
Feather		0.14
Feather		0.08
Feather	0.44	0.14
Feather	0.65	0.30
Feather	0.82	0.29
Feather	0.63	0.22
Feather	0.66	0.26
Feather	0.48	0.11
Feather	1.36	0.23
Feather	1.47	0.30
Feather	0.55	0.30
Feather	1.43	0.22
Feather	2.28	0.14
Feather	1.72	1.26
Feather	1.86	0.56
Feather	1.81	0.28
Feather	1.33	0.31
Feather	0.73	0.57
Feather	1.37	0.30
Feather	2.01	0.20
Feather		0.57
Feather	2.85	0.49
Feather	1.81	1.05
Feather	2.13	0.21
Feather	1.92	0.52
Step	0.36	0.36
Step	1.33	1.33
Hinge	0.51	0.24
Hinge		0.75
Hinge	0.66	1.59

FLAKE 03		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.28	0.44
Feather	1.04	0.24
Step	0.85	0.85
Hinge	0.58	0.86

FLAKE 04		
Termination	Width (mm)	Length (mm)
Feather	2.33	0.32
Feather	2.69	1.27
Feather		1.47
Feather	0.89	1.29
Feather	0.95	1.45
Feather	0.37	0.38
Step	0.88	0.92
Step	0.51	0.73
Step	1.66	0.67
Step	1.66	0.28
Step	0.94	0.04
Step	0.94	0.34
Step	1.33	0.41
Step	0.90	0.57
Hinge	3.70	0.44

FLAKE 04		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.32	0.76
Feather	1.45	1.03
Step	1.10	0.50
Hinge	3.70	0.44

FLAKE 05		
Termination	Width (mm)	Length (mm)
Feather	0.38	1.57
Feather	4.32	0.21
Feather	2.24	0.18
Feather	0.56	0.30
Feather		2.69
Feather		4.57
Feather	1.29	0.80
Feather	1.40	0.97
Feather	0.72	1.02
Feather	0.74	2.17
Feather	1.42	0.45
Feather	1.08	0.46
Feather	2.04	0.46
Feather	0.22	0.31
Feather	0.36	0.62
Feather	0.31	0.27
Feather	0.39	0.43
Feather	0.31	0.12
Feather	0.30	0.27
Feather	0.82	0.27
Step		3.38
Step	0.54	1.11
Step		1.44
Step	0.75	1.00
Step	1.17	0.36
Step	1.49	1.44
Step	0.66	0.38
Step	0.50	0.41
Hinge	1.07	0.97
Hinge	1.92	0.60

FLAKE 05		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.04	0.98
Feather	1.05	0.91
Step	0.85	1.19
Hinge	1.50	0.78

FLAKE 06		
Termination	Width (mm)	Length (mm)
Feather	0.80	0.63
Feather	0.69	0.52
Feather	0.33	0.40
Feather	0.28	0.29
Feather		0.94
Feather	1.69	0.62
Feather	2.52	0.80
Feather	1.33	0.58
Feather	1.02	0.34
Feather	1.10	0.25
Feather	1.81	0.24
Feather	0.91	0.34
Feather	0.91	0.34
Feather	0.87	0.32
Feather	0.34	0.57
Feather	0.22	0.60
Feather	0.30	0.65
Feather	0.33	0.50
Feather	0.75	0.23
Feather	1.48	0.28
Feather	1.09	0.45
Feather	2.14	0.39
Feather	1.06	0.28
Feather	0.83	0.30
Feather	1.68	0.40
Feather	0.81	0.53
Feather	0.86	0.55
Feather	1.10	3.09
Step	0.99	0.52
Step		0.74
Step	0.45	0.71
Hinge	1.43	1.77
Hinge		0.84
Hinge	1.95	0.88
Hinge	1.01	0.80

FLAKE 06		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.03	0.62
Feather	1.01	0.55
Step	0.72	0.66
Hinge	1.46	1.07

FLAKE 07		
Termination	Width (mm)	Length (mm)
Feather	0.93	0.48
Feather	0.55	0.16
Feather	0.63	0.34
Feather	0.69	0.34
Feather	0.47	0.56
Feather	3.23	0.22
Step	0.59	0.54
Step	0.77	1.03
Step	0.84	0.16
Hinge	1.12	0.40

FLAKE 07		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.98	0.42
Feather	1.08	0.35
Step	0.73	0.58
Hinge	1.12	0.40

FLAKE 08		
Termination	Width (mm)	Length (mm)
Feather	0.26	0.40
Feather	0.34	0.31
Feather	0.15	0.21
Feather	0.18	0.16
Feather	0.33	0.19
Feather	0.60	1.40
Feather		2.40
Feather	0.72	0.51
Feather	0.64	0.70
Step	0.36	0.27
Step	0.29	0.63
Step	0.27	0.41
Step	0.41	0.43
Step	0.46	0.38
Step	0.20	0.40
Step	0.42	0.25
Step	0.36	1.53

FLAKE 08		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.33	0.62
Feather	0.40	0.70
Step	0.35	0.54

FLAKE 09		
Termination	Width (mm)	Length (mm)
Feather	0.87	0.47
Feather	0.41	0.73
Feather	0.65	0.95
Feather	2.05	0.50
Feather	1.51	0.57
Feather	0.00	0.38
Feather	1.82	1.10
Feather	2.25	1.22
Hinge	0.94	0.93
Hinge	0.73	0.41

FLAKE 09		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.25	0.73
Feather	1.20	0.66
Hinge	0.83	0.67

FLAKE 10

Termination	Width (mm)	Length (mm)
Feather	0.56	0.24
Feather	0.42	0.25
Feather	0.42	0.39
Feather	0.84	0.20
Feather		0.27
Feather	0.14	0.25
Feather	0.28	0.26
Feather	0.60	0.31
Feather	0.53	0.56
Feather	0.16	0.26
Feather	0.42	0.70
Feather	0.43	0.39
Feather	0.19	0.29
Feather	0.34	0.53
Feather	0.96	0.62
Feather	1.04	0.48
Feather		0.54
Feather	0.74	0.84
Step	0.87	0.73
Step	0.71	0.52
Step	0.50	0.23
Step	0.58	0.46
Hinge	0.35	0.56
Hinge		0.45
Hinge	0.64	0.42
Hinge		0.36
Hinge	0.98	1.80
Hinge	0.49	0.45
Hinge		0.84

FLAKE 10

Termination	Avg Width (mm)	Avg Length (mm)
All	0.53	0.43
Feather	0.50	0.41
Step	0.67	0.49
Hinge	0.49	0.45

FLAKE 11

Termination	Width (mm)	Length (mm)
Feather	0.15	0.15
Feather	0.35	0.30
Feather	0.23	0.30
Feather		0.25
Feather	0.24	0.25
Feather	0.21	0.09
Feather	0.38	0.12
Feather	0.40	0.26
Feather	0.50	0.29
Feather		0.13

FLAKE 11

Termination	Avg Width (mm)	Avg Length (mm)
All	0.31	0.19
Feather	0.31	0.19

FLAKE 12

Termination	Width (mm)	Length (mm)
Feather	0.47	0.44
Feather		0.95
Feather	0.43	1.00
Feather	0.30	0.40
Feather	0.58	0.25
Feather		0.22

FLAKE 12

Termination	Avg Width (mm)	Avg Length (mm)
All	0.45	0.54
Feather	0.45	0.54

FLAKE 13		
Termination	Width (mm)	Length (mm)
Feather	0.51	0.66
Feather	0.43	0.38
Feather	0.24	0.14
Feather	0.22	0.11
Feather	0.23	0.11
Feather	0.14	0.10
Feather	0.17	0.07
Feather	0.14	0.13
Feather	0.38	0.21
Feather	0.64	0.12
Feather	0.29	0.17
Feather	0.27	0.11
Feather	0.28	0.34
Feather	0.43	0.24
Feather	0.33	0.22
Feather	0.26	0.19

FLAKE 13		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.31	0.21
Feather	0.31	0.21

FLAKE 14		
Termination	Width (mm)	Length (mm)
Feather	0.31	0.43
Feather	1.01	0.27
Feather	0.00	0.32
Feather	0.35	0.21
Feather	0.24	0.39
Feather	0.00	0.28
Feather	0.94	0.48
Feather	0.76	0.36
Feather	0.66	0.58
Feather	0.18	0.13
Feather	0.16	0.15
Feather	0.11	0.11
Feather	0.52	0.24
Feather	0.34	0.20
Feather	0.29	0.20
Feather	0.32	0.18
Feather	0.33	0.13
Feather		0.20
Feather	0.26	0.14
Feather	0.18	0.14
Feather	0.25	0.20
Feather	0.26	0.14
Feather		0.25
Feather	0.42	0.22
Feather		0.19
Feather	0.34	0.21
Step	1.81	0.99
Step	0.34	0.37
Step		0.71
Step	0.40	0.65
Step	0.57	0.24
Step		0.54
Hinge	1.14	0.52
Hinge	0.90	0.41
Hinge		0.95
Hinge	0.39	0.29
Hinge		0.29

FLAKE 14		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.49	0.33
Feather	0.32	0.30
Step	0.78	0.59
Hinge	0.81	0.49

FLAKE 15		
Termination	Width (mm)	Length (mm)
Feather	0.32	0.35
Feather	0.47	0.53
Feather		0.74
Feather	0.58	0.35
Feather		0.04
Feather	0.75	0.62
Feather	1.31	0.48
Feather	2.75	0.34
Feather	2.02	0.25
Feather	0.74	0.57
Feather	0.74	0.07
Step	0.89	0.59
Step	0.45	0.26
Step	0.93	0.44
Step	0.79	0.42
Step	0.30	0.28
Step	0.63	0.44
Step	0.98	0.59
Step	0.70	0.48
Step	0.54	0.28
Step	0.89	0.36
Hinge	0.47	0.27
Hinge	0.70	0.37

FLAKE 15		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.85	0.40
Feather	1.08	0.40
Step	0.71	0.42
Hinge	0.59	0.33

FLAKE 16		
Termination	Width (mm)	Length (mm)
Feather	1.14	0.54
Feather	0.72	0.94
Feather	0.68	0.30
Step	1.49	0.56
Step	0.96	0.63
Step	0.84	0.38
Step	0.85	0.37
Step	1.18	0.52
Step	2.23	1.00

FLAKE 16		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.11	0.58
Feather	0.85	0.59
Step	1.26	0.58

FLAKE 17		
Termination	Width (mm)	Length (mm)
Feather	1.11	0.50
Feather	1.98	0.29
Feather	0.66	0.77
Feather	0.40	0.38
Feather	0.71	0.85
Feather	1.18	0.28
Feather	3.06	0.56
Feather	0.46	0.95
Feather	1.03	1.30
Feather		0.16
Step	0.79	0.82
Step	0.77	0.78
Step	0.94	0.50
Step	0.62	0.70
Step	1.29	1.02
Step	0.65	0.43
Hinge		0.56
Hinge	0.99	0.48
Hinge	0.49	0.50

FLAKE 17		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.01	0.62
Feather	1.18	0.60
Step	0.85	0.71
Hinge	0.74	0.51

FLAKE 18		
Termination	**Width (mm)**	**Length (mm)**
Feather		0.46
Feather		0.51
Feather		0.35
Feather	0.47	0.51
Feather	0.77	0.76
Feather	1.52	0.26
Step	0.41	0.47
Step	0.68	0.60
Step	0.38	0.76
Hinge	0.87	0.81
Hinge	0.42	0.65
Hinge	0.41	0.49
Hinge	0.50	0.22
Hinge	0.32	0.30
Hinge	0.33	0.29
Hinge	1.25	0.55
Hinge	0.57	0.51
Hinge	0.02	0.59
Hinge	0.39	0.50
Hinge	0.71	0.55
Hinge	0.82	0.50
Hinge	0.57	0.38

FLAKE 18		
Termination	**Avg Width (mm)**	**Avg Length (mm)**
All	0.60	0.50
Feather	0.92	0.48
Step	0.49	0.63
Hinge	0.55	0.49

