ENGENDERING SPACE AT THE GRISSOM SITE (45KT301):
PREHISTORIC SPATIAL USE PATTERNS WITHIN THE SHADOW OF CHELOHAN, AN INTERTRIBAL MEETING GROUND WITHIN KITTITAS COUNTY, WASHINGTON

A Thesis

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by

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AUTHORIZATION TO SUBMIT THESIS

The thesis of Nicholas A. Finley, submitted for the degree of Master of Arts with a Major in Anthropology and titled "Engendering Space at the Grissom Site (45KT301): Prehistoric Spatial Use Patterns within the shadow of Chelohan, an Intertribal Meeting Ground within Kittitas County, Washington," has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies to the College of Graduate Studies for approval.

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DEDICATION

This thesis is dedicated to my mother Diane M. Finley. The woman whose unwavering faith in me has continued to be a source of strength.

To my parents Doug and Sasha Finley whose work ethic and wit helped me establish my own voice in this fast-paced world.

Finally, a hearty thank you to future wife Whitney Matthes, whose example I followed all the way through graduation.

ABSTRACT

The Grissom site (45KT301) is a multi-component archaeological site in the northeast Kittitas Valley within central Washington State. It was originally excavated by Central Washington State College from 1967-1971 as part of their efforts to find an annual meeting ground that held a substantial food source that fed the first people within the Plateau culture area. Accounts both historically and ethnographically name known people such as the Kittitas, Taitnapam, Klickitat, Yakama, Moses – Columbia, Wanapum, and Wenatchi, the majority of whom annually visited and engaged with this landscape. The location of the meeting ground known as Chelohan (Che-lo-han) and the Grissom site rests between two language families, the Salish and the Sahaptin, who annually shared and utilized this area together. Recently rehabilitated in the 21st century, the Grissom assemblage has the potential to address the role of women as lithic creators and users, through an analysis of the unifacial tools. As such, the questions raised from this study can help identifty the role of women in prehistory. Following a technological classification of these expedient tools, the intent is to show the extent of use for these unifacial artifacts throughout the Grissom site. This thesis is a summary of my analysis and a synthesis of my findings compared to other investigations at the Grissom site.

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CHAPTER 1: INTRODUCTION

Archaeologists in 1967-1971 sought to uncover evidence of Chelohan, an ethnographically known annual meeting ground for the first people of the Columbia Plateau. The region is marked by shared similarities amongst the ancestral people of the area whose movement patterns reached from the interior of British Columbia, Canada, to the interiors of Washington, Idaho, and Oregon. Archaeologists from then Central Washington State College, now Central Washington University, dug and recorded the archaeological assemblage they would later affectionately name the Grissom site (45KT301), a name reflecting the original European homesteaders of the area (Shea 2012) (See Figure 1).

The Grissom Site (45KT301) is located at the confluence of Caribou Creek and a tributary creek (Shea 2012:65) (See Figure 2). Currently, the archaeological site is on privately owned property due north of the historic town of Kittitas, Washington. Historically, archaeological investigations within Washington State have focused on riverine settlements in order to assist salvage operations prior to the construction of numerous hydroelectric dams that were constructed within the area. This focus of work allowed many upland archaeological sites to stay hidden and remain undisturbed. The Grissom site is located on such an upland foothill within a unique environmental zone. The excavation of the Grissom site spanned five field seasons totaling fifty – eight 2–x–2 m units, with 230 cm^3 of sediment moved. During these five years, the students and professional archaeologists uncovered 13,622-catalogued bags of pre-contact and historic cultural material. These artifacts describe a multi-component archaeological site with a human occupation extending thousands of years into the past. The size and scope of these cultural materials has prevented a comprehensive analysis of the artifacts. This thesis aims to address one category of artifacts, expedient flaked tools.

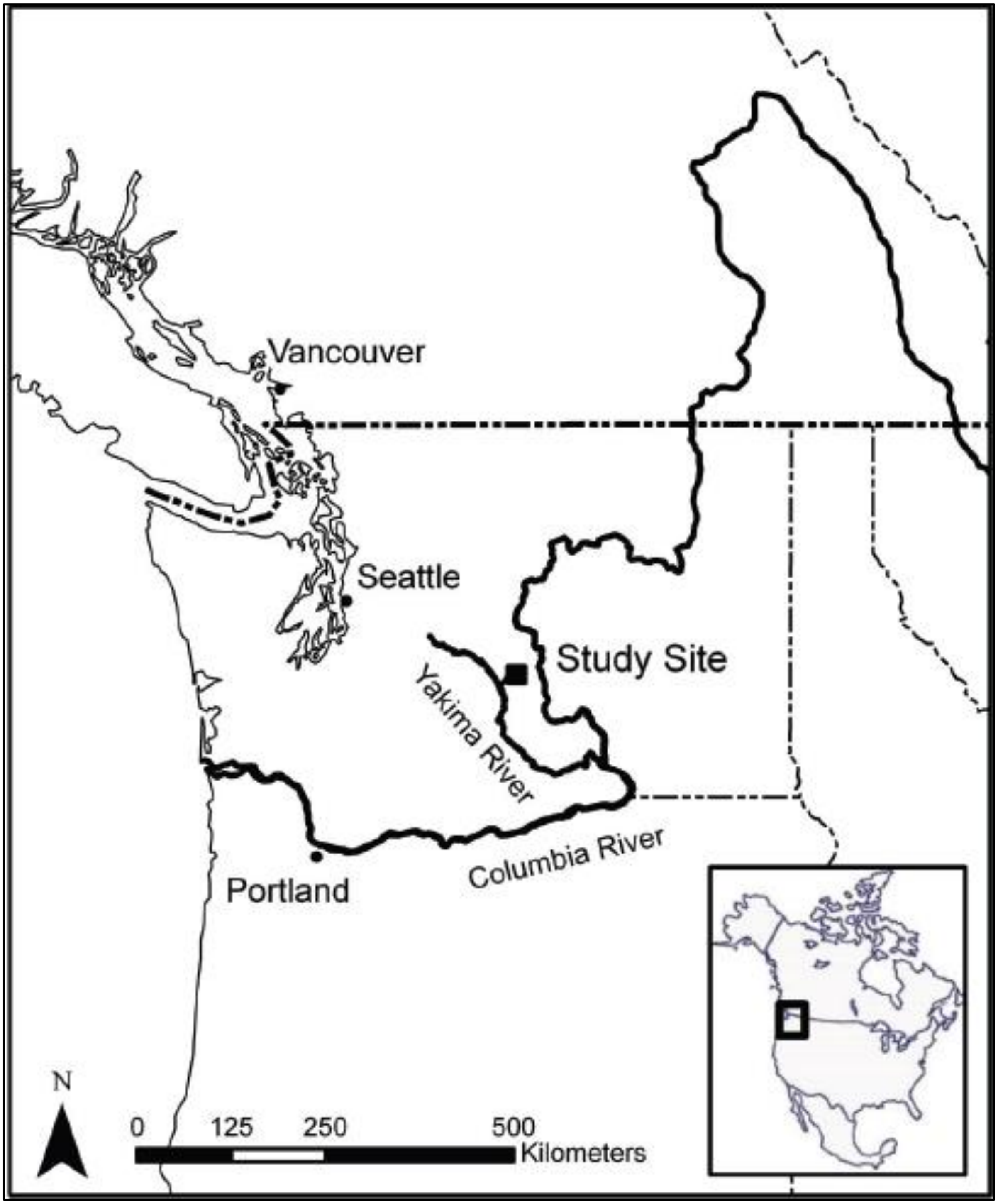


Figure 1: Location of the Grissom site (45KT301) within the Pacific Northwest. Map created by Holly Eagleston cited by Shea (2012:2).

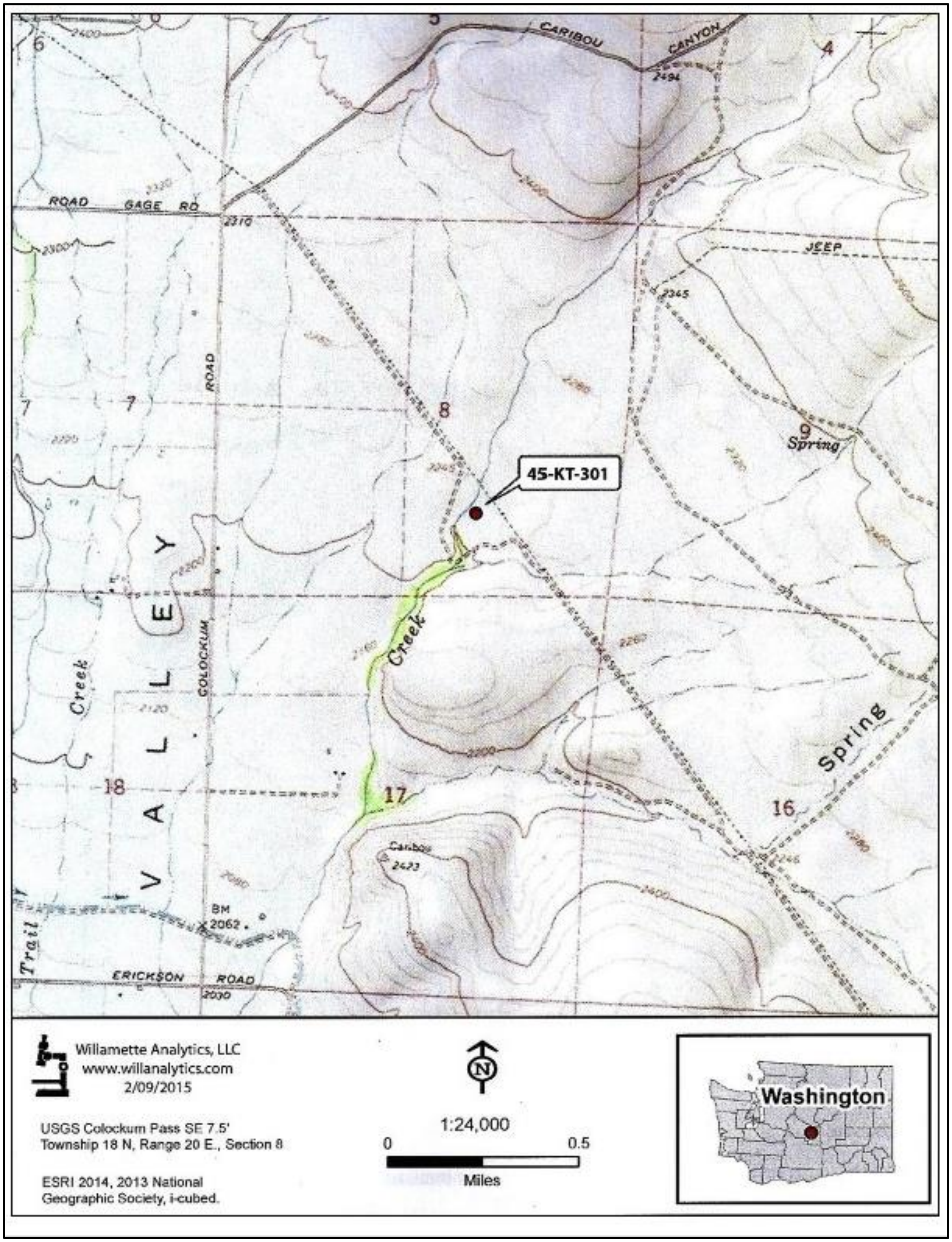


Figure 2: Location of the Grissom site (45KT301) within the Whiskey Dick Mountain Range (Thatcher 2015).

Since its excavation, the Grissom assemblage has been stored at Central Washington University and it has been recently investigated using radiocarbon AMS dating (Vassar 2012), obsidian hydration (Burris 2015; Thatcher 2015), and obsidian sourcing (Parfitt 2013), with the definitive final site report finished in 2012 by Holly Shea. From these reports the age and the use of the Grissom site was established during the historic period, the Cayuse phase (250-2500 YA), and with one charcoal radiocarbon date dating back to the Frenchman Springs phase (2,500-4,500 YA). Due to a global cooling phenomenon that is known to have occurred during the Frenchman Springs phase a new specialized subsistence strategy emerged that relied on other resources; wild plants, fish, and wild game became the norm (Morris 1984; Orvald 2009). This new trend expressed a time of seasonal rotation and seasonal movement amongst these first people whom would travel to the Kittitas Valley annually selecting different foodways. Rich with tool stone and foodways such as fish, plants, and animals, the Kittitas Valley was a critical component of many indigenous people's seasonal round. Both ethnographic and historical accounts describe the area surrounding the Grissom site as supplying ample root crops that by all accounts were the main attraction for the ancestral tribes of the area. Commonly these nations surrounding the Grissom site encompass two language families: the Sahaptian-speaking Kittitas, Klickitat, Taitnapam, Wanapam, and Yakama and the Salish-speaking Moses Columbia and Wenatchi (Henderson 1970, 1985; Ray 1936; Ruby and Brown 1995; Scheurman 1982; Schuster 1975; Shannon 2003).

Recent archaeological work done by Fumi Arakawa (2013) has prompted further consideration for the lithics recovered from the Grissom site. Arakawa's work (2000, 2013) analyzed a number of archaeological assemblages based on gendered spaces in the American Southwest. In these studies, Arakawa investigated how space was utilized by gender around the kivas within the Southwest. The goal of this thesis is to reconstruct the spatial use of the Grissom site by displaying the provenience information from these artifacts. As the Grissom site is attached to women's roles within the Plateau culture area (e.g., gathering wild plants) the recovered artifacts could provide insights into this unique place. Unlike most upland locations within the Plateau cultural area, the Grissom site has been extensively excavated. The tragedy for this assemblage is that a majority of the artifacts have yet to be comprehensively analyzed. This thesis will help to alleviate a large number of unanalyzed artifacts. A spatial reconstruction of the Grissom site could help point out archaeological trends. With this in mind, this thesis will replicate Fumi Arakawa's gender study (2000, 2013) in order to adapt it to the Pacific Northwest.

Research Questions

Initial archaeological investigations at the Grissom site were conducted by Central Washington State College from 1967-1971. Recent investigations have revealed the Grissom site was extensively used during the Cayuse period (2500-250 Y.B.P.), a time of resource intensification (Evans 2009; Finley 2013; Orvald 2009; Vassar 2012). These modern investigations (Burris 2015; Parfitt 2013; Thatcher 2015) have established the range of influence the Grissom site had on the indigenous groups within the area. Further study into the expedient flaked tools or unifacial flaked tools could shed light on an understudied tool type within the Plateau culture area. These tool sets have not been completely analyzed and hold important information on spatial use through gendered spaces, as they are ethnographically known to have been created by both men and women. During the excavation of the Grissom site 342 unifacially flaked tools were recovered. These unifacially flaked tools and artifacts have been examined both microscopically and macroscopically in this study in order to address these research questions. The research questions 5-7 will be created from the results of this initial analysis and will be compared to other Grissom investigations:

1. How intensively were these uniface tools used at 45KT301?
2. What are the trending raw material choices at 45KT301?
3. Is there preferential selection of one raw material type over another?
4. Is there residual evidence left on the edges of worn artifacts?
5. Is there evidence of spatial patterns of site-use present at 45KT301?
6. Are there any similarities across the site overview? Are there locations of intensified specific task or use?
7. Are there any questions raised from the use patterns at this site?

CHAPTER 2: GEOGRAPHY

Natural Setting

The Grissom site is nestled into the Kittitas Valley, which is a structural valley about twenty-five miles (40 kilometers) long and sixteen miles (25 kilometers) wide within central Washington State (Whitley 1950). To the west lies the Cascade Mountain Range, to the south the Manastash Ridge, and to the northeast lie the Wenatchee Mountains and its foothills the Whiskey Dick Mountains. The Grissom site sits within the Whiskey Dick Mountains at ca. 1600 feet (488 meters) above sea level at the confluence of ephemeral Caribou Creek and a tertiary creek. Ephemeral production makes up most of the water supply for the Kittitas Valley. The Kittitas Valley averages nine inches (22.86 centimeters) of water annually, the majority of which comes from melting snowpack (Chatters 1998; Shea 2012:7). These creeks eventually feed into the Yakima River that later meets the Columbia River in the southern half of Washington State. The closest large bodies of water to the Grissom site are the Yakima River located eleven miles downstream and the Columbia River located fourteen miles to the east. The majority of the ephemeral streams are prevented from reaching the Columbia River due to the Whiskey Dick Mountains, which are a series of rolling ridgelines in the east, running north to south.

Over the past, the Kittitas Valley has been shaped and molded by numerous folds. During the waning years of the Pleistocene some 14,000 years ago the Okanogan lobe of the Cordilleran Ice Sheet began to retreat (Sullivan 2000). At the known maximum, the Okanogan lobe reached as far as Elk Heights in the Kittitas Valley (Figure 3). During the terminal Pleistocene (12,000 years ago), Cordilleran and montane glaciers covered all the areas besides the lowlands of Oregon, Washington, and Idaho (Sullivan 2000). By the end of the

Pleistocene glacial retreat from the area allowed new fauna and flora to flourish. This new climatic period allowed for expanding forests and losses to grasslands, which meant a decline of the once vibrant megafauna populations in the form of species such as mammoth, mastodon, ground sloth, or sub-species horse and camel (Morris 1984:129). As earth's climate continued to change, by about 3500 years ago the temperatures stabilizde to the climate we see today (Fagan 2005). The temperature within the Kittitas Valley was recorded by Leslie H. Smith in 1937 with a high of 110º and low of -31 º F. Using the U.S. climate data, the temperatures for the year of 2015 in Ellensburg, Washington, with a high of 102.9 º and a low of -2.9 º F (US Climate).

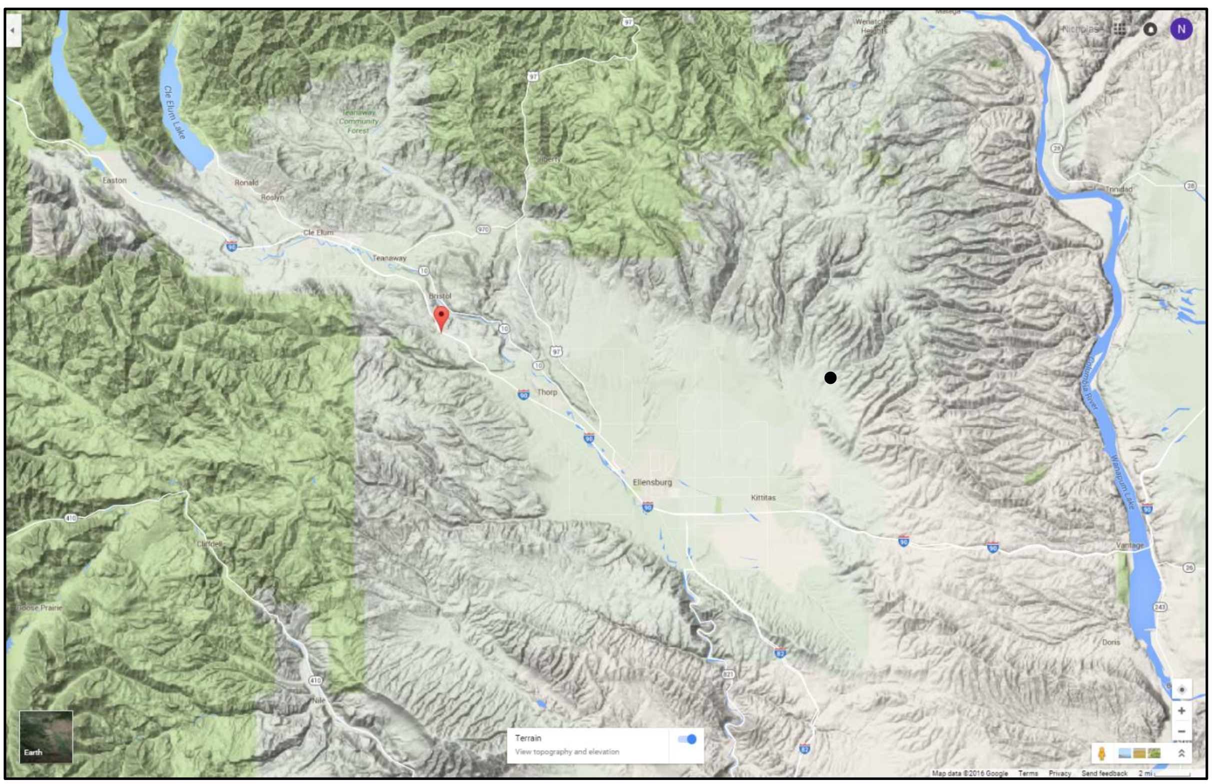


Figure 3: Google Map image of the Kittitas Valley. The approximate location of the Grissom site (45KT301) is marked with a black circle and Elk Heights Road is indicated with the red marker.

Flora and Fauna

The Kittitas Valley maintains a variety of diverse ecosystems. The waterways including the deep water of the Yakima River, to the shallows of the ephemeral streams within the valley, created and maintained a variety of riparian zones supporting the dynamic population of flora and fauna (Sullivan 2000:30). Looming over the valley to the north lies the Wenatchee mountain range and the Cascade mountain range to the west. Each of these mountains have distinct forest environments. Forests designated woodland transition, xeric montane, mesic montane, and subalpine which primarily consist of coniferous trees (Chatters 1984). These mountainous regions hold some of the best hunting locations to procure deer, elk, or further travel to find the habitat of mountain goat/sheep. The interior of the Kittitas Valley exhibits the characteristics of an arid shrub steppe ecosystem consisting of sagebrush and bunchgrass (Franklin and Dyrness 1973; Hessburg 2000). This vegetation zone is defined *Artemisia tridenta/Agropyron spicatum* by Daubenmire (1970). The valley floor was a mixture of marshy area and bunchgrasss before the grazing of cattle destroyed the natural vegetation (Shea 2012; Sullivan 2000).

The presence of ephemeral lakes and streams within the valley allows for habitat to support aviary resources such as ducks (*Anas patyrhynchos*), geese (*Anserini* spp.), and other waterfowl (Chatters 1998). The largest mammals which reside in the Kittitas Valley include elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), white-tail deer (*Odocoileus virginianus*), mountain goat (*Oreamnos americanus*), mountain sheep (*Ovis canadensis*), pronghorn antelope (*Antilocapra americana*), and bison (*Bison bison*) (Sullivan 2000:31). Mammals found in the Kittitas Valley are similar to those found throughout the Columbia Plateau which include coyote (*Canis latrans*), grey wolf (*Canis lupus*), domestic dog (*Canis* *lupus familiaris*), red fox (*Vulpes vulpes*), black bear (*Ursus americanus*), skunk (*Mephitidae* spp.), badger (*Taxidea taxus*), raccoon (*Procyon lotor*), cougar (*Puma concolor*), bobcat (*Lynx rufus*), wolverine (*Gulo gulo*), mink (*Neovision vison*), weasel (*Mustela* spp.), shrew (*Soricidae* spp.), mice (*Mus* spp.), gopher (*Gemyidae* spp.), chipmunk (*Tamias* spp.), squirrel (*Sciuridae* spp.), marmot (*Marmota* spp.), rabbit (*Oryctolagus* spp.), porcupine (*Erethizon dorsatum*), beaver (*Castor* spp.), muskrat (*Ondatra zibethicus*), and otter (*Lutrinae* spp.) (Boyce 1937:23; Chatters 1998; Harkins 1978; Larrison 1976; Morris 1984; Sullivan 2000:31; Thomson 1962).

A few relevant and edible plants that are native to the Kittitas Valley include camas (*Camassia quamash*), cous (*Lomatium cous*), wild onion (*Alium* spp.), balsamroot (*Balsamorhiza sagittata)*, chokecherry (*Prunus virginiana*), huckleberry (*Vaccnium deliciosum*), and serviceberry (*Amalanchier alnifolia*) (Daubenmire 1970; Shea 2012; Splawn 1913; Turner 1997:81, 93). These various lomatiums (camas and cous) and rootcrops (balsamroot) would be seen together with up to three genus of species in one location (Morris 1984:151). Relevant inedible plants found in the Kittitas Valley include willow (*Salix* spp.), black cottonwood (*Populus trichocarpa*), spreading dogbane (*Apocynum androsaemifolium*), tule (*Schoenoplectus acutus*), and cattail (*Typha* spp.), all of which are found within the riparian zones (Hunn 1990). Due to the importance of fresh greens and roots located at such places as the Grissom site these areas could be visited multiple times throughout one year's rotation.

The years from 15,000 to 12,000 B.P. saw the recession of the glaciers north of the Canadian Border from all areas except for the highest mountains of Alberta and British Columbia. The resulting outwash from this process carved out much of the lowlands in the

Kittitas Valley and predominantly the Yakima River canyon. Within the Plateau area, aquatic foodways were utilized in the form of anadromous and non-anadromous fish, river mussels, and turtles (Morris 1984:143). Archaeologically the runs of anadromous fish reached The Dalles, Oregon, by at least 9,000 years ago (Morris 1984) (See Figure 4). These anadromous fish are said to have reached secondary and tertiary rivers thousands of years later (Chatters et al. 1995; Butler and Chatters 2003).