FLAKE 19		
Termination	**Width (mm)**	**Length (mm)**
Feather		1.39
Feather	1.03	0.62
Feather	0.36	0.97
Feather	0.95	0.24
Feather	0.95	0.61
Feather	0.59	0.50
Feather	2.09	0.65
Feather	0.55	1.41
Feather		0.76
Feather	0.32	0.47
Feather	0.68	0.58
Feather	0.51	1.05
Feather	0.35	1.05
Feather	0.54	0.81
Step	3.48	1.32
Step	0.54	0.27
Step	0.65	0.60
Step	0.61	0.66
Step	0.71	0.37
Step	0.37	0.50
Step	0.76	0.53
Step	0.90	0.62
Step		0.83
Step		0.49
Step	0.53	1.58
Step		1.46
Step		1.03
Hinge	0.95	0.79
Hinge		0.65
Hinge	2.03	0.72

FLAKE 19		
Termination	**Avg Width (mm)**	**Avg Length (mm)**
All	0.89	0.79
Feather	0.74	0.79
Step	0.95	0.79
Hinge	1.49	0.72

FLAKE 20		
Termination	Width (mm)	Length (mm)
Feather	0.70	1.91
Feather	0.64	2.37
Feather	0.66	1.35
Feather		1.11
Feather	0.79	1.39
Feather	0.66	1.91
Feather	0.00	1.60
Feather	0.76	1.49
Feather	0.72	1.71
Feather		1.07
Feather	0.74	0.84
Feather	0.97	0.88
Feather	0.49	0.97
Feather	0.00	0.80
Feather	1.95	1.05
Feather	0.45	0.73
Feather		0.49
Feather	0.89	0.59
Step	0.45	0.59
Step	0.44	0.70
Step	0.70	0.91
Step	1.15	0.48
Hinge	0.59	0.50
Hinge	0.55	0.44
Hinge	0.91	2.12

FLAKE 20		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.76	1.12
Feather	0.80	1.24
Step	0.69	0.67
Hinge	0.69	1.02

FLAKE 21		
Termination	Width (mm)	Length (mm)
Feather	0.59	1.18
Feather	0.68	1.06
Feather	0.52	1.19
Feather	0.34	2.12
Feather	0.64	1.11
Feather	0.81	1.00
Feather	0.85	0.41
Feather	0.78	0.26
Feather	0.02	0.27
Feather	0.78	0.24
Feather	0.69	0.17
Feather	0.71	0.42
Feather	0.61	0.65
Feather	0.98	0.46
Feather	0.54	0.26
Feather	0.72	0.40
Feather	1.15	0.36
Step	0.53	1.70
Step	0.78	1.06
Step	0.84	0.51
Step	0.63	0.27
Step	0.46	0.24
Step	0.63	0.32
Step	0.55	0.45
Step	0.87	0.60
Hinge	1.28	0.44
Hinge	0.34	0.77

FLAKE 21		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.68	0.66
Feather	0.67	0.68
Step	0.66	0.64
Hinge	0.81	0.61

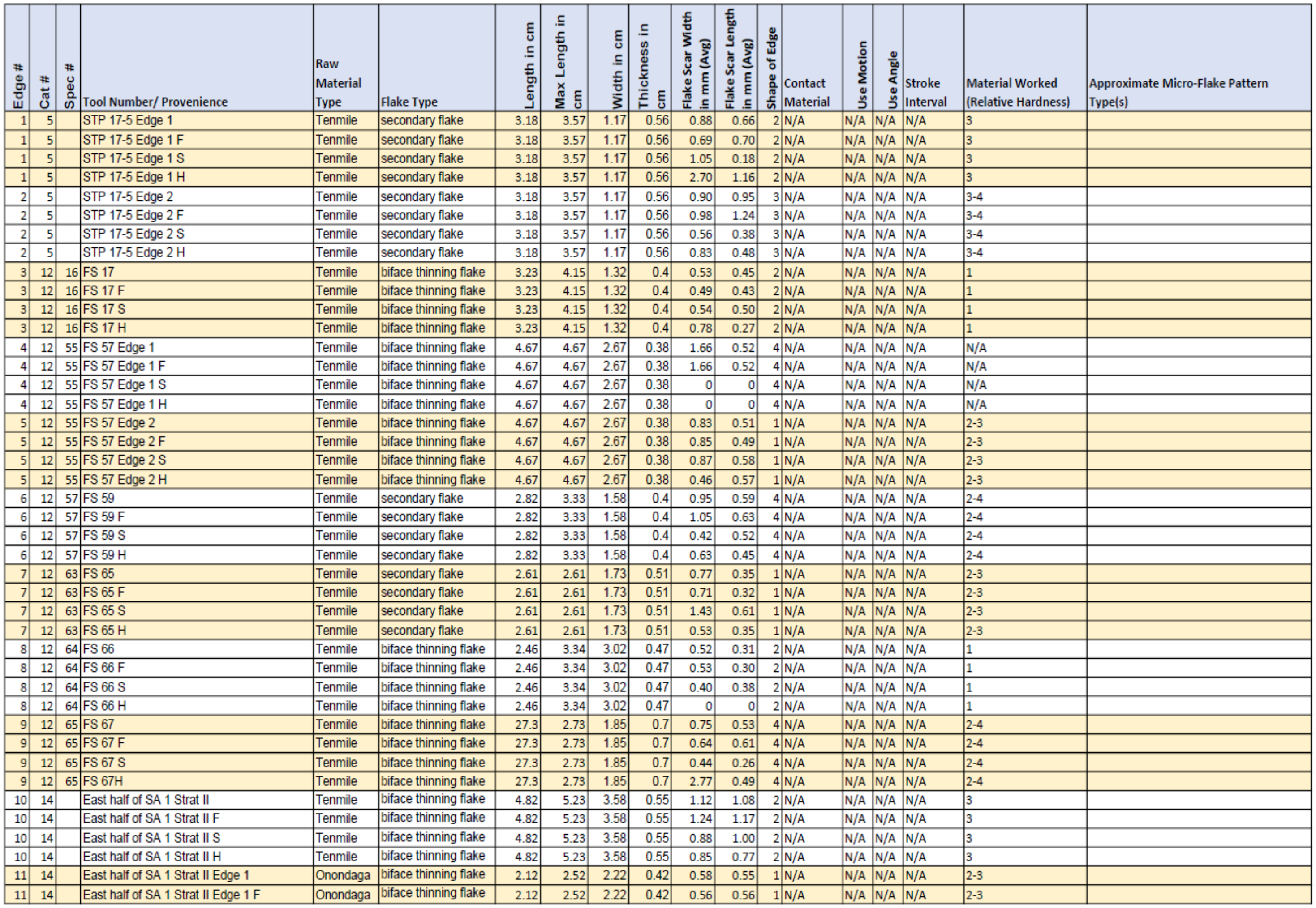
FLAKE 22		
Termination	Width (mm)	Length (mm)
Feather	0.53	0.28
Feather	1.03	1.17
Step	0.45	0.72
Step	0.49	1.81
Step	0.55	0.96
Step	0.95	3.22
Step	1.04	1.82
Step		3.38
Step	0.63	1.65
Step		1.07
Step	0.76	0.39
Step	0.82	0.28
Hinge	0.66	0.84
Hinge	0.59	1.16
Hinge	0.71	1.70
Hinge	2.01	0.56
Hinge	1.43	1.75
Hinge	0.57	0.38

FLAKE 22		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.84	1.34
Feather	0.78	0.73
Step	0.71	1.53
Hinge	1.08	1.20

FLAKE 24		
Termination	Width (mm)	Length (mm)
Feather	0.75	0.68
Feather		1.15
Feather		0.86
Feather	0.57	0.80
Feather		1.45
Feather		1.21
Feather	0.72	0.49
Feather	2.21	1.29
Feather	2.73	0.64
Feather	1.36	0.42
Feather		3.54
Feather	0.96	0.29
Step	2.19	1.76
Step	1.20	0.73
Step	0.76	1.24
Step	1.42	0.43
Step	1.87	1.00
Step	2.37	2.79
Step	0.69	0.87
Step	0.53	0.48
Step	0.49	0.34
Hinge	0.78	1.17
Hinge	1.51	0.90

FLAKE 24		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.28	1.07
Feather	1.33	1.07
Step	1.28	1.07
Hinge	1.15	1.04

Appendix G: Precontact Expedient Tool Excel Data Collection Sheets



Edge #	Cat #	Spec #	Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length in cm	Width in cm	Thickness in cm	Flake Scar Width in mm (Avg)	Flake Scar Length in mm (Avg)	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)	Approximate Micro-Flake Pattern Type(s)
1	5		STP 17-5 Edge 1	Tenmile	secondary flake	3.18	3.57	1.17	0.56	0.88	0.66	2	N/A	N/A	N/A	N/A	3	
1	5		STP 17-5 Edge 1 F	Tenmile	secondary flake	3.18	3.57	1.17	0.56	0.69	0.70	2	N/A	N/A	N/A	N/A	3	
1	5		STP 17-5 Edge 1 S	Tenmile	secondary flake	3.18	3.57	1.17	0.56	1.05	0.18	2	N/A	N/A	N/A	N/A	3	
1	5		STP 17-5 Edge 1 H	Tenmile	secondary flake	3.18	3.57	1.17	0.56	2.70	1.16	2	N/A	N/A	N/A	N/A	3	
2	5		STP 17-5 Edge 2	Tenmile	secondary flake	3.18	3.57	1.17	0.56	0.90	0.95	3	N/A	N/A	N/A	N/A	3-4	
2	5		STP 17-5 Edge 2 F	Tenmile	secondary flake	3.18	3.57	1.17	0.56	0.98	1.24	3	N/A	N/A	N/A	N/A	3-4	
2	5		STP 17-5 Edge 2 S	Tenmile	secondary flake	3.18	3.57	1.17	0.56	0.56	0.38	3	N/A	N/A	N/A	N/A	3-4	
2	5		STP 17-5 Edge 2 H	Tenmile	secondary flake	3.18	3.57	1.17	0.56	0.83	0.48	3	N/A	N/A	N/A	N/A	3-4	
3	12	16	FS 17	Tenmile	biface thinning flake	3.23	4.15	1.32	0.4	0.53	0.45	2	N/A	N/A	N/A	N/A	1	
3	12	16	FS 17 F	Tenmile	biface thinning flake	3.23	4.15	1.32	0.4	0.49	0.43	2	N/A	N/A	N/A	N/A	1	
3	12	16	FS 17 S	Tenmile	biface thinning flake	3.23	4.15	1.32	0.4	0.54	0.50	2	N/A	N/A	N/A	N/A	1	
3	12	16	FS 17 H	Tenmile	biface thinning flake	3.23	4.15	1.32	0.4	0.78	0.27	2	N/A	N/A	N/A	N/A	1	
4	12	55	FS 57 Edge 1	Tenmile	biface thinning flake	4.67	4.67	2.67	0.38	1.66	0.52	4	N/A	N/A	N/A	N/A	N/A	
4	12	55	FS 57 Edge 1 F	Tenmile	biface thinning flake	4.67	4.67	2.67	0.38	1.66	0.52	4	N/A	N/A	N/A	N/A	N/A	
4	12	55	FS 57 Edge 1 S	Tenmile	biface thinning flake	4.67	4.67	2.67	0.38	0	0	4	N/A	N/A	N/A	N/A	N/A	
4	12	55	FS 57 Edge 1 H	Tenmile	biface thinning flake	4.67	4.67	2.67	0.38	0	0	4	N/A	N/A	N/A	N/A	N/A	
5	12	55	FS 57 Edge 2	Tenmile	biface thinning flake	4.67	4.67	2.67	0.38	0.83	0.51	1	N/A	N/A	N/A	N/A	2-3	
5	12	55	FS 57 Edge 2 F	Tenmile	biface thinning flake	4.67	4.67	2.67	0.38	0.85	0.49	1	N/A	N/A	N/A	N/A	2-3	
5	12	55	FS 57 Edge 2 S	Tenmile	biface thinning flake	4.67	4.67	2.67	0.38	0.87	0.58	1	N/A	N/A	N/A	N/A	2-3	
5	12	55	FS 57 Edge 2 H	Tenmile	biface thinning flake	4.67	4.67	2.67	0.38	0.46	0.57	1	N/A	N/A	N/A	N/A	2-3	
6	12	57	FS 59	Tenmile	secondary flake	2.82	3.33	1.58	0.4	0.95	0.59	4	N/A	N/A	N/A	N/A	2-4	
6	12	57	FS 59 F	Tenmile	secondary flake	2.82	3.33	1.58	0.4	1.05	0.63	4	N/A	N/A	N/A	N/A	2-4	
6	12	57	FS 59 S	Tenmile	secondary flake	2.82	3.33	1.58	0.4	0.42	0.52	4	N/A	N/A	N/A	N/A	2-4	
6	12	57	FS 59 H	Tenmile	secondary flake	2.82	3.33	1.58	0.4	0.63	0.45	4	N/A	N/A	N/A	N/A	2-4	
7	12	63	FS 65	Tenmile	secondary flake	2.61	2.61	1.73	0.51	0.77	0.35	1	N/A	N/A	N/A	N/A	2-3	
7	12	63	FS 65 F	Tenmile	secondary flake	2.61	2.61	1.73	0.51	0.71	0.32	1	N/A	N/A	N/A	N/A	2-3	
7	12	63	FS 65 S	Tenmile	secondary flake	2.61	2.61	1.73	0.51	1.43	0.61	1	N/A	N/A	N/A	N/A	2-3	
7	12	63	FS 65 H	Tenmile	secondary flake	2.61	2.61	1.73	0.51	0.53	0.35	1	N/A	N/A	N/A	N/A	2-3	
8	12	64	FS 66	Tenmile	biface thinning flake	2.46	3.34	3.02	0.47	0.52	0.31	2	N/A	N/A	N/A	N/A	1	
8	12	64	FS 66 F	Tenmile	biface thinning flake	2.46	3.34	3.02	0.47	0.53	0.30	2	N/A	N/A	N/A	N/A	1	
8	12	64	FS 66 S	Tenmile	biface thinning flake	2.46	3.34	3.02	0.47	0.40	0.38	2	N/A	N/A	N/A	N/A	1	
8	12	64	FS 66 H	Tenmile	biface thinning flake	2.46	3.34	3.02	0.47	0	0	2	N/A	N/A	N/A	N/A	1	
9	12	65	FS 67	Tenmile	biface thinning flake	27.3	2.73	1.85	0.7	0.75	0.53	4	N/A	N/A	N/A	N/A	2-4	
9	12	65	FS 67 F	Tenmile	biface thinning flake	27.3	2.73	1.85	0.7	0.64	0.61	4	N/A	N/A	N/A	N/A	2-4	
9	12	65	FS 67 S	Tenmile	biface thinning flake	27.3	2.73	1.85	0.7	0.44	0.26	4	N/A	N/A	N/A	N/A	2-4	
9	12	65	FS 67H	Tenmile	biface thinning flake	27.3	2.73	1.85	0.7	2.77	0.49	4	N/A	N/A	N/A	N/A	2-4	
10	14		East half of SA 1 Strat II	Tenmile	biface thinning flake	4.82	5.23	3.58	0.55	1.12	1.08	2	N/A	N/A	N/A	N/A	3	
10	14		East half of SA 1 Strat II F	Tenmile	biface thinning flake	4.82	5.23	3.58	0.55	1.24	1.17	2	N/A	N/A	N/A	N/A	3	
10	14		East half of SA 1 Strat II S	Tenmile	biface thinning flake	4.82	5.23	3.58	0.55	0.88	1.00	2	N/A	N/A	N/A	N/A	3	
10	14		East half of SA 1 Strat II H	Tenmile	biface thinning flake	4.82	5.23	3.58	0.55	0.85	0.77	2	N/A	N/A	N/A	N/A	3	
11	14		East half of SA 1 Strat II Edge 1	Onondaga	biface thinning flake	2.12	2.52	2.22	0.42	0.58	0.55	1	N/A	N/A	N/A	N/A	2-3	
11	14		East half of SA 1 Strat II Edge 1 F	Onondaga	biface thinning flake	2.12	2.52	2.22	0.42	0.56	0.56	1	N/A	N/A	N/A	N/A	2-3	

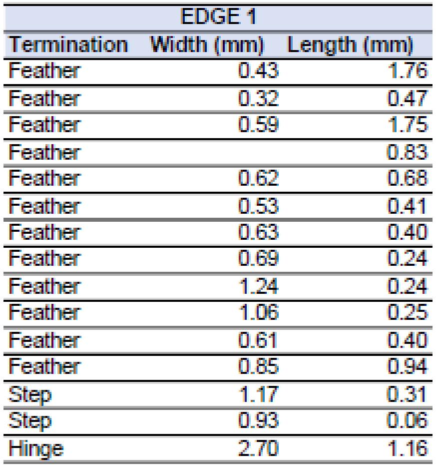
Edge #	Cat #	Spec #	Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length in cm	Width in cm	Thickness in cm	Flake Scar Width in mm (Avg)	Flake Scar Length in mm (Avg)	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)	Approximate Micro-Flake Pattern Type(s)
11	14		East half of SA 1 Strat II Edge 1 S	Onondaga	biface thinning flake	2.12	2.52	2.22	0.42	0.80	0.53	1	N/A	N/A	N/A	N/A	2-3	
11	14		East half of SA 1 Strat II Edge 1 H	Onondaga	biface thinning flake	2.12	2.52	2.22	0.42	0.68	0.50	1	N/A	N/A	N/A	N/A	2-3	
12	14		East half of SA 1 Strat II Edge 2	Onondaga	biface thinning flake	2.12	2.52	2.22	0.42	0.63	0.58	1	N/A	N/A	N/A	N/A	2-3	
12	14		East half of SA 1 Strat II Edge 2 F	Onondaga	biface thinning flake	2.12	2.52	2.22	0.42	0.66	0.58	1	N/A	N/A	N/A	N/A	2-3	
12	14		East half of SA 1 Strat II Edge 2 S	Onondaga	biface thinning flake	2.12	2.52	2.22	0.42	0.56	0.70	1	N/A	N/A	N/A	N/A	2-3	
12	14		East half of SA 1 Strat II Edge 2 H	Onondaga	biface thinning flake	2.12	2.52	2.22	0.42	0.28	0.46	1	N/A	N/A	N/A	N/A	2-3	
13	14		East half of SA 1 Strat II	Tenmile	secondary flake	3.54	3.78	2.42	0.71	0.63	0.52	2	N/A	N/A	N/A	N/A	1	
13	14		East half of SA 1 Strat II F	Tenmile	secondary flake	3.54	3.78	2.42	0.71	0.58	0.55	2	N/A	N/A	N/A	N/A	1	
13	14		East half of SA 1 Strat II S	Tenmile	secondary flake	3.54	3.78	2.42	0.71	0.92	0.39	2	N/A	N/A	N/A	N/A	1	
13	14		East half of SA 1 Strat II H	Tenmile	secondary flake	3.54	3.78	2.42	0.71	0.76	0.32	2	N/A	N/A	N/A	N/A	1	
14	14		East half of SA 1 Strat II Edge 1	Onondaga	biface thinning flake	2.8	3.15	1.56	0.54	0.55	0.37	2	N/A	N/A	N/A	N/A	1	
14	14		East half of SA 1 Strat II Edge 1 F	Onondaga	biface thinning flake	2.8	3.15	1.56	0.54	0.55	0.37	2	N/A	N/A	N/A	N/A	1	
14	14		East half of SA 1 Strat II Edge 1 S	Onondaga	biface thinning flake	2.8	3.15	1.56	0.54	0	0	2	N/A	N/A	N/A	N/A	1	
14	14		East half of SA 1 Strat II Edge 1 H	Onondaga	biface thinning flake	2.8	3.15	1.56	0.54	0	0	2	N/A	N/A	N/A	N/A	1	
15	14		East half of SA 1 Strat II Edge 2	Onondaga	biface thinning flake	2.8	3.15	1.56	0.54	0.64	0.64	3	N/A	N/A	N/A	N/A	3-4	
15	14		East half of SA 1 Strat II Edge 2 F	Onondaga	biface thinning flake	2.8	3.15	1.56	0.54	0.62	0.45	3	N/A	N/A	N/A	N/A	3-4	
15	14		East half of SA 1 Strat II Edge 2 S	Onondaga	biface thinning flake	2.8	3.15	1.56	0.54	0.88	1.57	3	N/A	N/A	N/A	N/A	3-4	
15	14		East half of SA 1 Strat II Edge 2 H	Onondaga	biface thinning flake	2.8	3.15	1.56	0.54	0.51	0.31	3	N/A	N/A	N/A	N/A	3-4	
16	15		Stripped Area 2 Edge 1	Tenmile	biface thinning flake	4.04	4.04	1.83	0.69	0.69	0.66	3	N/A	N/A	N/A	N/A	3-4	
16	15		Stripped Area 2 Edge 1 F	Tenmile	biface thinning flake	4.04	4.04	1.83	0.69	0.68	0.64	3	N/A	N/A	N/A	N/A	3-4	
16	15		Stripped Area 2 Edge 1 S	Tenmile	biface thinning flake	4.04	4.04	1.83	0.69	1.01	1.20	3	N/A	N/A	N/A	N/A	3-4	
16	15		Stripped Area 2 Edge 1 H	Tenmile	biface thinning flake	4.04	4.04	1.83	0.69	0.68	0.63	3	N/A	N/A	N/A	N/A	3-4	
17	15		Stripped Area 2 Edge 2	Tenmile	biface thinning flake	4.04	4.04	1.83	0.69	0.86	0.64	4	N/A	N/A	N/A	N/A	2-4	
17	15		Stripped Area 2 Edge 2 F	Tenmile	biface thinning flake	4.04	4.04	1.83	0.69	0.86	0.66	4	N/A	N/A	N/A	N/A	2-4	
17	15		Stripped Area 2 Edge 2 S	Tenmile	biface thinning flake	4.04	4.04	1.83	0.69	0.92	1.12	4	N/A	N/A	N/A	N/A	2-4	
17	15		Stripped Area 2 Edge 2 H	Tenmile	biface thinning flake	4.04	4.04	1.83	0.69	0.82	0.48	4	N/A	N/A	N/A	N/A	2-4	
18	17		Stripped Area 4	Tenmile	secondary flake	3.27	3.27	2.5	0.77	0.94	0.57	1	N/A	N/A	N/A	N/A	2-3	
18	17		Stripped Area 4 F	Tenmile	secondary flake	3.27	3.27	2.5	0.77	0.94	0.57	1	N/A	N/A	N/A	N/A	2-3	
18	17		Stripped Area 4 S	Tenmile	secondary flake	3.27	3.27	2.5	0.77	0	0	1	N/A	N/A	N/A	N/A	2-3	
18	17		Stripped Area 4 H	Tenmile	secondary flake	3.27	3.27	2.5	0.77	0	0	1	N/A	N/A	N/A	N/A	2-3	
19	18		Feature 1 (0-14 cm) Edge 1	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0.68	0.51	1	N/A	1	N/A	N/A	2-3	Small Deep Scalar
19	18		Feature 1 (0-14 cm) Edge 1 F	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0.69	0.51	1	N/A	1	N/A	N/A	2-3	
19	18		Feature 1 (0-14 cm) Edge 1 S	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0	0	1	N/A	1	N/A	N/A	2-3	
19	18		Feature 1 (0-14 cm) Edge 1 H	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0.62	0.47	1	N/A	1	N/A	N/A	2-3	
20	18		Feature 1 (0-14 cm) Edge 2	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0.53	0.25	1	N/A	N/A	N/A	N/A	2-3	
20	18		Feature 1 (0-14 cm) Edge 2 F	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0.53	0.25	1	N/A	N/A	N/A	N/A	2-3	
20	18		Feature 1 (0-14 cm) Edge 2 S	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0	0	1	N/A	N/A	N/A	N/A	2-3	
20	18		Feature 1 (0-14 cm) Edge 2 H	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0	0	1	N/A	N/A	N/A	N/A	2-3	
21	18		Feature 1 (0-14 cm) Edge 3	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0.81	0.60	1	N/A	N/A	N/A	N/A	2-3	
21	18		Feature 1 (0-14 cm) Edge 3 F	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0.82	0.61	1	N/A	N/A	N/A	N/A	2-3	
21	18		Feature 1 (0-14 cm) Edge 3 S	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0	0	1	N/A	N/A	N/A	N/A	2-3	
21	18		Feature 1 (0-14 cm) Edge 3 H	Tenmile	biface thinning flake	3.78	4.12	2.64	0.53	0.67	0.50	1	N/A	N/A	N/A	N/A	2-3	