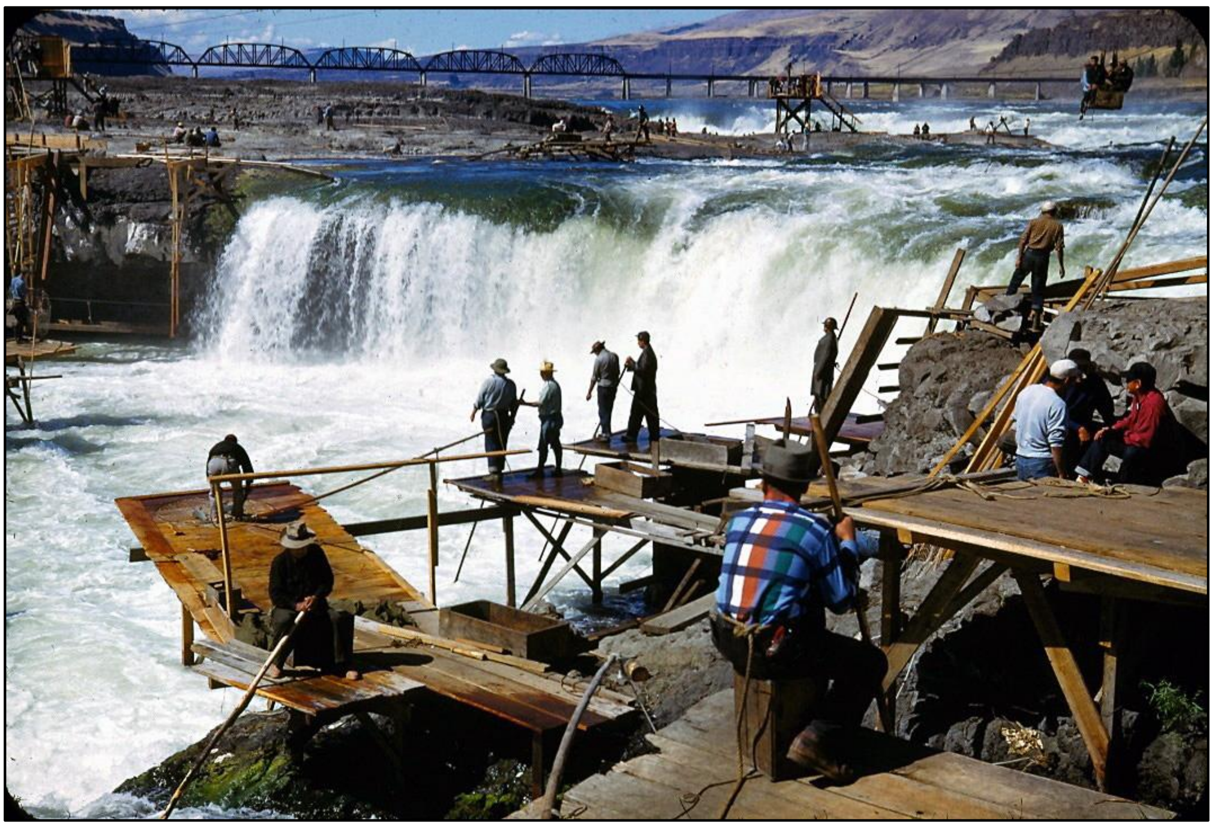


Figure 4: Celilo Falls circa 1952. Much of the same resources though sparse in places are still utilized by living people. Along the Columbia Plateau, places of plenty became meeting places and trading hubs.

Photo retrieved from http://www.critfc.org/member_tribes_overview/

Anadromous fish resources found in valley streams include steelhead trout (*Oncorhynchus mykiss)* and chinook salmon (*Oncorhynchus tshawytscha)* (Washington Department of Fish and Wildlife 2012). The Yakima River, located eleven miles downstream from the Grissom site supported life for chinook, steelhead and sockeye salmon (*Oncorhynchus nerka)* (Sullivan 2000) (Figure 5). The Columbia River still sees the runs of anadromous fish families like *Salmonidae* (salmon, trout, and whitefish), *Cyprinidae* (chubs, squawfish), *Castomiidae* (suckers), *Cottidae* (sculpins) and the genus *Acipenser* (sturgeon) (Chatters 1979). Much like the flora within the region, fish and their seasonal returns shaped seasonal movements of indigenous people and their traditions with the Kittitas Valley.

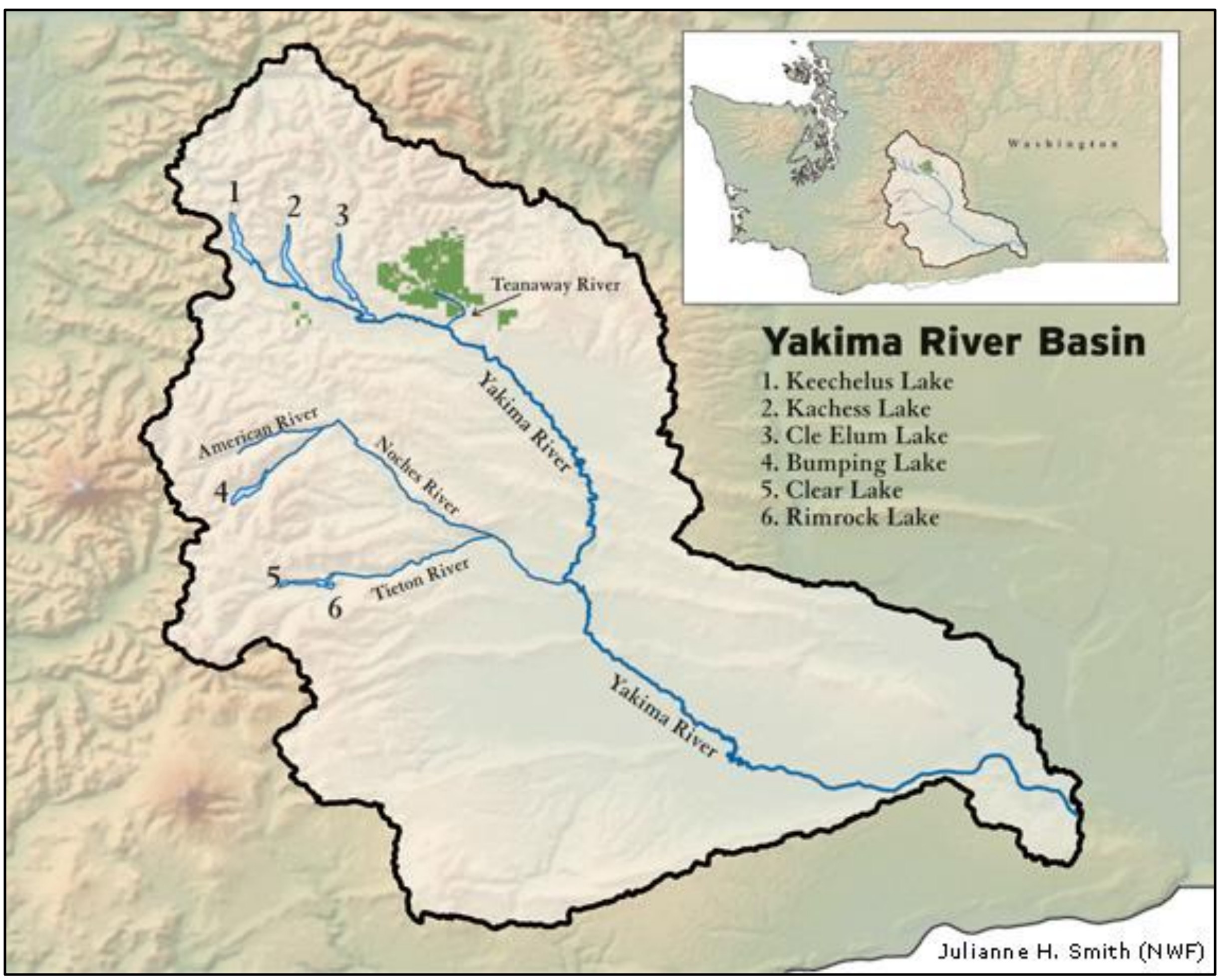


Figure 5: Map of the Yakima River Basin. Note that the majority of the ephemeral streams and creeks within Central Washington State feed the Yakima River drainage.

Faunal studies focusing on fish bones were conducted to describe the remains of the fish bones recovered from the Grissom site. Table 1 below displays the remains of thirty-three minimum number of individuals (MNI), which identified peamouth, northern pikeminnow, salmon or trout, and suckers present at the Grissom site (Lubinski and Partlow 2012). Though this site is not widely known, it is one site that reflects the use of suckers. Historically these suckers are known to be used extensively in the past (Morris 194:149). These fish would be found in marshes and small streams and were a major spring food source for the first people of the valley (Morris 1984). Bordered by mountain ranges and rivers the Kittitas Valley becomes a relative wind tunnel. The winds' constant presence in the Kittitas Valley would be an effective tool to dry fish resources.

Table 1: Fish remains identified at the Grissom Site (Shea 2012).

Order/Family	Taxon	Common Name	NISP	MNI
Order Salmoniformes:				
Family Salmonidae	*Oncorhynchus* sp.	Salmon or trout	460	4
	Unidentified salmonid	--	119	--
Order Cypriniformes:				
Family Cyprinidae	*Mylocheilus caurinus*	Peamouth	45	19
	Ptychocheilus oregonensis	Northern pikeminnow	31	5
	Unidentified cyprinid	--	33	--
Family Catostomidae	*Catostomus columbianus*	Bridgelip sucker	10	3
	Catostomus macrocheilus	Largescale sucker	10	2
	Catostomus sp.	--	171	--
Unidentified cyprinform	--	--	146	--
Order unknown:				
Unidentified fish	--	--	323	--
		TOTAL =	1,348	33

[1]From Lubinski and Partlow (2012).

CHAPTER 3: GEOLOGY

Formation of the Valley

Three major geologic processes have shaped the Kittitas Valley. The first is series of uplifts and tectonic activity. The uplift of the Western Cascade Mountain range started 39 million years ago and finally reached its contemporary form by 9 million years ago, creating the western boundary of the valley (Sullivan 2000). The Cascades Mountain range starts in British Columbia and ends in Northern California following along the edge of the North American tectonic plate. Standing at an average elevation of 1,500 m (4,500 ft) in height much of the Cascades are composed of older tertiary flows, tuffs, and intrusive rocks that make up the foundation for the high Cascades (Price 1978). These high Cascades are made up of a series of Pliocene and Pleistocene stratovolcanoes rising over 2,000 m (6,000 ft) above their foundation (Price 1978). To the south lies the Yakima Fold Belt that affect a number of tectonic regions including the Kittitas Valley with its anticlinal ridges and their corresponding synclinal valleys. These synclinal valleys erode away the steep columns of the Grande Ronde Basalt group near the edge of the basin (Waitt 1979) (See Figure 6). Exposing tool stone for the indigenous groups of the area. Along the eastern extent of the valley lies the Hog Ranch uplift, which forged the Whiskey Dick Mountains off the Wenatchee Mountain Range.