Edge #	Cat #	Spec #	Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length in cm	Width in cm	Thickness in cm	Flake Scar Width in mm (Avg)	Flake Scar Length in mm (Avg)	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)	Approximate Micro-Flake Pattern Type(s)
22	18		Feature 1 (0-14 cm)	Tenmile	secondary flake	0.08	2.15	2.09	0.44	1.29	1.67	2	N/A	2	N/A	N/A	3-4	Large Stepped, Small Stepped
22	18		Feature 1 (0-14 cm) F	Tenmile	secondary flake	0.08	2.15	2.09	0.44	0.98	1.69	2	N/A	2	N/A	N/A	3-4	
22	18		Feature 1 (0-14 cm) S	Tenmile	secondary flake	0.08	2.15	2.09	0.44	1.66	1.29	2	N/A	2	N/A	N/A	3-4	
22	18		Feature 1 (0-14 cm) H	Tenmile	secondary flake	0.08	2.15	2.09	0.44	0	4.03	2	N/A	2	N/A	N/A	3-4	
23	21		Feature 3 (0-10 cm)	Flint Ridge	secondary flake	1.97	2.27	1.53	0.51	1.19	1.06	1	N/A	N/A	N/A	N/A	3	
23	21		Feature 3 (0-10 cm) F	Flint Ridge	secondary flake	1.97	2.27	1.53	0.51	1.19	1.07	1	N/A	N/A	N/A	N/A	3	
23	21		Feature 3 (0-10 cm) S	Flint Ridge	secondary flake	1.97	2.27	1.53	0.51	0	0.83	1	N/A	N/A	N/A	N/A	3	
23	21		Feature 3 (0-10 cm) H	Flint Ridge	secondary flake	1.97	2.27	1.53	0.51	0	0	1	N/A	N/A	N/A	N/A	3	
24	39		N105 E139 Strat II (10-20 cm)	Tenmile	secondary flake	2.14	2.52	2.22	0.6	2.44	2.38	2	N/A	N/A	N/A	N/A	3	
24	39		N105 E139 Strat II (10-20 cm) F	Tenmile	secondary flake	2.14	2.52	2.22	0.6	2.44	2.38	2	N/A	N/A	N/A	N/A	3	
24	39		N105 E139 Strat II (10-20 cm) S	Tenmile	secondary flake	2.14	2.52	2.22	0.6	0	0	2	N/A	N/A	N/A	N/A	3	
24	39		N105 E139 Strat II (10-20 cm) H	Tenmile	secondary flake	2.14	2.52	2.22	0.6	0	0	2	N/A	N/A	N/A	N/A	3	
25	41		N105 E140 Strat II (10-20 cm)	Tenmile	biface thinning flake	2.6	2.6	1.35	0.54	1.64	2.07	1	N/A	N/A	N/A	N/A	3	
25	41		N105 E140 Strat II (10-20 cm) F	Tenmile	biface thinning flake	2.6	2.6	1.35	0.54	1.70	2.40	1	N/A	N/A	N/A	N/A	3	
25	41		N105 E140 Strat II (10-20 cm) S	Tenmile	biface thinning flake	2.6	2.6	1.35	0.54	1.81	0.75	1	N/A	N/A	N/A	N/A	3	
25	41		N105 E140 Strat II (10-20 cm) H	Tenmile	biface thinning flake	2.6	2.6	1.35	0.54	1.09	0.43	1	N/A	N/A	N/A	N/A	3	
26	44		N105 E141 Strat II (20-25 cm)	Tenmile	secondary flake	1.71	3.28	3.28	0.47	1.01	0.19	1	N/A	N/A	N/A	N/A	2-3	
26	44		N105 E141 Strat II (20-25 cm) F	Tenmile	secondary flake	1.71	3.28	3.28	0.47	1.01	0.19	1	N/A	N/A	N/A	N/A	2-3	
26	44		N105 E141 Strat II (20-25 cm) S	Tenmile	secondary flake	1.71	3.28	3.28	0.47	0	0	1	N/A	N/A	N/A	N/A	2-3	
26	44		N105 E141 Strat II (20-25 cm) H	Tenmile	secondary flake	1.71	3.28	3.28	0.47	0	0	1	N/A	N/A	N/A	N/A	2-3	
27	45		N106 E138 Strat II (0-10 cm) Edge 1	Tenmile	secondary flake	3.31	5.35	2.11	0.69	0.77	0.38	3	N/A	N/A	N/A	N/A	3-4	
27	45		N106 E138 Strat II (0-10 cm) Edge 1 F	Tenmile	secondary flake	3.31	5.35	2.11	0.69	0.78	0.37	3	N/A	N/A	N/A	N/A	3-4	
27	45		N106 E138 Strat II (0-10 cm) Edge 1 S	Tenmile	secondary flake	3.31	5.35	2.11	0.69	0.87	0.57	3	N/A	N/A	N/A	N/A	3-4	
27	45		N106 E138 Strat II (0-10 cm) Edge 1	Tenmile	secondary flake	3.31	5.35	2.11	0.69	0.57	0.33	3	N/A	N/A	N/A	N/A	3-4	
28	45		N106 E138 Strat II (0-10 cm) Edge 2	Tenmile	secondary flake	3.31	5.35	2.11	0.69	1.10	0.76	1	N/A	N/A	N/A	N/A	2-3	
28	45		N106 E138 Strat II (0-10 cm) Edge 2 F	Tenmile	secondary flake	3.31	5.35	2.11	0.69	1.06	0.72	1	N/A	N/A	N/A	N/A	2-3	
28	45		N106 E138 Strat II (0-10 cm) Edge 2 S	Tenmile	secondary flake	3.31	5.35	2.11	0.69	1.13	1.20	1	N/A	N/A	N/A	N/A	2-3	
28	45		N106 E138 Strat II (0-10 cm) Edge 2 H	Tenmile	secondary flake	3.31	5.35	2.11	0.69	1.23	0.74	1	N/A	N/A	N/A	N/A	2-3	
29	45		N106 E138 Strat II (0-10 cm) Edge 3	Tenmile	secondary flake	3.31	5.35	2.11	0.69	1.13	0.50	1	N/A	N/A	N/A	N/A	2-3	
29	45		N106 E138 Strat II (0-10 cm) Edge 3 F	Tenmile	secondary flake	3.31	5.35	2.11	0.69	1.13	0.46	1	N/A	N/A	N/A	N/A	2-3	
29	45		N106 E138 Strat II (0-10 cm) Edge 3 S	Tenmile	secondary flake	3.31	5.35	2.11	0.69	2.29	1.08	1	N/A	N/A	N/A	N/A	2-3	
29	45		N106 E138 Strat II (0-10 cm) Edge 3 H	Tenmile	secondary flake	3.31	5.35	2.11	0.69	1.01	0.86	1	N/A	N/A	N/A	N/A	2-3	
30	47		N106 E139 Strat II (0-10 cm)	Tenmile	secondary flake	3.75	4.07	3.1	1.22	1.77	1.03	1	N/A	N/A	N/A	N/A	3	Large Deep Scalar, Small Deep Scalar
30	47		N106 E139 Strat II (0-10 cm) F	Tenmile	secondary flake	3.75	4.07	3.1	1.22	1.76	0.98	1	N/A	N/A	N/A	N/A	3	
30	47		N106 E139 Strat II (0-10 cm) S	Tenmile	secondary flake	3.75	4.07	3.1	1.22	0	0	1	N/A	N/A	N/A	N/A	3	
30	47		N106 E139 Strat II (0-10 cm) H	Tenmile	secondary flake	3.75	4.07	3.1	1.22	1.80	1.15	1	N/A	N/A	N/A	N/A	3	
31	49		N106 E140 Strat II (0-10 cm) Edge 1	Tenmile	secondary flake	3.27	4.38	1.93	0.65	1.51	0.93	1	N/A	N/A	N/A	N/A	3	
31	49		N106 E140 Strat II (0-10 cm) Edge 1 F	Tenmile	secondary flake	3.27	4.38	1.93	0.65	2.01	0.65	1	N/A	N/A	N/A	N/A	3	
31	49		N106 E140 Strat II (0-10 cm) Edge 1 S	Tenmile	secondary flake	3.27	4.38	1.93	0.65	1.52	1.10	1	N/A	N/A	N/A	N/A	3	
31	49		N106 E140 Strat II (0-10 cm) Edge 1 H	Tenmile	secondary flake	3.27	4.38	1.93	0.65	0	1.01	1	N/A	N/A	N/A	N/A	3	
32	49		N106 E140 Strat II (0-10 cm) Edge 2	Tenmile	secondary flake	3.27	4.38	1.93	0.65	1.65	0.68	1	N/A	N/A	N/A	N/A	3	
32	49		N106 E140 Strat II (0-10 cm) Edge 2 F	Tenmile	secondary flake	3.27	4.38	1.93	0.65	1.09	2.89	1	N/A	N/A	N/A	N/A	3	