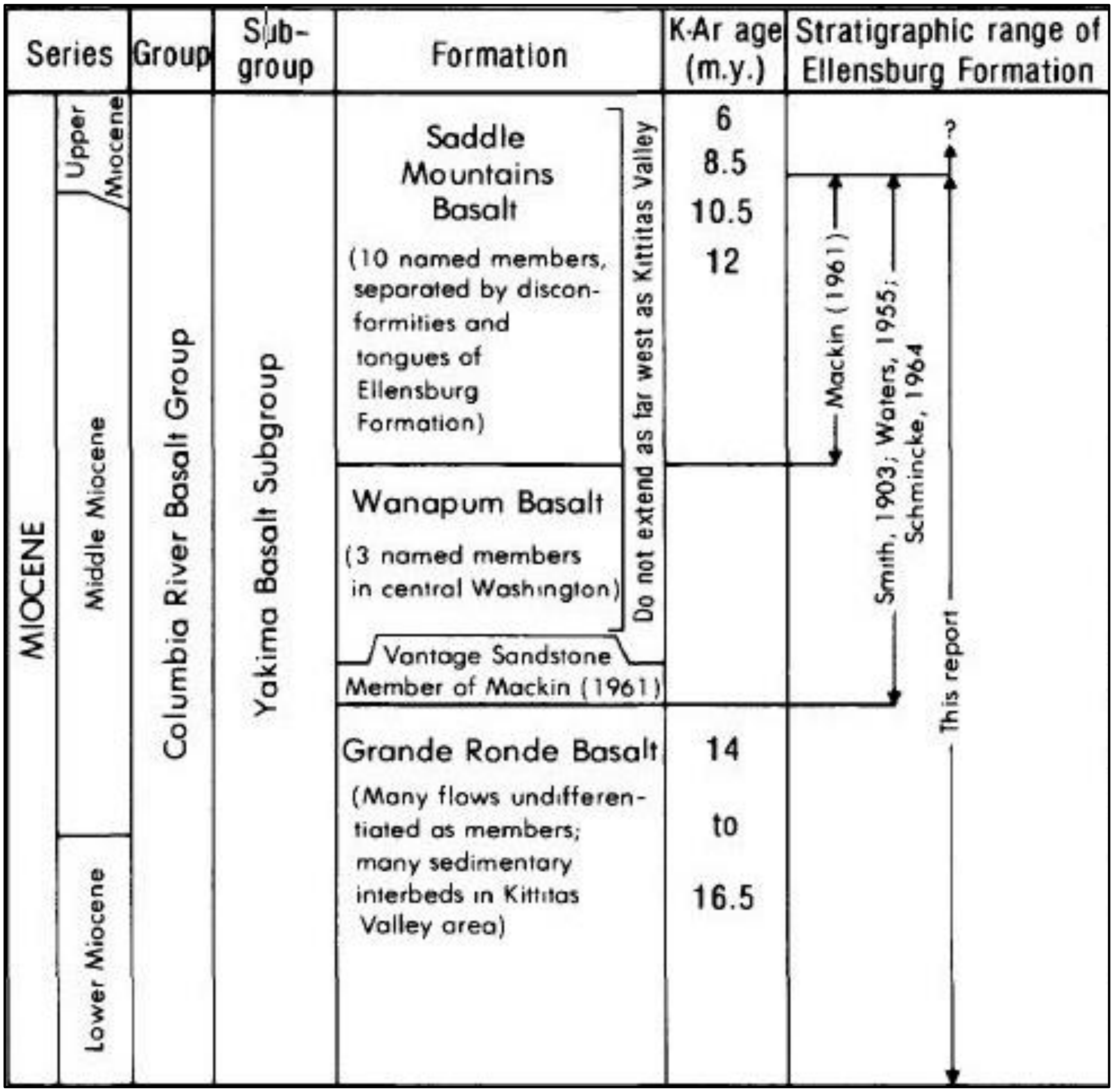


Figure 6: Geological timescale for the Columbia River Basin Group (CRBG) in relation to the Ellensburg formation in the Eastern Cascades (Wait 1979).

Over the course of the last 9 million years, a series of large lava flows have affected the Kittitas Valley ranging between 17 and 6 million years ago (Sullivan 2000). These lava flows created what are commonly referred to as the Columbia River Basalt Group or CRBG (Alt and Hyndman 1984; Campbell 1989). The CRBG lava flows are divided up into four distinct formations: the Imnaha, Grande Ronde, Wanapum, and Saddle Mountain basalts (Alt and Hyndman 1995; Shea 2012). These four formations of the CRBG affected Washington, Oregon and Idaho. The Grand Ronde, the Wanapum, and the Saddle Mountain basalts have affected the Kittitas Valley from the west, east and north respectively. Along the western expression of the Kittitas Valley, the Grand Ronde basalt formations interfingered with basalt towards the west and silic volcanoclastic sedimentary rock to the east (Tabor et al. 1982; Waitt 1979). A recent geologic formation referred to as the Ellensburg formation interwove itself with the Wanapum basalt group and the Saddle Mountain basalts (Waitt 1979). The Ellensburg formation is a very early Pliocene lakebed characterized by both overlays and intrusions of basalt (Whitley 1950). Figure 7 on the next page shows the geological formations for the Kittitas Valley with Grissom site labeled by a dot. This depositional unit is intermixed by exceptionally stony ground lithosols and deep loess deposits. These patterned grounds are important for the early spring roots they produce, such as bitterroot, lomatium, and onion (Morris 1984:50). The material exposed through outcrops from the Ellensburg formation contains material suitable for the creation of stone tools (Morris 1984:50).

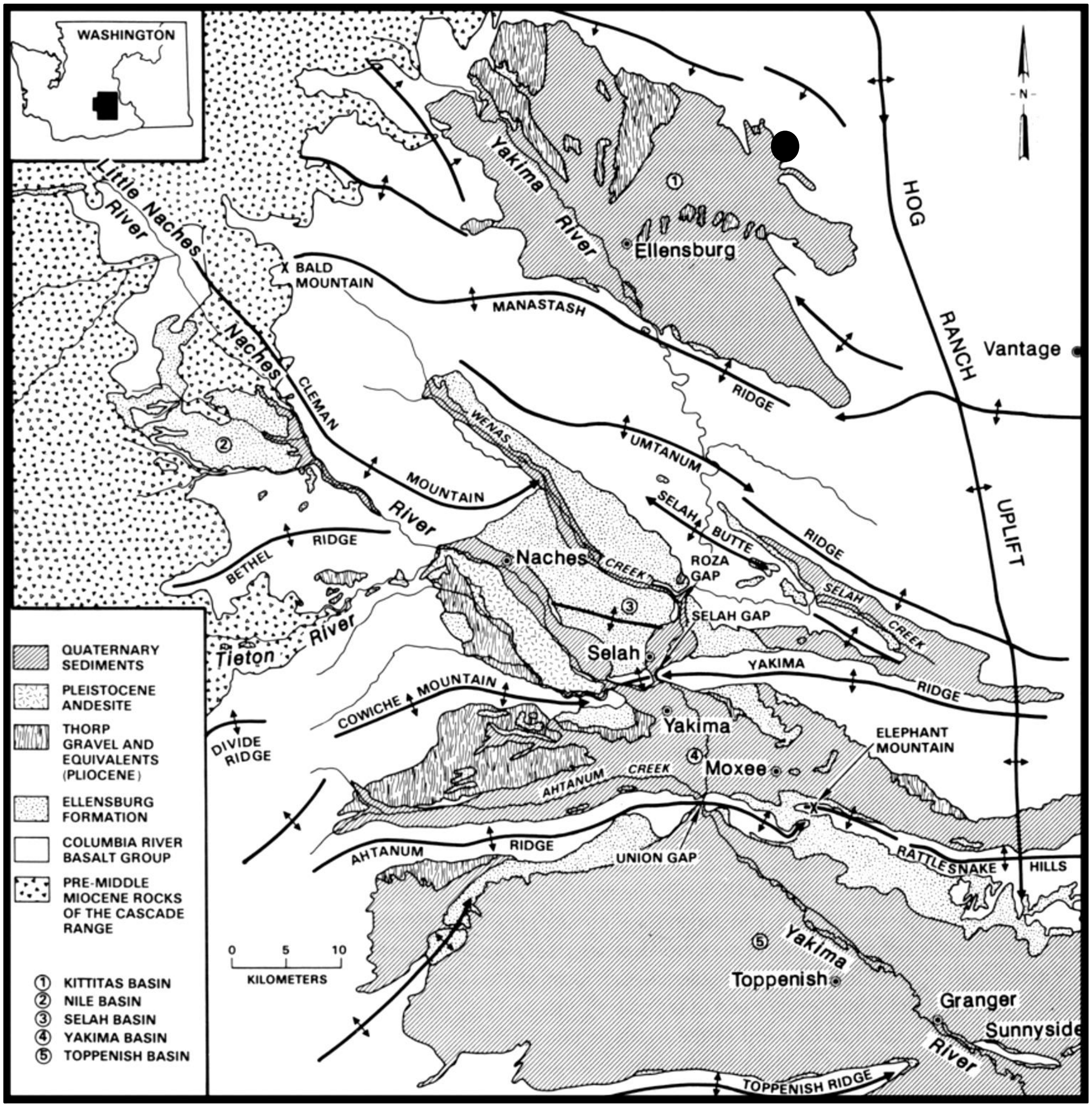


Figure 7: The geological formations within the Kittitas and Yakima valleys (Smith 1988:1480). The approximate location of the Grissom site (45KT301) denoted by the black circle.

The third major geologic process for the Kittitas Valley was glaciation but this area only suffered the indirect effects of climatic change (Shea 2012; Sullivan 2000). The closest glacier followed along the eastern edge of the Cascade Mountain Range went as far south as Elk Heights. This terminal moraine deposited vast amounts of sediment as the glacier stalled and retreated from the western edge of the Kittitas Valley. Resulting outwash from the glacier washed away the snowpack along the Hog Ranch-Naneum Uplift. The resulting outwash filled the area with alluvium depths exceeding 1828 meters (6000 ft) in certain places. These alluvial deposits have been ever shifting as new riverine systems were established and tectonic pressures eroded the alluvial deposits (Sullivan 2000).

Soil Deposits within the Valley

East of the Cascades the Kittitas Valley sees the most complete geologic record of the Pliocene (5.3-2.58 MYA) and the Pleistocene (2.58 MYA- 12,000 YA) (Waitt 1979). The Grissom site maintains an existence between the CRBG basalt group and quaternary sediments. Most of the Kittitas Valley is made up of the quaternary sediments and the Thorp gravels which are leftover material from the Pliocene. There are 183 different types of soil within the Kittitas Valley (Shea 2012). The soils surrounding the Whiskey Dick Mountain range are made up of side stream alluvium with moderately sorted gravels and predominantly very fine silt (Tabor 1982). The Whiskey Dick Mountain range has other unique soils that make it an excellent location to harvest camas. The Whiskey Dick-Camas prairie soil are made up of loess and colluvium and residue derived from the Grand Ronde basalt. As we go further up slope the amount of loess decreases exposing a greater number of basalt (USDA Soil Survey of Kittitas Valley).

Kittitas soil is primarily made up of very fine sandy loam occupying gentle slopes within the lowland valley. Allen Sullivan in his doctoral dissertation describes the soils found along Caribou and Parke creeks as areas comparatively free from alkali (2000:112). The soil surrounding the opposite side of the Caribou Creek overlays a thin layer of tuffaceous interbed resting on top of the Frenchman Springs Member (Tabor et al. 1982). This Frenchman Springs formation is the oldest member of the Wanapum basalt in this area (Tabor et al. 1982). The Grissom site is indicated in Figure 8 by a black circle, as noted between colored/labeled geologic formations (Tgn2, Tev, Qs, and Qks). The Tgn2 formation corresponds to the basalt flows associated with the Whiskey Dick Mountain Range. The Tev formation is the Ellensburg formation holding within its depths mostly volcanoclastic rocks compromising mainly of sandstone and siltstone but does include some conglomerates. The Qs formation reflects side stream alluvium that is moderately well sorted boulder to pebble. The Qks formation is described as a side stream gravel deposition that is terraced by clasts of the Grand Ronde basalt.

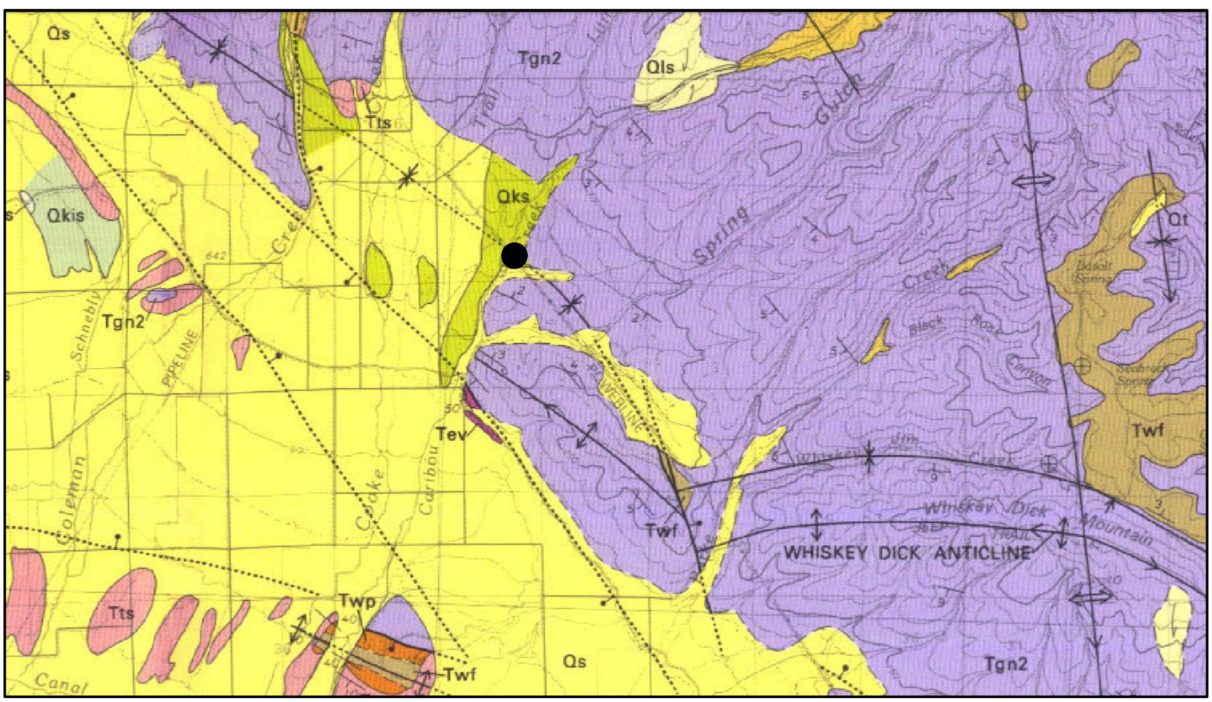


Figure 8: A portion of the USDA Soil Map of the Kittitas Valley; the Grissom site (45KT301) is indicated by the black circle (Tabor et al. 1982).