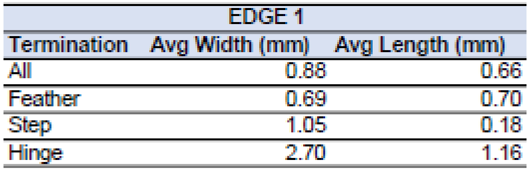
Edge #	Cat #	Spec #	Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length in cm	Width in cm	Thickness in cm	Flake Scar Width in mm (Avg)	Flake Scar Length in mm (Avg)	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)	Approximate Micro-Flake Pattern Type(s)
32	49		N106 E140 Strat II (0-10 cm) Edge 2 S	Tenmile	secondary flake	3.27	4.38	1.93	0.65	1.09	0.96	1	N/A	N/A	N/A	N/A	3	
32	49		N106 E140 Strat II (0-10 cm) Edge 2 H	Tenmile	secondary flake	3.27	4.38	1.93	0.65	0	0	1	N/A	N/A	N/A	N/A	3	
33	50		N106 E140 Strat II (10-20 cm)	Tenmile	secondary flake	1.71	3.27	2.37	0.75	1.35	0.32	1	N/A	N/A	N/A	N/A	2-3	
33	50		N106 E140 Strat II (10-20 cm) F	Tenmile	secondary flake	1.71	3.27	2.37	0.75	1.35	0.32	1	N/A	N/A	N/A	N/A	2-3	
33	50		N106 E140 Strat II (10-20 cm) S	Tenmile	secondary flake	1.71	3.27	2.37	0.75	0	0	1	N/A	N/A	N/A	N/A	2-3	
33	50		N106 E140 Strat II (10-20 cm) H	Tenmile	secondary flake	1.71	3.27	2.37	0.75	0	0	1	N/A	N/A	N/A	N/A	2-3	
34	57		N107 E137 Strat II (0-10 cm) Edge 1	Tenmile	biface thinning flake	4.61	4.61	1.7	0.75	1.02	0.90	2	N/A	N/A	N/A	N/A	3	
34	57		N107 E137 Strat II (0-10 cm) Edge 1 F	Tenmile	biface thinning flake	4.61	4.61	1.7	0.75	0.10	0.80	2	N/A	N/A	N/A	N/A	3	
34	57		N107 E137 Strat II (0-10 cm) Edge 1 S	Tenmile	biface thinning flake	4.61	4.61	1.7	0.75	2.45	1.19	2	N/A	N/A	N/A	N/A	3	
34	57		N107 E137 Strat II (0-10 cm) Edge 1 H	Tenmile	biface thinning flake	4.61	4.61	1.7	0.75	1.82	0.68	2	N/A	N/A	N/A	N/A	3	
35	57		N107 E137 Strat II (0-10 cm) Edge 2	Tenmile	biface thinning flake	4.61	4.61	1.7	0.75	1.39	1.24	3	N/A	N/A	N/A	N/A	3-4	
35	57		N107 E137 Strat II (0-10 cm) Edge 2 F	Tenmile	biface thinning flake	4.61	4.61	1.7	0.75	1.36	1.16	3	N/A	N/A	N/A	N/A	3-4	
35	57		N107 E137 Strat II (0-10 cm) Edge 2 S	Tenmile	biface thinning flake	4.61	4.61	1.7	0.75	1.74	0.95	3	N/A	N/A	N/A	N/A	3-4	
35	57		N107 E137 Strat II (0-10 cm) Edge 2 H	Tenmile	biface thinning flake	4.61	4.61	1.7	0.75	1.39	1.76	3	N/A	N/A	N/A	N/A	3-4	
36	61		N107 E138 Strat II (10-16 cm)	Tenmile	secondary flake	2.44	2.86	2.16	0.71	1.36	1.22	2	N/A	N/A	N/A	N/A	3-4	
36	61		N107 E138 Strat II (10-16 cm) F	Tenmile	secondary flake	2.44	2.86	2.16	0.71	1.42	1.42	2	N/A	N/A	N/A	N/A	3-4	
36	61		N107 E138 Strat II (10-16 cm) S	Tenmile	secondary flake	2.44	2.86	2.16	0.71	1.25	0.71	2	N/A	N/A	N/A	N/A	3-4	
36	61		N107 E138 Strat II (10-16 cm) H	Tenmile	secondary flake	2.44	2.86	2.16	0.71	0	0	2	N/A	N/A	N/A	N/A	3-4	
37	63		N107 E139 Strat II (10-20 cm)	Tenmile	secondary flake	2.23	4.47	3.17	0.7	0.81	0.98	2	N/A	N/A	N/A	N/A	3	
37	63		N107 E139 Strat II (10-20 cm) F	Tenmile	secondary flake	2.23	4.47	3.17	0.7	0.76	0.81	2	N/A	N/A	N/A	N/A	3	
37	63		N107 E139 Strat II (10-20 cm) S	Tenmile	secondary flake	2.23	4.47	3.17	0.7	0	0	2	N/A	N/A	N/A	N/A	3	
37	63		N107 E139 Strat II (10-20 cm) H	Tenmile	secondary flake	2.23	4.47	3.17	0.7	1.59	2.27	2	N/A	N/A	N/A	N/A	3	
38	75		N108 E140 Strat II (10-20 cm)	Tenmile	secondary flake	2.83	2.92	2.41	0.81	0.71	0.23	2	N/A	N/A	N/A	N/A	N/A	
38	75		N108 E140 Strat II (10-20 cm) F	Tenmile	secondary flake	2.83	2.92	2.41	0.81	0.71	0.23	2	N/A	N/A	N/A	N/A	N/A	
38	75		N108 E140 Strat II (10-20 cm) S	Tenmile	secondary flake	2.83	2.92	2.41	0.81	0	0	2	N/A	N/A	N/A	N/A	N/A	
38	75		N108 E140 Strat II (10-20 cm) H	Tenmile	secondary flake	2.83	2.92	2.41	0.81	0	0	2	N/A	N/A	N/A	N/A	N/A	
39	83		N110 E138 Strat III (10-20 cm)	Tenmile	secondary flake	4.19	6.15	2.22	0.92	0.81	0.64	2	N/A	N/A	N/A	N/A	3	
39	83		N110 E138 Strat III (10-20 cm) F	Tenmile	secondary flake	4.19	6.15	2.22	0.92	0.82	0.73	2	N/A	N/A	N/A	N/A	3	
39	83		N110 E138 Strat III (10-20 cm) S	Tenmile	secondary flake	4.19	6.15	2.22	0.92	0.89	0.27	2	N/A	N/A	N/A	N/A	3	
39	83		N110 E138 Strat III (10-20 cm) H	Tenmile	secondary flake	4.19	6.15	2.22	0.92	0.69	0.78	2	N/A	N/A	N/A	N/A	3	
40	90		N113 E133 Strat III (12-22 cm) Edge 1	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	1.09	1.70	1	N/A	2	N/A	N/A	3	Large Deep Scalar, Small Deep Scalar
40	90		N113 E133 Strat III (12-22 cm) Edge 1 F	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	0.77	0.67	1	N/A	N/A	N/A	N/A	3	
40	90		N113 E133 Strat III (12-22 cm) Edge 1 S	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	1.94	3.49	1	N/A	N/A	N/A	N/A	3	
40	90		N113 E133 Strat III (12-22 cm) Edge 1 H	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	3.77	2.87	1	N/A	N/A	N/A	N/A	3	
41	90		N113 E133 Strat III (12-22 cm) Edge 2	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	1.90	1.63	1	N/A	N/A	N/A	N/A	3	
41	90		N113 E133 Strat III (12-22 cm) Edge 2 F	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	1.20	1.38	1	N/A	N/A	N/A	N/A	3	
41	90		N113 E133 Strat III (12-22 cm) Edge 2 S	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	2.81	1.42	1	N/A	N/A	N/A	N/A	3	
41	90		N113 E133 Strat III (12-22 cm) Edge 2 H	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	0	0	1	N/A	N/A	N/A	N/A	3	
42	90		N113 E133 Strat III (12-22 cm) Edge 3	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	1.92	2.72	2	N/A	N/A	N/A	N/A	3	Large Stepped, Small Stepped
42	90		N113 E133 Strat III (12-22 cm) Edge 3 F	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	1.67	2.04	2	N/A	N/A	N/A	N/A	3	
42	90		N113 E133 Strat III (12-22 cm) Edge 3 S	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	0	4.74	2	N/A	N/A	N/A	N/A	3	
42	90		N113 E133 Strat III (12-22 cm) Edge 3 H	Tenmile	biface thinning flake	2.76	3.51	2.95	0.72	3.93	3.41	2	N/A	N/A	N/A	N/A	3	

Edge #	Cat #	Spec #	Tool Number/ Provenience	Raw Material Type	Flake Type	Length in cm	Max Length in cm	Width in cm	Thickness in cm	Flake Scar Width in mm (Avg)	Flake Scar Length in mm (Avg)	Shape of Edge	Contact Material	Use Motion	Use Angle	Stroke Interval	Material Worked (Relative Hardness)	Approximate Micro-Flake Pattern Type(s)
43	91		N113 E135 (0-10 cm) Edge 1	Tenmile	biface thinning flake	3.84	3.84	3.15	0.49	0.93	1.08	4	N/A	N/A	N/A	N/A	2-4	
43	91		N113 E135 (0-10 cm) Edge 1 F	Tenmile	biface thinning flake	3.84	3.84	3.15	0.49	1.01	1.21	4	N/A	N/A	N/A	N/A	2-4	
43	91		N113 E135 (0-10 cm) Edge 1 S	Tenmile	biface thinning flake	3.84	3.84	3.15	0.49	0.74	0.79	4	N/A	N/A	N/A	N/A	2-4	
43	91		N113 E135 (0-10 cm) Edge 1 H	Tenmile	biface thinning flake	3.84	3.84	3.15	0.49	0.70	0.65	4	N/A	N/A	N/A	N/A	2-4	
44	91		N113 E135 (0-10 cm) Edge 2	Tenmile	biface thinning flake	3.84	3.84	3.15	0.49	1.00	0.60	1	N/A	N/A	N/A	N/A	2-3	
44	91		N113 E135 (0-10 cm) Edge 2 F	Tenmile	biface thinning flake	3.84	3.84	3.15	0.49	1.23	0.67	1	N/A	N/A	N/A	N/A	2-3	
44	91		N113 E135 (0-10 cm) Edge 2 S	Tenmile	biface thinning flake	3.84	3.84	3.15	0.49	1.01	0.75	1	N/A	N/A	N/A	N/A	2-3	
44	91		N113 E135 (0-10 cm) Edge 2 H	Tenmile	biface thinning flake	3.84	3.84	3.15	0.49	0	0	1	N/A	N/A	N/A	N/A	2-3	
45	96		N113 E139 (10-20 cm)	Tenmile	secondary flake	2.62	3.33	2.69	0.9	0.93	0.67	2	N/A	N/A	N/A	N/A	3	
45	96		N113 E139 (10-20 cm) F	Tenmile	secondary flake	2.62	3.33	2.69	0.9	1.01	0.64	2	N/A	N/A	N/A	N/A	3	
45	96		N113 E139 (10-20 cm) S	Tenmile	secondary flake	2.62	3.33	2.69	0.9	0.13	0.07	2	N/A	N/A	N/A	N/A	3	
45	96		N113 E139 (10-20 cm) H	Tenmile	secondary flake	2.62	3.33	2.69	0.9	0.70	0.65	2	N/A	N/A	N/A	N/A	3	
46	101		N114 E136 (0-10 cm)	Tenmile	secondary flake	3.17	3.34	2.55	0.68	1.06	0.54	2	N/A	N/A	N/A	N/A	3	
46	101		N114 E136 (0-10 cm) F	Tenmile	secondary flake	3.17	3.34	2.55	0.68	1.09	0.46	2	N/A	N/A	N/A	N/A	3	
46	101		N114 E136 (0-10 cm) S	Tenmile	secondary flake	3.17	3.34	2.55	0.68	1.00	0.69	2	N/A	N/A	N/A	N/A	3	
46	101		N114 E136 (0-10 cm) H	Tenmile	secondary flake	3.17	3.34	2.55	0.68	0	0	2	N/A	N/A	N/A	N/A	3	
47	123		N121 E126 Strat III (14-24 cm) Edge 1	Tenmile	secondary flake	3.5	4.45	3.71	1.07	1.10	0.84	1	N/A	2	N/A	N/A	2-3	Large Stepped, Small Stepped
47	123		N121 E126 Strat III (14-24 cm) Edge 1 F	Tenmile	secondary flake	3.5	4.45	3.71	1.07	0.97	0.88	1	N/A	N/A	N/A	N/A	2-3	
47	123		N121 E126 Strat III (14-24 cm) Edge 1 S	Tenmile	secondary flake	3.5	4.45	3.71	1.07	1.56	0.80	1	N/A	N/A	N/A	N/A	2-3	
47	123		N121 E126 Strat III (14-24 cm) Edge 1 H	Tenmile	secondary flake	3.5	4.45	3.71	1.07	0.96	0.49	1	N/A	N/A	N/A	N/A	2-3	
48	123		N121 E126 Strat III (14-24 cm) Edge 2	Tenmile	secondary flake	3.5	4.45	3.71	1.07	0.79	0.24	2	N/A	N/A	N/A	N/A	N/A	
48	123		N121 E126 Strat III (14-24 cm) Edge 2 F	Tenmile	secondary flake	3.5	4.45	3.71	1.07	0.79	0.24	2	N/A	N/A	N/A	N/A	N/A	
48	123		N121 E126 Strat III (14-24 cm) Edge 2 S	Tenmile	secondary flake	3.5	4.45	3.71	1.07	0	0	2	N/A	N/A	N/A	N/A	N/A	
48	123		N121 E126 Strat III (14-24 cm) Edge 2 H	Tenmile	secondary flake	3.5	4.45	3.71	1.07	0	0	2	N/A	N/A	N/A	N/A	N/A	
49	129		Feature 12 N Edge 1	Tenmile	biface thinning flake	3.06	3.06	1.74	0.36	0.81	0.32	1	N/A	N/A	N/A	N/A	2-3	
49	129		Feature 12 N Edge 1 F	Tenmile	biface thinning flake	3.06	3.06	1.74	0.36	0.81	0.32	1	N/A	N/A	N/A	N/A	2-3	
49	129		Feature 12 N Edge 1 S	Tenmile	biface thinning flake	3.06	3.06	1.74	0.36	0	0	1	N/A	N/A	N/A	N/A	2-3	
49	129		Feature 12 N Edge 1 H	Tenmile	biface thinning flake	3.06	3.06	1.74	0.36	0	0	1	N/A	N/A	N/A	N/A	2-3	
50	129		Feature 12 N Edge 2	Tenmile	biface thinning flake	3.06	3.06	1.74	0.36	1.42	1.26	1	N/A	N/A	N/A	N/A	3	
50	129		Feature 12 N Edge 2 F	Tenmile	biface thinning flake	3.06	3.06	1.74	0.36	1.44	1.32	1	N/A	N/A	N/A	N/A	3	
50	129		Feature 12 N Edge 2 S	Tenmile	biface thinning flake	3.06	3.06	1.74	0.36	0	0	1	N/A	N/A	N/A	N/A	3	
50	129		Feature 12 N Edge 2 H	Tenmile	biface thinning flake	3.06	3.06	1.74	0.36	1.19	0.85	1	N/A	N/A	N/A	N/A	3	
51	135		Feature 14 W	Tenmile	secondary flake	2.13	3.73	2.71	0.37	0.77	0.84	1	N/A	N/A	N/A	N/A	2-3	
51	135		Feature 14 W F	Tenmile	secondary flake	2.13	3.73	2.71	0.37	0.80	1.06	1	N/A	N/A	N/A	N/A	2-3	
51	135		Feature 14 W S	Tenmile	secondary flake	2.13	3.73	2.71	0.37	1.94	0.90	1	N/A	N/A	N/A	N/A	2-3	
51	135		Feature 14 W H	Tenmile	secondary flake	2.13	3.73	2.71	0.37	0.96	0.49	1	N/A	N/A	N/A	N/A	2-3	

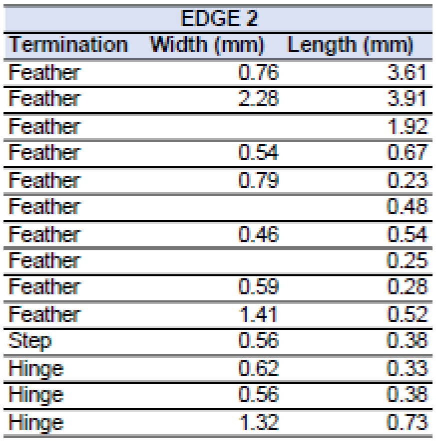
Appendix H: Precontact Expedient Tool Raw Data Charts



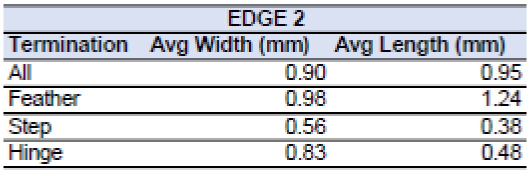
EDGE 1		
Termination	Width (mm)	Length (mm)
Feather	0.43	1.76
Feather	0.32	0.47
Feather	0.59	1.75
Feather		0.83
Feather	0.62	0.68
Feather	0.53	0.41
Feather	0.63	0.40
Feather	0.69	0.24
Feather	1.24	0.24
Feather	1.06	0.25
Feather	0.61	0.40
Feather	0.85	0.94
Step	1.17	0.31
Step	0.93	0.06
Hinge	2.70	1.16



EDGE 1		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.88	0.66
Feather	0.69	0.70
Step	1.05	0.18
Hinge	2.70	1.16



EDGE 2		
Termination	Width (mm)	Length (mm)
Feather	0.76	3.61
Feather	2.28	3.91
Feather		1.92
Feather	0.54	0.67
Feather	0.79	0.23
Feather		0.48
Feather	0.46	0.54
Feather		0.25
Feather	0.59	0.28
Feather	1.41	0.52
Step	0.56	0.38
Hinge	0.62	0.33
Hinge	0.56	0.38
Hinge	1.32	0.73



EDGE 2		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.90	0.95
Feather	0.98	1.24
Step	0.56	0.38
Hinge	0.83	0.48

EDGE 3		
Termination	Width (mm)	Length (mm)
Feather	1.29	1.06
Feather	0.00	0.28
Feather	0.24	0.41
Feather	0.59	0.37
Feather		0.38
Feather	0.41	0.13
Feather	0.36	0.38
Feather		0.21
Feather	0.51	0.27
Feather		0.39
Feather		0.62
Feather		1.03
Feather	0.40	0.07
Feather	0.37	0.45
Feather	0.23	0.45
Step	0.64	0.51
Step	0.28	0.28
Step	0.57	0.83
Step	0.59	0.19
Step	0.54	1.06
Step	0.50	0.53
Step	0.42	0.23
Step	0.76	0.33
Hinge	0.78	0.27

EDGE 3		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.53	0.45
Feather	0.49	0.43
Step	0.54	0.50
Hinge	0.78	0.27

EDGE 4		
Termination	Width (mm)	Length (mm)
Feather	1.38	0.52
Feather	1.55	0.38
Feather	0.88	0.50
Feather	1.16	0.49
Feather	1.44	0.65
Feather	3.57	0.55

EDGE 4		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.66	0.52
Feather	1.66	0.52

EDGE 5		
Termination	Width (mm)	Length (mm)
Feather		0.33
Feather	2.05	0.44
Feather	1.22	1.00
Feather	1.33	0.84
Feather	0.57	0.33
Feather	1.09	0.35
Feather	0.65	0.18
Feather	0.96	0.00
Feather	0.76	0.15
Feather	1.68	0.25
Feather	0.44	0.68
Feather	0.55	1.03
Feather	1.03	0.41
Feather	1.00	0.09
Feather	1.61	0.34
Feather	0.44	
Feather	0.40	
Feather	1.36	0.32
Feather	0.46	0.76
Feather		0.95
Feather		0.75
Feather	0.71	0.51
Feather	0.00	0.47
Feather	0.35	0.43
Feather		0.57
Feather	0.36	1.36
Feather	0.73	0.87
Feather	1.01	0.41
Feather	1.15	0.43
Feather	0.40	0.40
Feather	1.02	0.40
Feather	0.73	0.41
Feather	0.74	0.36
Feather	0.25	0.42
Feather		0.34
Feather	0.66	1.10
Feather	0.62	0.26
Feather	1.29	0.27
Feather	0.63	0.23
Feather	0.59	0.43
Feather	1.02	0.36
Feather	0.72	0.35
Feather	1.59	0.54
Step	0.81	0.50
Step	0.74	0.27
Step		0.70
Step		0.62
Step	0.73	0.38
Step	1.19	0.98
Hinge	0.57	1.02
Hinge	0.35	0.24
Hinge		0.54
Hinge		0.48

EDGE 5		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.83	0.51
Feather	0.85	0.49
Step	0.87	0.58
Hinge	0.46	0.57

EDGE 6		
Termination	Width (mm)	Length (mm)
Feather	0.54	1.76
Feather	0.67	0.47
Feather	0.37	1.75
Feather	0.42	0.83
Feather	0.81	0.68
Feather	0.25	0.41
Feather	0.52	0.40
Feather	0.60	0.24
Feather	0.37	0.24
Feather	0.55	0.25
Feather	0.62	0.40
Feather	0.59	0.94
Feather	0.15	0.31
Feather	0.29	0.40
Feather	0.63	0.40
Feather	0.66	0.27
Feather	5.00	1.76
Feather	6.94	0.47
Step		0.68
Step	0.42	0.35
Hinge		0.51
Hinge	0.89	0.66
Hinge	0.52	0.38
Hinge	0.49	0.46
Hinge	0.61	0.22

EDGE 6		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.95	0.59
Feather	1.05	0.63
Step	0.42	0.52
Hinge	0.63	0.45

EDGE 7		
Termination	Width (mm)	Length (mm)
Feather	0.38	0.30
Feather	0.79	0.16
Feather	0.54	0.18
Feather	0.76	0.43
Feather	0.44	0.35
Feather	0.51	0.27
Feather	0.54	0.31
Feather	0.48	0.50
Feather	0.43	0.24
Feather		0.56
Feather		0.49
Feather	1.14	0.49
Feather		0.33
Feather	0.49	0.20
Feather	0.34	0.15
Feather	0.45	0.22
Feather	0.37	0.30
Feather	0.33	0.15
Feather		0.41
Feather	0.28	0.12
Feather	3.75	0.59
Step	1.85	0.86
Step	1.02	0.36
Hinge	0.53	0.35

EDGE 7		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.77	0.35
Feather	0.71	0.32
Step	1.43	0.61
Hinge	0.53	0.35

	EDGE 8	
Termination	Width (mm)	Length (mm)
Feather	0.68	0.64
Feather	0.99	0.82
Feather	0.44	0.15
Feather	0.31	0.10
Feather	0.31	0.18
Feather	0.32	0.05
Feather	0.34	0.40
Feather	0.29	0.16
Feather	0.53	0.19
Feather	0.68	0.24
Feather	0.29	0.16
Feather	0.56	0.43
Feather	0.83	0.64
Feather	0.45	0.28
Feather	0.44	0.28
Feather	0.24	0.11
Feather	0.24	0.13
Feather	0.21	0.18
Feather	1.89	0.52
Step		0.32
Step	0.40	0.43

	EDGE 8	
Termination	Avg Width (mm)	Avg Length (mm)
All	0.52	0.31
Feather	0.53	0.30
Step	0.40	0.38

	EDGE 9	
Termination	Width (mm)	Length (mm)
Feather	0.32	0.09
Feather	0.49	0.09
Feather	0.24	0.21
Feather	0.47	0.29
Feather	0.64	0.22
Feather	0.47	0.15
Feather		0.42
Feather	0.28	0.43
Feather	0.92	3.69
Feather	1.42	0.61
Feather	1.17	0.51
Step	0.24	0.19
Step	0.38	0.28
Step	0.71	0.31
Hinge	2.77	0.49

	EDGE 9	
Termination	Avg Width (mm)	Avg Length (mm)
All	0.75	0.53
Feather	0.64	0.61
Step	0.44	0.26
Hinge	2.77	0.49

EDGE 10		
Termination	Width (mm)	Length (mm)
Feather	1.47	0.71
Feather	0.51	0.66
Feather	0.36	0.22
Feather	2.01	0.64
Feather		0.53
Feather		0.81
Feather	0.81	0.84
Feather	0.59	1.64
Feather	1.16	1.02
Feather	0.30	0.56
Feather	0.49	0.33
Feather	0.43	0.52
Feather	2.65	0.64
Feather	0.31	0.14
Feather	0.55	0.14
Feather	0.28	0.41
Feather	3.19	1.81
Feather	2.20	1.71
Feather	1.41	3.09
Feather	2.57	3.27
Feather	0.47	0.43
Feather	0.56	0.30
Feather	1.40	0.17
Feather		1.43
Feather	1.32	1.05
Feather	1.43	0.99
Feather	2.40	1.14
Feather	1.90	1.90
Feather		4.58
Feather	2.57	3.64
Feather	1.14	1.68
Feather	0.53	0.48
Feather	0.34	0.47
Feather	0.65	0.85
Feather	0.47	1.11
Feather	1.91	1.87
Feather	1.36	1.62
Feather	2.45	1.20
Step	2.11	1.47
Step	0.65	0.65
Step	0.21	0.43
Step	0.27	0.27
Step		1.94
Step	0.90	0.72
Step	0.52	0.63
Step	0.51	0.63
Step	1.65	1.38
Step	1.09	1.84
Hinge	0.39	0.19
Hinge	0.30	0.59
Hinge	0.00	1.63
Hinge	1.25	0.41
Hinge	0.68	1.10
Hinge	1.62	1.19
Hinge	0.76	0.18
Hinge	0.94	0.86

EDGE 10		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.12	1.08
Feather	1.24	1.17
Step	0.88	1.00
Hinge	0.85	0.77

EDGE 11		
Termination	Width (mm)	Length (mm)
Feather	1.22	0.31
Feather		1.49
Feather		1.28
Feather	0.30	0.43
Feather	0.34	0.40
Feather	0.43	0.41
Feather	0.69	0.91
Feather	0.38	0.78
Feather	0.50	0.22
Feather	0.40	0.42
Feather	0.53	0.75
Feather	0.28	0.26
Feather	0.37	0.22
Feather	0.44	0.37
Feather	0.81	0.71
Feather	0.93	0.71
Feather	0.28	0.80
Feather	0.44	0.77
Feather	0.51	0.69
Feather	0.48	0.53
Feather	0.58	0.63
Feather	0.31	0.49
Feather	0.40	0.50
Feather	0.31	0.50
Feather	0.42	0.19
Feather	0.81	0.16
Feather	0.72	0.16
Feather	1.05	0.26
Feather	0.82	0.51
Feather	0.29	0.15
Feather	0.32	0.53
Feather	0.44	0.37
Feather	0.61	0.77
Feather	0.66	0.80
Feather	0.44	0.66
Feather		0.61
Feather	0.63	0.44
Feather		0.50
Feather	0.22	0.35
Feather	0.43	0.47
Feather	0.73	0.79
Feather	2.26	0.83
Feather	0.35	0.82
Feather	0.37	0.47
Step	0.80	0.53
Hinge	0.53	0.74
Hinge	1.16	0.37
Hinge	0.36	0.39

EDGE 11		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.58	0.55
Feather	0.56	0.56
Step	0.80	0.53
Hinge	0.68	0.50

EDGE 12		
Termination	Width (mm)	Length (mm)
Feather	2.01	1.57
Feather	0.76	0.45
Feather	0.81	1.64
Feather	0.44	0.46
Feather	0.53	0.25
Feather	0.35	0.20
Feather	0.42	0.46
Feather		0.45
Feather	0.64	0.37
Feather	0.81	0.65
Feather	0.31	0.61
Feather	0.93	0.29
Feather	0.27	0.22
Feather	0.52	1.05
Feather	0.28	0.51
Feather	0.90	0.19
Feather	0.49	0.41
Step	0.35	0.52
Step	0.77	0.87
Hinge	0.28	0.46

EDGE 12		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.63	0.58
Feather	0.66	0.58
Step	0.56	0.70
Hinge	0.28	0.46