CHAPTER 4: HUMAN EXISTENCE WITHIN THE COLUMBIA PLATEAU

Archaeologists have established a chronology for the Columbia Plateau surmised from the remnants of the cultural material used by our ancestors. Archaeologists have unearthed some of the earliest occupations dating to 14,000 years ago from evidence of human coprolites at Paisley caves (Gilbert et al. 2008; Stuart 2013) and the Manis site, a mastodon kill site dating to 13,800 years ago (Gustafson 1979; Waters et al. 2011). The oldest known sites in this area correlate to the Clovis culture that left very little evidence of their occupation across the landscape and the Western Stemmed Tradition culture that left behind elaborately made artifacts.

The Western Stemmed Tradition (WST) toolkits are found from Alberta, Canada, to the Oregon Coast and extend southwest to the Great Basin (Chatters et al. 2012). This tradition begins in some places 13,000 years ago and ends in the last places 9,000 years ago. In this toolkit tradition stone is crafted into implements of broad-bladed stemmed and lanceolate projectile points, biface cores, preforms, large end-scrapers, and side-scrapers produced from large flakes with edge modification, burins, gravers, and evidence of retouch. Two unique tools found within this toolkit (WST) include stone crescents and egg-sized stone plumb bobs with longitudinal grooves (Chatters et al. 2012). This complex toolkit comes as a stark contrast to the limited number of food processing items such as milling stones and metates. Thermally altered rocks are present but are rare, occurring only in the form of roasting stones as opposed to boiling stones recovered along the lower Snake River at *Wewukiyepuh* (Sappington and Schuknecht-McDaniel 2001; Schuknecht 2000).

There is evidence of big game hunting in the form of deer, elk, and bison among northern sites in this WST area. Though there is a presence of milling stones, as of yet there is no link to a specific plant processed during this time period (Chatters et al. 2012). There has been no evidence to suggest food storage was used during this time as well. At the Lind Coulee site, there is evidence to suggest an annual subsistence practice that included site re-use and hunting large game such as bison and elk (Daugherty 1956). The contemporary toolkit of WST was the esteemed Clovis fluted lanceolate point culture known to hunt megafauna such as mastodon and mammoth in all parts of the lower forty-eight states and parts of Canada (Fagan 2005). A unique aspect of central Washington is the east Wenatchee Clovis cache known as the Richey Roberts archaeological site that recovered the largest Clovis points in all of North America (Mehringer and Foit 1990). The rest of the information we as archaeologists know is limited with regard to their interaction with their environment as the Clovis culture packed light, leaving behind either little cultural material or material did not preserve for future generations. By 13,000 years ago we see a trend away from the Clovis tradition and the continuation of the Western Stemmed Tradition until about 9,000 years ago, which was replaced by another toolkit known as the Old Cordilleran Tradition (See Figure 9). This new technology foregoes an emphasis on fish resources and heavily modified bone tools.

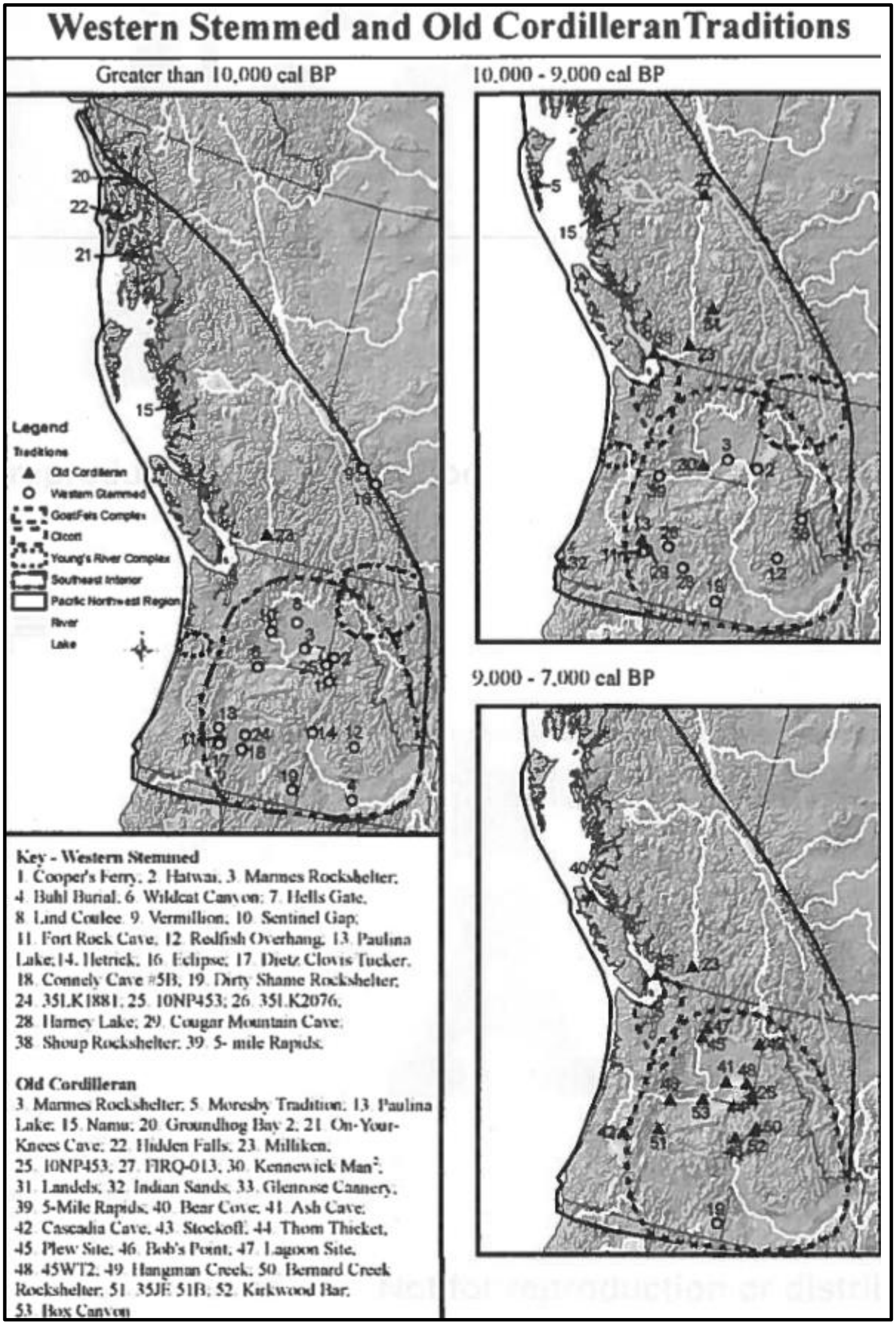


Figure 9: The distribution of OCT and WST occupations across the Pacific Northwest over time (Chatters et al. 2012:51).

The Old Cordilleran Tradition (OCT) takes hold of lithic developers in the north by about 10,600 years ago and expands south as it replaced the WST over the next 1,600 years (Chatters et al. 2012). Butler (1961) describes this tool tradition as constructing foliate shaped biface, cobble tools, and expedient flake tools focused on riparian and riverine environments. OCT projectile point, are known to be pressure flaked (Chatters et al. 2012). This toolkit also includes gravers, cobble tools, bone tools, and microblades, which appear in the archaeological record around 9,900 years ago (Fedje et al. 2008). Unique to the northwest the microblade technology began truly in the Arctic centuries before the Plateau (Vasil'ev 2001). Bifacial tools appear in lesser quantity during this time period (Chatters et al. 2012). Cobble tools become more elaborate with the OCT toolkit ranging from choppers to plane-like unifaces, and large spall knives.

This OCT toolkit is a contemporary of the Windust phase that is represented by a basal-notched lanceolate point tool type known from various archaeological sites along the lower Snake River, Marmes rockshelter in southeastern Washington, to the upper Kittitas County Washington, north into British Columbia, and south into Oregon. Similar to the OCT the Windust phase uses a similar tool kit such as milling stones, bifaces and expedient flakes. Cobble tools created during this time period are equally as elaborate as the Windust toolkit and the OCT toolkit. These two toolkit traditions, the OCT that date from 10,600 to 4,500 years ago, and the Windust that dates from 10,500 to 8,000 years ago, overlapped for a brief period (Chatters et al. 2012; Fagan 2005). Both traditions were characterized by small highly mobile forager/hunter groups that exploited a wide range of foodways including an emphasis on plant foods rather than a focus on fishing and hunting wild game seen in the WST. In terms of paleoenvironments, the Windust toolkit which is found along or near former grasslands that held habitat for megafuna. On the other hand, OCT sites are confined to mountain regions and the major river corridors (Chatters and Pokotylo 1998). Archaeological evidence suggests that the people utilizing the WST toolkit would reoccupy lower valley sites while OCT would abandon sites after one use (Chatters et al. 2012). At the Marmes Rockshelter for example there is a clear distinction between a Windust cultural occupation and a later occupation, but no evidence of continuous human occupation (Rice 1972).

After the Windust phase there exists a transitionary border between the OCT and the Cascade/Vantage phase from 8,000 to 4,500 years ago (Orvald 2009) (See Figure 10). Some would argue that the Cascade/Vantage phase is interchangeable with OCT as there are similarities between these toolkits (Chatters et al. 2012). However, for the purposes of this study our focus becomes this shifting trend towards acquiring and using plant resources. The earliest ovens known by archaeologists have been found at the Hannayan Creek site in the Southern Willamette Valley, Oregon, dating back to 8,500 years ago (Cheatham 1988). Camas bulbs were found within these ovens at Hannayan Creek (Cheatham 1988: Turner 2014). This technological shift is known as a nutritional transition with the advent of earth ovens. Early ovens are also noted within the Calispell Valley in Washington dating from 6,000 to 5,000 years ago (Turner 2014). Typically, the measurements of these ovens range from 60 centimeters to 4 meters across and from about 12 to 60 centimeters in depth (Matthes 2016). The greater frequency of grinding stones and the appearance of earth ovens assume that a greater dependence on plant foods was achieved. This technologic advance came in the face of a global warming and a drying phase during the Altithermal some 8000 years ago when the climate was cooler and had more moisture than that of today’s climate (Fagan 2005).