EDGE 13		
Termination	Width (mm)	Length (mm)
Feather	1.27	1.57
Feather	0.70	0.45
Feather	0.40	1.64
Feather	0.83	0.46
Feather	0.48	0.25
Feather	0.52	0.20
Feather		0.46
Feather		0.45
Feather		0.37
Feather	0.52	0.65
Feather	0.45	0.61
Feather	0.49	0.29
Feather	0.41	0.22
Feather	0.34	1.05
Feather	0.35	0.51
Feather	1.40	0.19
Step	0.82	0.45
Step	1.03	0.32
Hinge	0.76	0.32

EDGE 13		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.63	0.52
Feather	0.58	0.55
Step	0.92	0.39
Hinge	0.76	0.32

EDGE 14		
Termination	Width (mm)	Length (mm)
Feather	0.51	0.56
Feather	0.29	0.16
Feather	0.89	0.24
Feather	0.93	0.25
Feather	0.27	0.58
Feather	0.40	0.40

EDGE 14		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.55	0.37
Feather	0.55	0.37

EDGE 15		
Termination	Width (mm)	Length (mm)
Feather		0.86
Feather	0.68	0.20
Feather	0.56	0.52
Feather	1.79	0.96
Feather	0.28	0.23
Feather	0.39	0.33
Feather	0.63	0.51
Step	0.88	0.61
Step		2.52
Hinge	0.51	0.31

EDGE 15		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.64	0.64
Feather	0.62	0.45
Step	0.88	1.57
Hinge	0.51	0.31

EDGE 16		
Termination	Width (mm)	Length (mm)
Feather	0.72	0.46
Feather	0.23	0.71
Feather	1.39	1.38
Feather	0.95	0.13
Feather	0.87	0.43
Feather	0.71	0.67
Feather	0.25	0.50
Feather	0.28	0.44
Feather	0.94	1.16
Feather	0.43	0.83
Feather	0.42	0.48
Feather		0.96
Feather	0.29	0.70
Feather	0.55	0.60
Feather	0.73	0.87
Feather	1.39	0.75
Feather		0.62
Feather	0.27	0.32
Feather	0.58	0.46
Feather	1.19	0.39
Feather	0.71	0.68
Feather	1.17	0.41
Step	1.01	1.20
Hinge		0.47
Hinge		0.44
Hinge	0.96	1.23
Hinge	0.43	0.40
Hinge	1.11	1.65
Hinge	0.35	0.23
Hinge	0.55	0.28
Hinge	0.87	0.74
Hinge	0.50	0.24

EDGE 16		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.69	0.66
Feather	0.68	0.64
Step	1.01	1.20
Hinge	0.68	0.63

EDGE 17		
Termination	Width (mm)	Length (mm)
Feather	1.49	0.46
Feather	0.59	0.71
Feather	0.72	1.38
Feather	0.66	0.13
Feather	0.45	0.43
Feather	0.94	0.67
Feather	0.52	0.50
Feather	0.71	0.44
Feather	0.46	1.16
Feather	1.32	0.83
Feather	0.75	0.48
Feather	1.03	0.96
Feather	0.83	0.70
Feather	1.46	0.60
Feather	1.44	0.87
Feather	0.79	0.75
Feather	0.49	0.62
Feather	0.88	0.32
Feather	0.76	0.46
Step	0.92	1.12
Hinge		0.82
Hinge	0.36	0.33
Hinge		0.16
Hinge	0.40	0.36
Hinge	1.70	0.71

EDGE 17		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.86	0.64
Feather	0.86	0.66
Step	0.92	1.12
Hinge	0.82	0.48

EDGE 18		
Termination	Width (mm)	Length (mm)
Feather	0.67	0.40
Feather	0.70	0.21
Feather	0.66	0.33
Feather	0.59	0.54
Feather	2.89	1.62
Feather	0.77	0.49
Feather		1.16
Feather	0.76	0.46
Feather	0.95	0.75
Feather	0.80	0.21
Feather	0.64	0.11

EDGE 18		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.94	0.57
Feather	0.94	0.57

EDGE 19		
Termination	Width (mm)	Length (mm)
Feather	0.35	0.21
Feather	0.10	0.21
Feather	0.18	0.13
Feather	0.26	0.16
Feather	0.36	0.07
Feather	0.27	0.14
Feather	0.24	0.18
Feather	0.37	0.21
Feather	0.47	0.28
Feather	1.11	1.09
Feather	3.93	2.95
Hinge	0.72	0.42
Hinge	0.51	0.52

EDGE 19		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.68	0.51
Feather	0.69	0.51
Hinge	0.62	0.47

EDGE 20		
Termination	Width (mm)	Length (mm)
Feather	0.37	0.20
Feather	0.52	0.32
Feather	1.11	0.18
Feather	0.62	0.27
Feather	0.25	0.25
Feather	0.28	0.29

EDGE 20		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.53	0.25
Feather	0.53	0.25

EDGE 21		
Termination	Width (mm)	Length (mm)
Feather	1.68	0.97
Feather	1.48	0.79
Feather	1.23	0.32
Feather	1.67	0.80
Feather	0.77	0.40
Feather	0.47	0.34
Feather	0.23	
Feather	0.31	0.27
Feather	0.32	0.19
Feather	0.36	0.31
Feather	0.40	0.37
Feather		0.25
Feather	1.31	0.47
Feather	0.41	0.93
Feather		2.16
Hinge	0.67	0.50

EDGE 21		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.81	0.60
Feather	0.82	0.61
Hinge	0.67	0.50

EDGE 22		
Termination	Width (mm)	Length (mm)
Feather	2.47	2.96
Feather		1.90
Feather		0.62
Feather	1.04	1.71
Feather		1.49
Feather	0.66	0.95
Feather		2.56
Feather	0.74	2.69
Feather		1.62
Feather		2.16
Feather		0.99
Feather	0.40	2.13
Feather	0.59	0.93
Feather		0.91
Step		0.49
Step	0.29	0.38
Step		2.30
Step	2.25	1.93
Step	2.27	2.70
Step	0.74	0.46
Step	2.76	0.75
Hinge	0.78	4.03

EDGE 22		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.29	1.67
Feather	0.98	1.69
Step	1.66	1.29
Hinge		4.03

EDGE 23		
Termination	Width (mm)	Length (mm)
Feather	1.48	0.53
Feather	0.60	0.88
Feather	0.97	0.74
Feather		1.49
Feather		0.58
Feather	0.42	0.57
Feather	0.91	0.49
Feather	2.65	2.41
Feather	1.31	0.80
Feather	0.91	1.19
Feather	0.95	0.39
Feather		2.27
Feather	1.07	2.22
Feather		0.63
Feather	1.82	0.88
Step		0.83

EDGE 23		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.19	1.06
Feather	1.19	1.07
Step		0.83

EDGE 24		
Termination	Width (mm)	Length (mm)
Feather	2.99	2.05
Feather	1.18	0.92
Feather	3.17	3.35
Feather		3.19

EDGE 24		
Termination	Avg Width (mm)	Avg Length (mm)
All	2.44	2.38
Feather	2.44	2.38

EDGE 25		
Termination	Width (mm)	Length (mm)
Feather	3.19	2.51
Feather	2.40	6.13
Feather	0.00	4.06
Feather	2.34	5.32
Feather	0.94	0.40
Feather	1.02	0.27
Feather	0.76	0.40
Feather		1.73
Feather	1.22	0.80
Step	1.81	0.75
Hinge	1.09	0.43

EDGE 25		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.64	2.07
Feather	1.70	2.40
Step	1.81	0.75
Hinge	1.09	0.43

EDGE 26		
Termination	Width (mm)	Length (mm)
Feather	0.78	0.21
Feather	0.61	0.29
Feather	1.20	0.22
Feather	0.43	0.24
Feather	0.71	0.16
Feather	0.98	0.10
Feather	1.09	0.14
Feather	0.95	0.13
Feather	1.42	0.25
Feather	1.27	0.13
Feather	1.61	0.13
Feather	0.82	0.21
Feather	0.62	0.21
Feather	1.71	0.21

EDGE 26		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.01	0.19
Feather	1.01	0.19

EDGE 27		
Termination	Width (mm)	Length (mm)
Feather	0.76	1.24
Feather	0.74	1.13
Feather	0.32	0.32
Feather	0.34	0.32
Feather	0.27	0.25
Feather		0.29
Feather	0.35	0.21
Feather	0.31	0.14
Feather	0.30	0.15
Feather	0.25	0.18
Feather	0.38	0.14
Feather	0.31	0.19
Feather	0.37	0.28
Feather	0.39	0.25
Feather	1.34	0.12
Feather	1.35	0.26
Feather	0.51	0.17
Feather	1.00	0.87
Feather		0.18
Feather	0.58	0.47
Feather	0.31	
Feather	0.27	0.24
Feather	0.21	
Feather	0.32	0.14
Feather	1.01	0.39
Feather	0.21	0.35
Feather	0.41	0.41
Feather	0.41	
Feather	0.47	0.24
Feather	0.75	
Feather	0.86	0.24
Feather	0.89	0.28
Feather		0.32
Feather	0.95	0.73
Feather	3.73	0.80
Feather	3.95	0.49
Feather		0.48
Feather	2.30	0.57
Feather	0.98	0.25
Feather	0.56	0.30
Feather	1.03	0.43
Feather	0.49	0.34
Feather	0.58	0.59
Feather	0.67	0.30
Step	1.14	0.24
Step	1.01	0.56
Step	0.47	0.91
Hinge	0.72	0.49
Hinge	0.54	0.24
Hinge	0.44	0.27

EDGE 27		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.77	0.38
Feather	0.78	0.37
Step	0.87	0.57
Hinge	0.57	0.33

EDGE 28		
Termination	Width (mm)	Length (mm)
Feather	0.77	1.76
Feather		0.47
Feather	1.75	1.75
Feather		0.83
Feather	0.84	0.68
Feather	0.69	0.41
Feather	0.83	0.40
Feather	0.84	0.24
Feather	0.00	0.24
Feather	1.51	0.25
Feather	0.68	0.40
Feather		0.94
Feather	1.00	0.31
Feather	0.55	0.40
Feather	1.38	0.40
Feather	2.03	0.27
Feather	0.74	1.76
Feather	1.64	0.47
Feather	0.70	1.75
Step	1.37	1.39
Step	0.88	1.01
Hinge	1.14	1.38
Hinge	1.32	0.51
Hinge	1.07	0.68
Hinge	1.37	0.41

EDGE 28		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.10	0.76
Feather	1.06	0.72
Step	1.13	1.20
Hinge	1.23	0.74

EDGE 29		
Termination	Width (mm)	Length (mm)
Feather	1.65	0.69
Feather	0.65	0.40
Feather	1.71	0.31
Feather	1.41	0.50
Feather		0.56
Feather		0.51
Feather	1.54	0.46
Feather	1.08	0.40
Feather	0.82	0.57
Feather	0.54	0.23
Feather	0.87	0.40
Feather	1.06	0.50
Step	1.45	0.56
Step	0.84	0.53
Hinge	1.01	0.86

EDGE 29		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.13	0.50
Feather	1.13	0.46
Step	2.29	1.08
Hinge	1.01	0.86

EDGE 30		
Termination	Width (mm)	Length (mm)
Feather	2.76	2.08
Feather	4.02	2.13
Feather	0.93	0.29
Feather	1.40	0.24
Feather	0.93	0.85
Feather	0.54	0.31
Hinge	2.09	1.40
Hinge	1.50	0.91

EDGE 30		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.77	1.03
Feather	1.76	0.98
Hinge	1.80	1.15

EDGE 31		
Termination	Width (mm)	Length (mm)
Feather	2.78	0.53
Feather	1.56	0.55
Feather	1.68	0.95
Feather		0.55
Step		0.95
Step		1.04
Step	1.76	0.88
Step	1.70	2.22
Step	2.13	1.15
Step	0.50	0.38
Hinge		1.01

EDGE 31		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.51	0.93
Feather	2.01	0.65
Step	1.52	1.10
Hinge		1.01

EDGE 32		
Termination	Width (mm)	Length (mm)
Feather	2.71	0.13
Feather		0.89
Feather	1.24	0.59
Feather	1.54	0.28
Step	1.09	0.57
Step		1.12
Step		1.19

EDGE 32		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.65	0.68
Feather	1.09	2.89
Step	1.09	0.96

EDGE 33		
Termination	Width (mm)	Length (mm)
Feather	1.79	0.66
Feather	1.81	0.40
Feather	1.36	0.30
Feather	0.90	0.11
Feather	1.28	0.34
Feather	0.96	0.28
Feather	0.00	0.15

EDGE 33		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.35	0.32
Feather	1.35	0.32