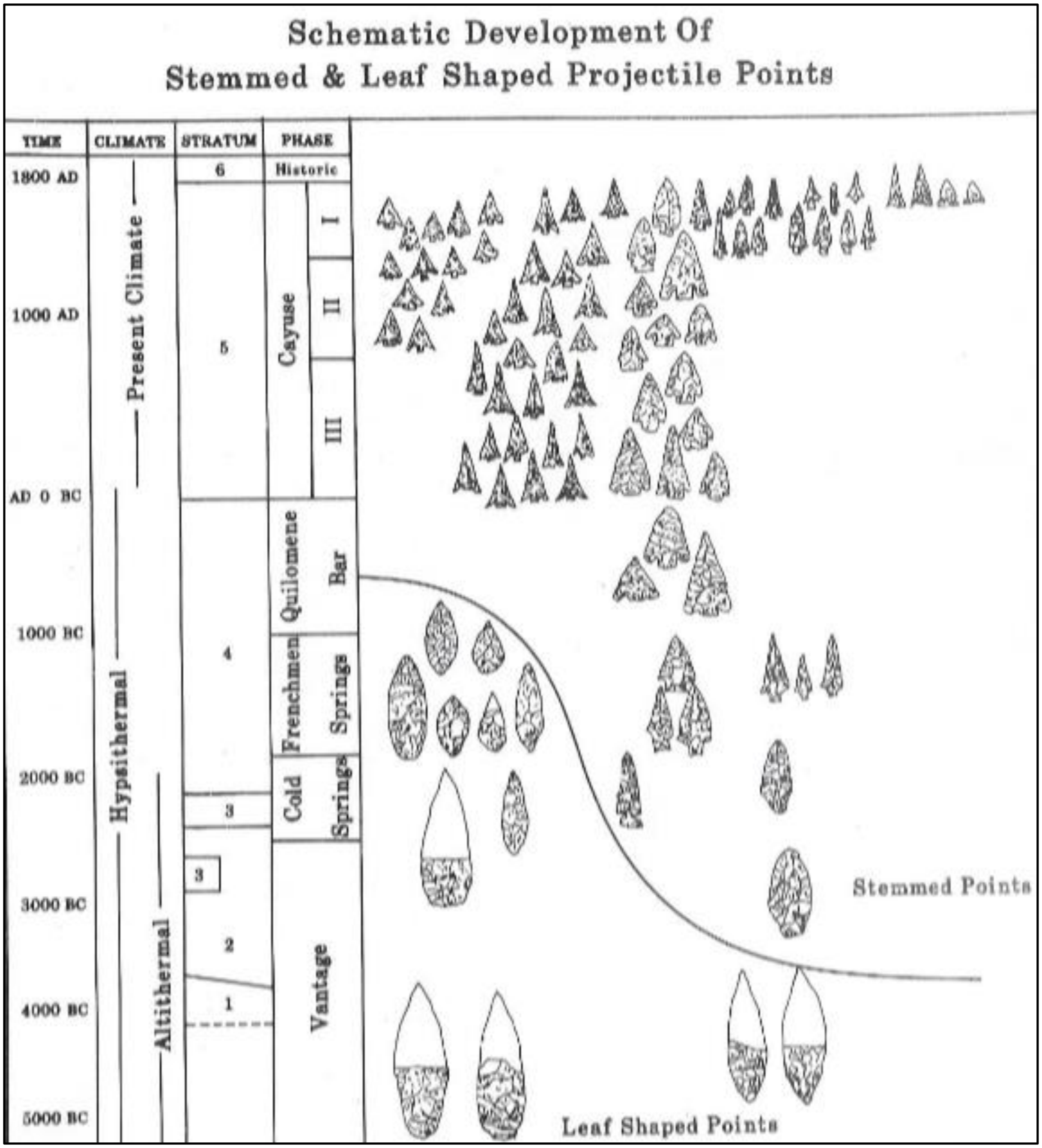


Figure 10: The seriation and development of projectile points through time among the Plateau culture (Morris 1984; Rice 1972).

This transitional climatic period shows that human populations shifted their focus on riverine settlements creating homes on or near rivers and expanding out to reach specific resources across this landscape. The diagnostic artifacts from this time period correspond to a leaf shaped Cascade points or large side-notched points (Nelson 1969). Within this toolkit archaeologists have recovered evidence of continued use of milling stones, expedient flaked tools, triangular knives, bone tools, atatl spurs, and basalt cores, just to name a few. As time progressed the people living in this environment began to build semi-subterranean structures along these waterways dating back to at least 4,500 years ago (Orvald 2009). This technologic shift marks a transition into what is called the Frenchman Springs phase in Central Washington and the Tucannon phase along the lower Snake River (Rice 1972).

The Frenchman Springs/Tucannon phase continues to build on the previous emphasis on plant processing with ground stone and cobble tools. With the appearance of semi-subterranean houses, more time is devoted to specialized camps useful for hunting, root collecting, and plant processing and this phase sees evidence of a seasonal subsistence strategy (Chatters 1984). Archaeologists have uncovered several variations of stemmed points (Cold Springs, Frenchman Springs, and Quilomene Bar) with the corner-removed style dominating the archaeological record (Nelson 1969). The toolkits used during this time period focused on cryptocrystalline silicates (CCS) over basalt as tool stones. Many have argued that the ethnographically observed “Plateau Culture” had emerged by the end of this phase (Ames et al. 1998; Orvald 2009).

The end of the Frenchman Springs phase brings about the Cayuse phase in central Washington and the Harder phase along the lower Snake River, both noted within the archaeological record by about 2,500 to 350 years ago. This period reflects a greater emphasis on the winter village model, with populations spending much of the year stockpiling food for the winter to feed the village consisting of a number of families. This next section deals with this known period through ethnographic and historic detail. As the Grissom site dates mainly within the Cayuse period, this body of work must take into consideration the Plateau cultures' influence on this area as the living descendants involved with the Grissom site are known ancestral people.

The historic period has a wide range across North America. For the Kittitas Valley, the historic period does not start until first Euro-American to set foot in the valley, Alexander Ross in 1814. This historic period marks a time of cultural conflict as Russians, Spanish, English, French, and Americans began to interact with the Native American population through the occupation of western land. Although the Plateau culture area is one of the last cultures to be visited by Euro-Americans, the indirect affects of these new people on the land were felt throughout the Plateau.

CHAPTER 5: ETHNOGRAPHIC AND HISTORIC CONTEXT

Context Pre-1848

> Coyote Digs Roots - Thompson Stories
>
> Coyote was travelling, and came to a country where many tatu'en roots grew. He was hungry, and could find no game, nor could he see any lodges or people. He cut a stick to serve as a root-digger, and said, "I will dig some roots and eat them." He saw a large one and dug it out. Wind rushed up through the hole, and he could see people walking down below. He put the plant back again. He dug another one, and the same thing happened. He must have been in the sky country, and these roots were stars (Boas 1917:7).

The ethnographic and historical accounts are used to demonstrate the relationship between the landscape and humanity through our past, present, and future (Figure 11). It is believed that the Canadian fur trapper Alexander Ross was the first European to set foot in the Kittitas Valley. His exploration of the Pacific Northwest was well documented by his journal entries. In the spring of 1814, Ross wrote this down when traveling through what he termed the Eyakema Valley but by all accounts was the Kittitas Valley (Schuster 1982:2; Splawn 1917).

Figure 11: Undated photograph assumed taken from Chelohan by an unknown photographer. Photograph courtesy of the Ellensburg Public Library (Shea 2012:129).

> The second day after our friends left us, we entered the Eyakema Valley. The beautiful Eyakema valley. So called by the whites. But, on the present occasion, there was nothing either beautiful or interesting before us as we had scarcely advanced three miles when a camp, of which we could see the beginning but the not the end! It could not have contained less than 3,000 men, exclusive of women and children, and treble that number of horses. It was a grand and imposing sight in the wilderness, covering more than six miles in every direction. Councils, root gathering, hunting, horse racing, foot racing, gambling, singing, dancing, drumming, yelling, and a thousand other things, which I cannot mention were going on around us. The din of men, the noise of women, the screaming of children, the tramping of horses, and howling of dogs, was more than can well be described (Ross 1855:21).

The term Eyakema seems to have taken root from Alexander Ross himself as he 'named' the people and their valley. Other settlers of the region would correct this mix up while writing about the "the beautiful E-ya-ki-ma or Kittitas Valley" (Splawn 1917:4). Contemporary Native American groups who lived or camped regularly in the Kittitas Valley include bands of the Taitnapum, Kittitas, Klickitat, Yakama, Wanapum, Wenatchi, and Moses-Columbia. The area just south of the Grissom site is known ethnographically and historically to be occupied throughout the year by the Kittitas tribe. Figure 12 maps the traditional village sites known to be used by the Kittitas, Yakama, Taitnapam, Wanapam, and Klickitat (Schuster 1998). The Kittitas are now a legally and federally recognized band of the Confederated Tribes of the Yakama Nation. The tribes that visited the Kittitas Valley were attached to two language families, the Salish and the Sahaptin (See Figure 13). The Salish language to the north include the Wenatchi and the Moses-Columbia. The Wanapum, Kittitas, Yakama, Taitnapam, Klickitat, were and remain among the Sahaptin language family.

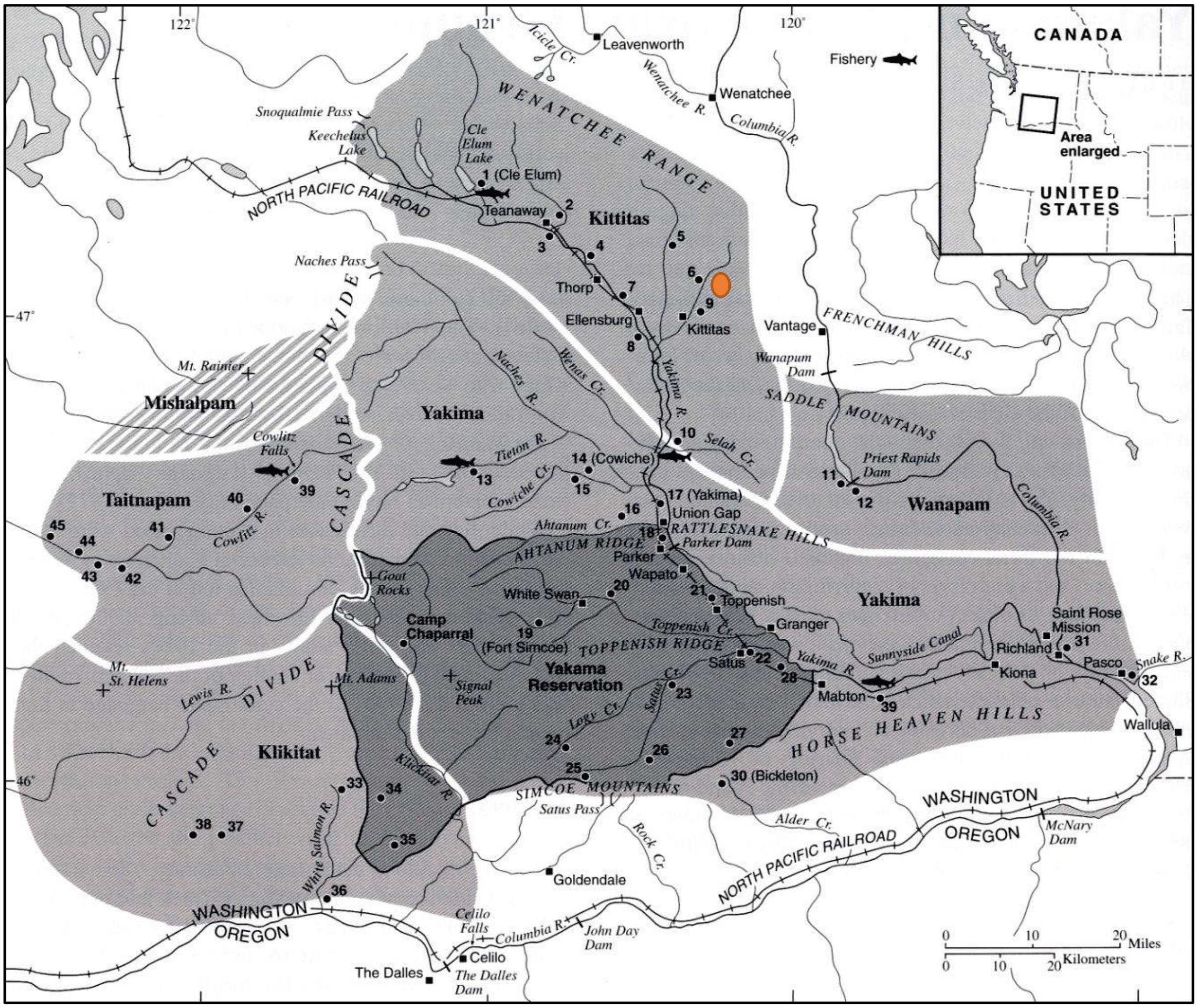


Figure 12: Map indicating the territory of the Kittitas, Wanapum, Yakama, Taitnapam, and Klickitat in the 19th century (Schuster 1998:328). The numbers along with their corresponding dots are locations of traditional village sites. The orange oval marks the approximate location of the Grissom site (Shea 2012:21).