EDGE 34		
Termination	Width (mm)	Length (mm)
Feather		2.17
Feather		1.19
Feather		1.21
Feather	0.41	1.04
Feather	0.34	0.30
Feather	1.39	0.39
Feather	0.26	0.52
Step	3.72	2.01
Step		1.13
Step	1.18	0.43
Hinge	1.82	0.68

EDGE 34		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.02	0.90
Feather	0.10	0.80
Step	2.45	1.19
Hinge	1.82	0.68

EDGE 35		
Termination	Width (mm)	Length (mm)
Feather	3.76	2.80
Feather	0.53	0.40
Feather	1.05	0.43
Feather	0.53	0.79
Feather	0.34	0.77
Feather	1.18	1.13
Feather	1.22	1.31
Feather	1.57	0.69
Feather	2.04	2.12
Step	1.74	0.95
Hinge	1.21	0.99
Hinge	1.56	2.53

EDGE 35		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.39	1.24
Feather	1.36	1.16
Step	1.74	0.95
Hinge	1.39	1.76

EDGE 36		
Termination	Width (mm)	Length (mm)
Feather		0.80
Feather	1.14	2.43
Feather	2.62	1.67
Feather	1.02	1.40
Feather	0.90	0.81
Step	1.35	0.30
Step	1.15	1.12

EDGE 36		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.36	1.22
Feather	1.42	1.42
Step	1.25	0.71

EDGE 37		
Termination	Width (mm)	Length (mm)
Feather	2.07	1.32
Feather	1.13	0.53
Feather	0.61	1.22
Feather	0.45	0.73
Feather	0.71	0.52
Feather	0.51	0.54
Feather	0.71	0.61
Feather	0.99	0.62
Feather	0.44	0.36
Feather	1.12	0.59
Feather	0.62	1.54
Feather	0.53	1.38
Feather	0.54	0.93
Feather	0.39	0.79
Feather	0.64	0.52
Hinge		2.41
Hinge	1.59	2.12

EDGE 37		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.81	0.98
Feather	0.76	0.81
Hinge	1.59	2.27

EDGE 38		
Termination	Width (mm)	Length (mm)
Feather	0.63	0.18
Feather	0.75	0.22
Feather	0.72	0.21
Feather	0.67	0.38
Feather	1.10	0.27
Feather	0.60	0.17
Feather	0.48	0.15
Feather	0.49	0.38
Feather	1.02	0.24
Feather	0.64	0.14

EDGE 38		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.71	0.23
Feather	0.71	0.23

EDGE 39		
Termination	Width (mm)	Length (mm)
Feather	2.25	1.76
Feather	1.30	0.47
Feather	0.49	1.75
Feather	0.46	0.83
Feather	0.58	0.68
Feather	0.27	0.41
Feather	0.48	0.40
Feather	0.65	0.24
Feather	0.44	0.24
Feather	0.95	0.25
Feather	1.53	0.40
Feather		0.94
Feather	0.65	0.31
Feather		0.40
Feather	1.07	0.40
Feather	0.81	0.27
Feather	0.98	1.76
Feather		0.47
Feather	0.47	1.75
Feather	0.59	0.83
Step	1.07	0.19
Step	0.71	0.34
Hinge	0.86	0.27
Hinge	0.56	0.24
Hinge	0.66	0.27

EDGE 39		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.81	0.64
Feather	0.82	0.73
Step	0.89	0.27
Hinge	0.69	0.78

	EDGE 40	
Termination	**Width (mm)**	**Length (mm)**
Feather	0.85	1.25
Feather	0.42	2.21
Feather	1.11	1.91
Feather	0.67	0.34
Feather	0.83	0.43
Feather	0.75	0.27
Feather	1.55	0.27
Feather	0.24	0.06
Feather	0.97	0.21
Feather	0.70	0.27
Feather	0.37	0.18
Step		4.18
Step		4.02
Step	1.94	1.36
Step		4.21
Step		3.67
Hinge	3.77	5.05
Hinge		0.69

	EDGE 40	
Termination	**Avg Width (mm)**	**Avg Length (mm)**
All	1.09	1.70
Feather	0.77	0.67
Step	1.94	3.49
Hinge	3.77	2.87

	EDGE 41	
Termination	**Width (mm)**	**Length (mm)**
Feather	3.62	2.37
Feather		5.79
Feather		4.15
Feather	0.78	0.18
Feather	1.76	0.28
Feather	0.79	0.38
Feather	0.62	0.30
Feather	2.05	0.38
Step		2.58
Step	3.79	1.27
Step		1.26
Step	1.82	0.59

	EDGE 41	
Termination	**Avg Width (mm)**	**Avg Length (mm)**
All	1.90	1.63
Feather	1.20	1.38
Step	2.81	1.42

	EDGE 42	
Termination	**Width (mm)**	**Length (mm)**
Feather	0.90	0.91
Feather	6.00	4.49
Feather	1.22	2.58
Feather	1.80	3.86
Feather	0.93	1.52
Feather	0.71	0.90
Feather	0.78	1.80
Feather	0.99	1.14
Feather		1.32
Feather		1.93
Step		2.95
Step		8.90
Step		2.36
Hinge	3.93	3.41

	EDGE 42	
Termination	**Avg Width (mm)**	**Avg Length (mm)**
All	1.92	2.72
Feather	1.67	2.04
Step		4.74
Hinge	3.93	3.41

EDGE 43		
Termination	Width (mm)	Length (mm)
Feather	1.56	0.90
Feather		0.66
Feather	0.87	0.76
Feather	0.83	0.49
Feather	0.79	0.62
Feather	1.08	1.34
Feather	1.51	2.45
Feather	1.98	2.70
Feather	2.72	4.33
Feather	1.61	0.44
Feather	1.74	1.76
Feather	0.56	0.14
Feather	0.52	0.35
Feather	0.32	0.68
Feather	0.62	1.77
Feather	1.90	0.32
Feather	1.05	1.07
Feather		0.67
Feather	0.63	1.50
Feather	0.57	1.57
Feather	0.45	1.45
Feather	0.50	1.47
Feather	0.59	0.95
Feather		2.27
Feather	0.69	0.44
Feather	0.53	0.73
Feather	0.57	0.90
Step	1.32	0.57
Step	0.35	0.25
Step	0.41	0.13
Step	0.79	0.44
Step	0.50	1.40
Step	0.98	0.93
Step	0.66	0.42
Step	0.94	1.07
Step		1.92
Hinge	0.86	0.78
Hinge	0.54	0.51

EDGE 43		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.93	1.08
Feather	1.01	1.21
Step	0.74	0.79
Hinge	0.70	0.65

EDGE 44		
Termination	Width (mm)	Length (mm)
Feather	0.98	1.76
Feather	2.34	0.47
Feather	2.01	1.75
Feather	2.44	0.83
Feather	0.79	0.68
Feather	1.36	0.41
Feather	0.89	0.40
Feather		0.24
Feather	0.68	0.24
Feather	1.90	0.25
Feather	1.08	0.40
Feather	1.87	0.94
Feather	1.44	0.31
Feather	0.57	0.40
Feather	0.81	0.40
Feather	0.60	0.27
Feather	0.51	1.76
Feather	0.36	0.47
Feather	1.92	1.75
Feather	0.99	0.83
Feather	0.71	0.68
Feather	1.17	0.41
Feather	1.61	0.40
Step	0.87	1.41
Step	0.71	1.49
Step		0.55
Step	1.13	0.34
Step		0.76
Step	1.24	0.47
Step	1.16	0.59
Step	0.87	0.71
Step	1.11	0.44

EDGE 44		
Termination	Avg Width (mm)	Avg Length (mm)
All	1.00	0.60
Feather	1.23	0.67
Step	1.01	0.75

EDGE 45		
Termination	Width (mm)	Length (mm)
Feather	1.55	1.76
Feather		0.47
Feather	0.87	1.75
Feather	0.83	0.83
Feather	0.79	0.68
Feather	1.08	0.41
Feather	1.51	0.40
Feather	1.98	0.24
Feather	2.72	0.24
Feather	1.61	0.25
Feather	1.74	0.40
Feather	0.56	0.94
Feather	0.52	0.31
Feather	0.32	0.40
Feather	0.62	0.40
Feather	1.90	0.27
Feather	1.05	1.76
Feather		0.47
Feather	0.63	1.75
Feather	0.57	0.83
Feather	0.45	0.68
Feather	0.50	0.41
Feather	0.59	0.40
Feather		0.24
Feather	0.69	0.24
Feather	0.53	0.25
Feather	0.57	0.40
Step	1.32	0.57
Step	0.35	0.25
Step	0.41	0.13
Step	0.79	0.44
Step	0.50	1.40
Step	0.98	0.93
Step	0.66	0.42
Step	0.94	1.07
Step		1.92
Hinge	0.86	0.78
Hinge	0.54	0.51

EDGE 45		
Termination	Avg Width (mm)	Avg Length (mm)
All	0.93	0.67
Feather	1.01	0.64
Step	0.13	0.07
Hinge	0.70	0.65

	EDGE 46	
Termination	Width (mm)	Length (mm)
Feather	0.98	0.36
Feather	0.69	0.34
Feather	0.75	0.43
Feather	1.13	0.60
Feather	1.55	0.52
Feather	1.46	0.51
Step	0.64	0.65
Step	1.04	0.54
Step	1.33	0.89

	EDGE 46	
Termination	Avg Width (mm)	Avg Length (mm)
All	1.06	0.54
Feather	1.09	0.46
Step	1.00	0.69

	EDGE 47	
Termination	Width (mm)	Length (mm)
Feather	4.65	1.29
Feather		2.32
Feather		2.33
Feather	0.66	2.74
Feather	1.35	0.49
Feather	0.74	0.29
Feather	0.76	0.34
Feather	0.68	0.33
Feather	0.86	0.38
Feather	0.81	1.08
Feather	0.48	0.47
Feather	1.23	0.49
Step	2.88	1.48
Step	0.77	0.56
Step		0.76
Step	1.03	0.41
Hinge	0.96	0.49

	EDGE 47	
Termination	Avg Width (mm)	Avg Length (mm)
All	1.10	0.84
Feather	0.97	0.88
Step	1.56	0.80
Hinge	0.96	0.49

	EDGE 48	
Termination	Width (mm)	Length (mm)
Feather	0.84	0.26
Feather	0.90	0.28
Feather	0.79	0.32
Feather	0.56	0.30
Feather	1.15	0.07
Feather	0.76	0.21
Feather	0.59	0.22
Feather	0.67	0.14
Feather	0.76	0.27
Feather	0.84	0.32

	EDGE 48	
Termination	Avg Width (mm)	Avg Length (mm)
All	0.79	0.24
Feather	0.79	0.24

	EDGE 49	
Termination	Width (mm)	Length (mm)
Feather	0.81	0.56
Feather	0.72	0.27
Feather	0.60	0.24
Feather	0.79	0.19
Feather	0.61	0.19
Feather	0.97	0.15
Feather	1.60	0.29
Feather	0.66	0.41
Feather	1.08	0.43
Feather	1.05	0.74
Feather	1.38	0.46

	EDGE 49	
Termination	Avg Width (mm)	Avg Length (mm)
All	0.81	0.32
Feather	0.81	0.32

	EDGE 50	
Termination	Width (mm)	Length (mm)
Feather	0.73	0.28
Feather	0.71	0.40
Feather	0.78	1.30
Feather	1.28	0.65
Feather	0.72	1.87
Feather	1.66	2.72
Feather		2.55
Feather		2.64
Feather	4.51	0.89
Feather	1.48	0.72
Feather	1.09	1.08
Feather		1.35
Feather		0.77
Hinge	1.19	0.11
Hinge		1.59

	EDGE 50	
Termination	Avg Width (mm)	Avg Length (mm)
All	1.42	1.26
Feather	1.44	1.32
Hinge	1.19	0.85

	EDGE 51	
Termination	Width (mm)	Length (mm)
Feather	0.92	0.75
Feather	0.88	0.71
Feather	1.05	0.41
Feather	0.95	0.41
Feather	1.02	0.57
Feather		0.74
Feather		2.15
Feather		3.20
Feather		0.63
Step	0.70	0.30
Step	0.62	0.24
Step	0.62	0.37
Hinge	0.96	0.49

	EDGE 51	
Termination	Avg Width (mm)	Avg Length (mm)
All	0.77	0.84
Feather	0.80	1.06
Step	1.94	0.90
Hinge	0.96	0.49