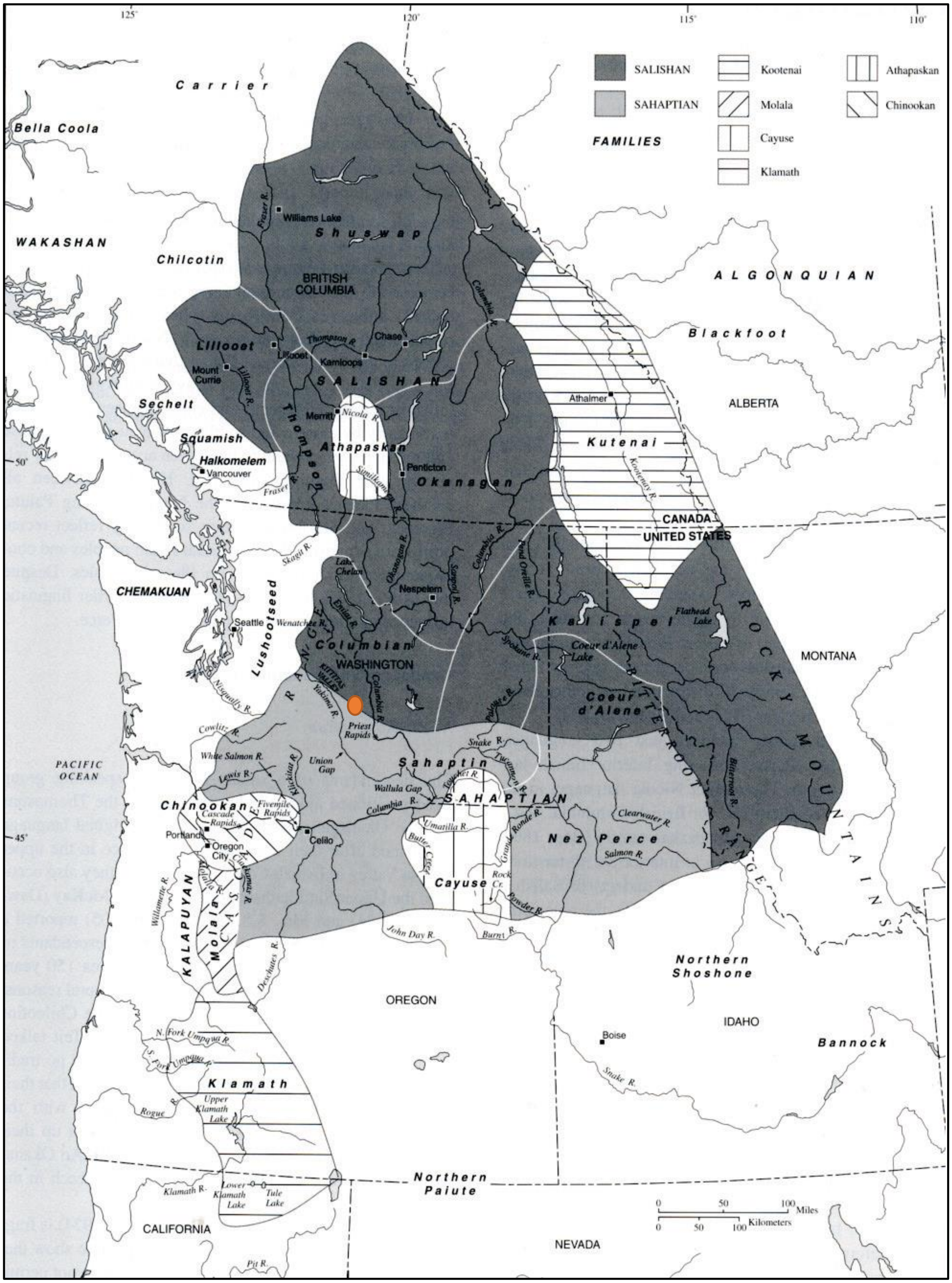


Figure 13: Map indicating the language groups for the Plateau Culture Area (Kinkade et al. 1998:50). The approximate location of the Grissom site (45KT301) is denoted by the orange oval (Shea 2012:22).

The Grissom site held a significant place in the hearts of the tribes who visited the area. This continuity of support and admiration for this area is also of historical truth. In the 1878 treaty, Chief Moses, a chief of the Sinkiuse-Columbia, negotiated for the area around Chelohan to be included into their reservation (Ruby and Brown 1995). This site also held importance with the Wenatchi group who frequented the area and also intermarried with the Kittitas. Historic accounts from landowners recall a time when they would open their land to tribal members to enjoy their traditional places (Henderson 1970, 1985). In the late 20th century the Grissom site and the area surrounded believed to be a part of Chelohan was owned by the Smyths (Shea 2012). When the site was excavated in the 1970s, those among the investigation interviewed Theresa Smyth, whom recalled memories from her childhood at the Frying Pan Ranch (Shea 2012:58)

> The food in this particular area was prized by the Indians all over the state and I might tell you that they had this superstition that they never had any fighting or any battles in the Kittitas Valley because it was a place of plenty (food) and they felt it as a sacred place and this is the reason they had their gathering here. This food was highly prized by all the tribes so any extra food they had they could always be traded for something that they had on the sound (Puget Sound) or any other place (Smyth n.d. 10, cited by Shea 2012:130).

This land of plenty had a number of lifeways in the form of flora and fauna that were discussed previously above. In this section we focus on the lifeways that promoted human existence in the valley and the Columbia Plateau in a broader sense. By the end of the Frenchman Springs phase, the Plateau culture is evident throughout the archaeological record (Ames 1998). This time period is noted by the appearance of semi-subterranean houses and more specialized camps for specific types of foods (Chatters 1984; Morris 1984). These specialized camps were a major part of the seasonal interaction with the landscape.

Specialized camps enabled able-bodied people to hunt, gather wild vegetation, and fish. These wild greens could be edible while inedible plant resources included willow, black cottonwood, tule, spreading dogbane, all of which are found along the stream channels and in the marshy areas of the Kittitas Valley (Hunn 1990; Shea 2012).

The seasonal round (Shown in Figure 14) displays the known subsistence strategy for the Plateau cultures, in this case most specifically the Yakama. In the case of the Grissom site, these areas would be places of note around the Yakima River or the other ephemeral streams. These places were frequently used for winter activities and winter lodging from late November through early March, and sometimes were inhabited all year round by the young and old (Morris 1984). As the sun of spring shone, the resulting rush of water from the snowpack would also unfreeze the surface of the rivers. The first salmon run would begin as early as March or April depending on that season's climatic fluctuation. This first salmon run would be a cause to celebrate the renewal of life through a first foods ceremony (Desmond 1952). The return of salmon, fresh roots, and wild game provided fresh food for the people who were nearing the end of their winter caches.

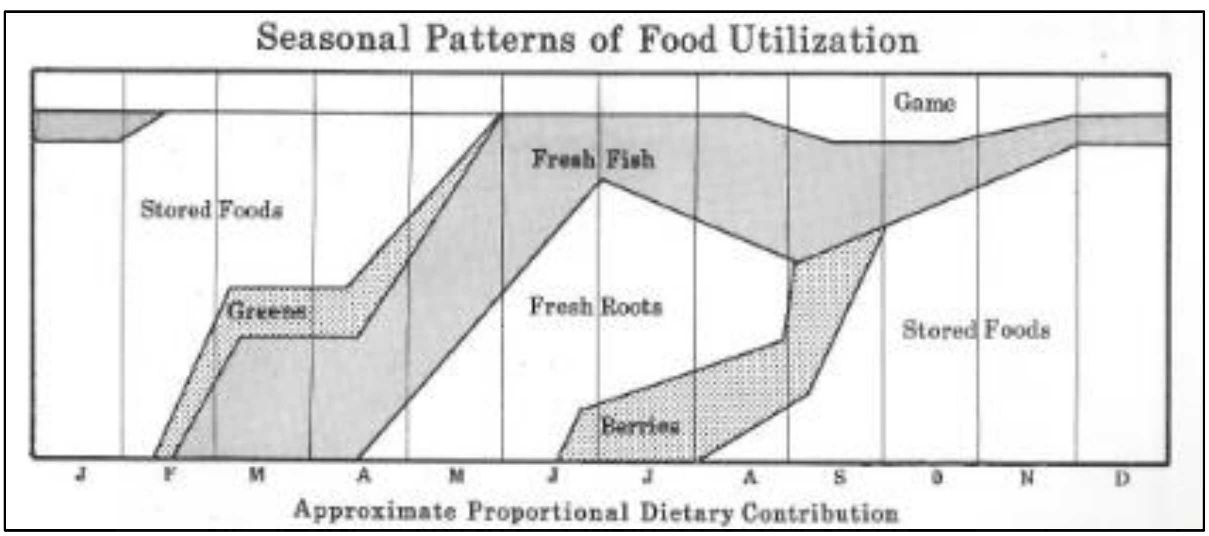


Figure 14: Model showing the annual seasonal rotation of subsistence practice for the Yakama tribe (Hunn and French 1981; Morris 1984:129).

Early spring sometime marked a period of resource scarcity for stored supplies (Morris 1984; Schlessman 1984). April through early June would begin a dispersal of specialized task groups to gather resources (game, vegetation, and fish) for the upcoming winter. Roots were normally ready to dig in early April at lower elevations, and as the seasons continued higher elevations yielded roots as well (Kirk and Daugherty 1978:79). Lomatium reach the maximum density within the region during April or early May (Morris 1984:191). Digging for these root crops continues to be done using sharpened sticks with wooden or antler handles (Morris 1984). People dug up these crops in April and May at the sign of the first flowering (Turner 1997). These harvested crops were carried to camp for sorting in bags woven of willow bark or spreading dogbane. Any roots damaged in digging were set aside for eating fresh (Kirk and Daugherty 1978). The other roots, depending on their species, were baked in shallow pits filled with heated stones and covered over, or they were pulverized and patted into cakes to be spread onto mats and dried in the sun (Kirk and Daugherty 1978; Turner 1997). Some roots were strung and dried whole, lasting up to three years (Kirk and Daugherty 1978:79; Turner 1994:82).

The month of May has historical relevance with the mention of Andrew Splawn's story written on a May Day in 1863 who describes what he saw in the Kittitas Valley as "*the whole flat covered with Indian lodges"* (Splawn 1904:236-237). Chelohan was a part of the seasonal round that tribes of the Plateau followed; these activities were well defined in their order (Desmond 1952; Schuster 1975; Shea 2012). With the introduction of the horse in the 1700s these various trade and intergroup hubs all over the Plateau and parts of the Plains areas expanded to include distant tribes and larger groups. The large gatherings were held during this time of year within the Kittitas Valley for the first root crops and around Lake Cle Elum in late June would be a large gathering place referred to as *The Big Time* (Desmond 1952). These two resources may reach their optimum at the same time but at other times they are separated by months depending on the snowpack. It is very possible that groups divided among individual talents or by gender to acquire both resources at the optimum harvest time. *The Big Time* was a large multi-day event that happens continuously while different native groups fluctuate into and out of this area during the month of June and early summer (Desmond 1952).

> The men left the high density meadows and went to the lower Columbia to fish, trade some of the roots already processed, and to visit. Women and children continued to camp on the root resource amassing huge piles of roots (Morris 1984:194).

Summer marked the peak time for fishing. By early summer high densities of fish reached the Yakima River and its tributaries like Caribou Creek (Morris 1984:193). These specialized groups would begin to disperse and acquire the annual bounty of fish, game, roots, and berries of the summer. By August wild game hunts became more frequent as the arrival of winter approached. This time period saw groups disperse to meet again at the extensive root digging grounds in Klickitat territory, where trout fishing, berry picking, trading, and horse racing were said to take place (Desmond 1952). When huckleberries became ripest in the high mountains they would correspond with another first foods feast for the people of the Plateau. Huckleberries ripen from mid-August through October depending on the seasonal fluctuation (Turner 1998).

In fall, the Plateau people would return home to their own river valleys for the late fish runs. For the Kittitas they continued to hunt deer and elk in high frequency in the mountains and continued caching foods for winter (Desmond 1952). The areas surrounding the Kittitas Valley held elk, antelope, mountain sheep, mountain goat, and bear (Anastasio 1972:125).

Each year the hunting season's scarcity or abundance, would provide clothing, shelter, horse gear, and many other items as well as the meat itself. By 1853, game was scarce in the Kittitas territories (Doty et al. 1978). In times of resource scarcity, trade networks created a safety network for the obscure resources not available within a given region.

The frequency and intensity of winter hunting would be in direct response to the previous year. The year's work would reflect the anticipated shortage for the winter months. By late fall, sometimes November or as early as October, Plateau cultures would come back together in a large nucleated winter pit house village to weather out the winter (Orvald 2009). The winter villages would be located in different places or would sometimes be repeated.

These intertribal meeting places held economic, social and political value for each tribe that would travel to these meetups. Other regional trade centers within the Columbia Plateau included Soap Lake, The Dalles, Celilo Falls, Waterville, Kettle Falls, Wenatchee, Okanogan, Snake River, Icicle Creek, and Teanaway Valley (See Figure 15) (Scheurman 1982; Schuster 1975; Shea 2012:144; Stern 1993, 1998; Swaggerty 1998). Each of these points held significant meaning to those who visited these places for ceremonies, feasts, sporting events, councils, gambling, marriage arrangements, visiting, and a host of other important activities (Hunn 1990; Schuster 1975; Shea 2012; Teit 1900). This trade network gave access to a greater variety of foods and raw materials than their own territories provided (Turner 1994:30). Truthfully, just as the landscape is a reflection of humanity's connection to the world, these trade networks show the true extent of the cultural influence of the Columbia Plateau. Prized trade goods, such as marine shells, obsidian, and plant material traveling hundreds and sometimes thousands of miles from their origin (Swaggerty 1988:351). These major trade centers were predominantly located within a sedentary population with surplus goods ripe for trade in exchange for clothes, jewelry, wild plants, or fresh fish. During this exchange, a relationship could be built and a marriage planned and prepared. These most enduring trade networks revolved around these different plant distributions that provided a great environment for a particular plant, whether used for food, material, or medicine (Turner 2014:127; Hunn et al. 2016). Figure 15 shows the protohistoric trade network shown in Swaggerty (1988). Notice the name of the "Kittitas Fair" near the Grissom site in central Washington.

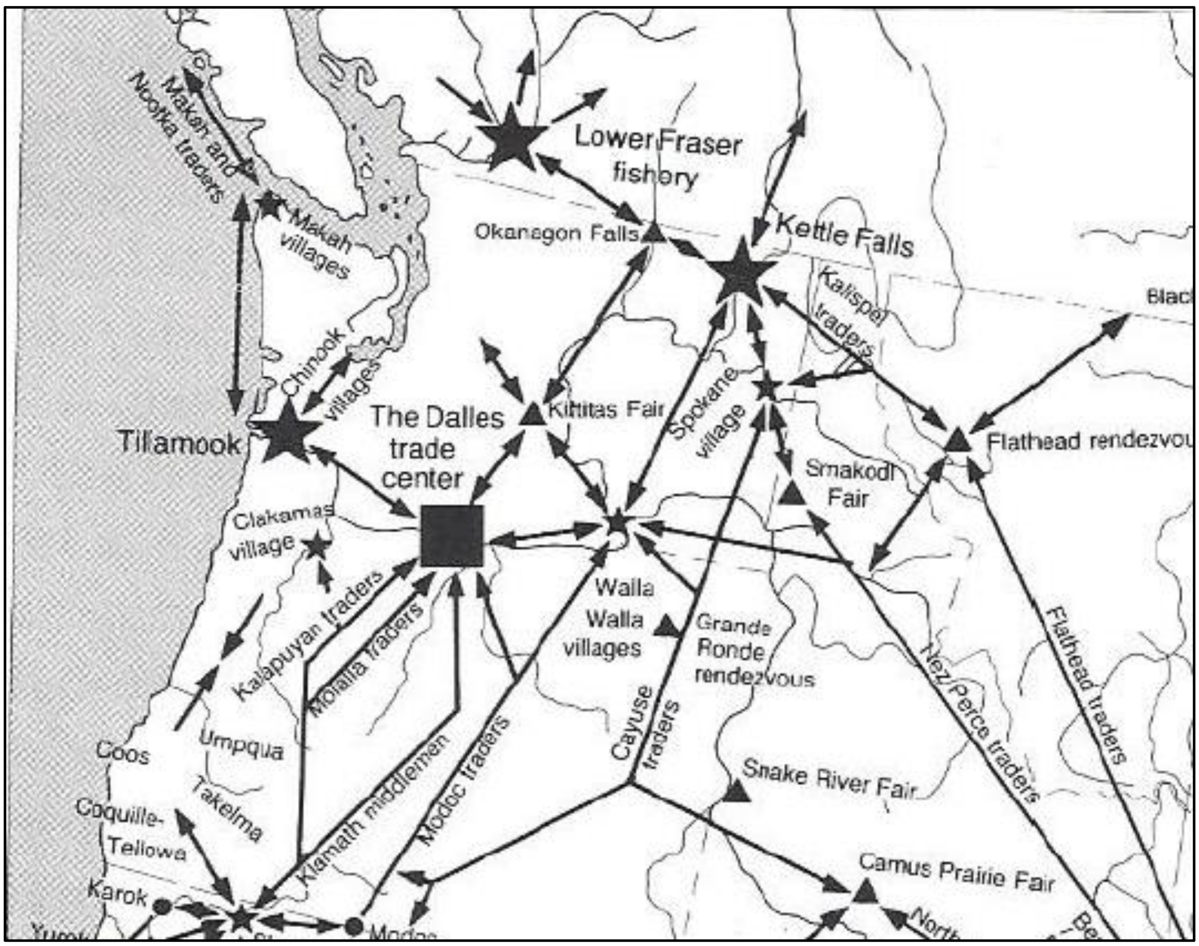


Figure 15: Map illustrating the protohistoric trade network within the Pacific Northwest. Map adapted from Swaggerty (1988:522).

> Both on the coast and in the southern Interior Plateau, camas bulbs were a highly valued trade item, sometimes exchanged in the form of loaves of dried, cooked bulbs, some over 4.5 kilograms, which the Nez Perce and Sahaptian traded for horses (Turner 2014:127).

The above quote and Figure 15 have a similar theme of trade explaining the protohistoric trade routes through all of North America and for our purposes focused on the Grissom area. As Europeans began to flood the western United States, disease and the American way followed each newcomer. Influence from the Russians, Spanish, French, English, and Americans reached into parts of North America leaving behind germs and diseases that devastated an untold number of Native Americans in North and South America. The Kittitas Valley was no different. What Alexander Ross and the early settlers saw in this area may have been a pale image of what it was like prior to contact.

In 1844, Charles Wilkes, acting within the United States Exploring Expedition, sent out Lieutenant Robert Johnson to travel across the land observing both the navigability of the Columbia River and to observe the interior Columbia Plateau for its people and natural setting (Wilkes 1976). During Johnson's travels through the Kittitas Valley, he recorded a number of journal entries, most noteworthy of which was the purchasing of Plateau horses, the meeting with the Kittitas Chief Teias, and he observed women harvesting, preparing, and baking, camas and other roots (Glauert and Kunz 1976; Wilkes 1976, cited by Shea 2012:27).

Context Post-1848

The earliest occupation of Euro-Americans within the area was the construction of Ridge Mission upon Manastash Creek in 1848 (Glauret and Kunz 1976). Historically, the Kittitas Valley was settled by the Euro-Americans in 1867. During this time period two principal Native American villages recorded at the time were led by *Shushushkushkin* and an

Alex, who resided near Thorp, Washington (Interstate Publishing House 1904:237). Land for cattle, logging, and the presence of gold drew thousands of Euro-Americans to the region leading to a quick settlement of the area.

By the 1860s, the cattle industry began driving cattle through the Yakima and Kittitas valleys (Prater 1981). This early European life focused on horticulture and raising livestock within the Kittitas Valley. As farms began to pop up throughout the valley, impromptu irrigation systems were created out of the existing ephemeral streams, further damaging the natural riparian zones within the valley. As populations expanded within the west the growing demand for food within the Puget Sound area led to the arduous journey driving cattle from the Kittitas Valley over the Snoqualmie Pass to Seattle and nearby towns (Prater 1981; Splawn 1917).

Historic logging camps established in Kittitas County focused around three lakes including Cle Elum, Kachess, and Keechelus (Figure 5). The first sawmill in Kittitas County was established in Ellensburg during the early 1870s (Prater 1981). By 1887, the Northern Pacific Railway was completed through Ellensburg that became the headquarters of its Cascade division (Shea 2012). These train depots allowed the northwest lumber industry to flourish in this environment connecting the Kittitas Valley to the wider world by railroad.

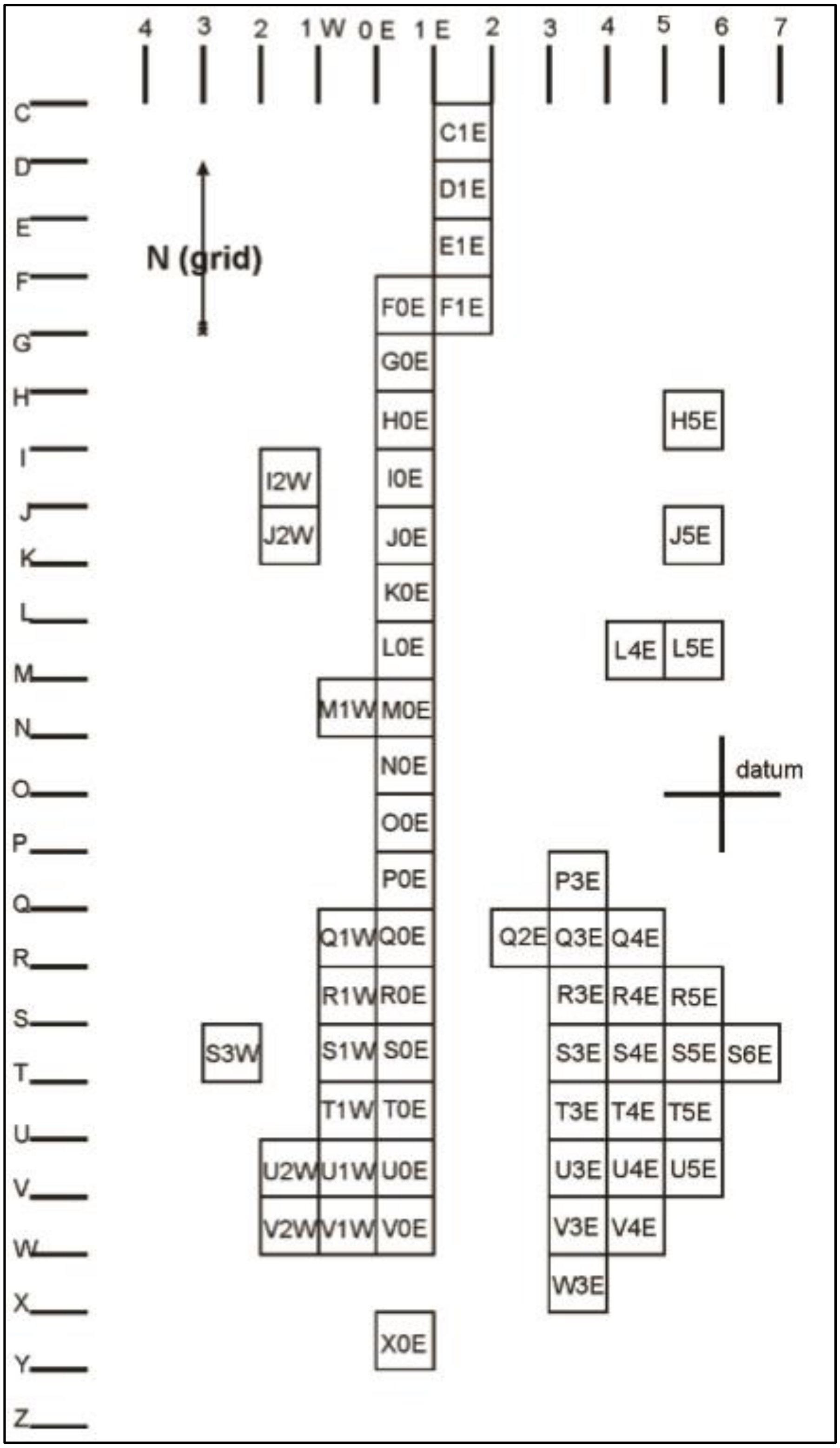
Gold was found along Swauk Creek as early as 1867. During the ensuing two or three years the region was prospected occasionally, but no one found enough gold to warrant the establishment of a camp. In the fall of 1873, however, a party of five men met with better success than any of their predecessors (Interstate Publishing Company 1904:240). Within two weeks these five men secured $500 to $600 in gold (Interstate Publishing Company 1904:240). This brought on hundreds of miners and prospectors into the valley, many of whom remained in the valley assisting the quick development of Kittitas Valley resources. The direct and indirect effects of the gold rush, as well as the mining community, echoed through the historic period of the Kittitas Valley.

Holly Shea summarized the historic ownership of the Grissom site (2012:58-59). This historic ownership of the area surrounding the site began in 1882 when John and Elizabeth Grissom, who hailed from Iowa, applied for a homestead and began farming the land (Lyman 1919). John Grissom passed away from unknown causes in August 1887 leaving behind his widow Elizabeth Grissom (Funk 1989). Upon receiving the homestead receipt from the US Government in December of 1887, Elizabeth sold the land some eleven months later to Mr. Charles M. Smith in November 1888 (KCC 1888; DBG: 207, cited by Shea 2012:58). Charles and Emily Smith were recent migrants from California who made the Kittitas Valley their home in 1884 (KCC 1989). The couple lived on the land for half a century raising a number of children. The memories of these children, notably the daughters Theresa Smith-Smyth and Ruth Smith-Gehlen, are on file at the Ellensburg Public Library in which they discuss their own memories of Native Americans occupying their family's homestead. Thersa Smyth and her husband Mark Smyth purchased the homestead from her parents. Dr. Clay Denman began the investigation of the Grissom site in 1967 after gaining permission from the Smyths.

CHAPTER 6: ARCHAEOLOGICAL INVESTIGATIONS AT THE GRISSOM SITE (45KT301)

In 1967, Dr. Clay Denman undertook an investigation into the location of the famed Chelohan intergroup/intertribal gathering area (Shea 2012). At the time, Dr. Denman received permission to excavate from the land owners and named the archaeological site after the original homesteaders of the area, John and Elizabeth Grissom. Dr. Denman led the excavation of the Grissom site for the first two field seasons in 1967 and 1968. Undergraduate papers from 1967 and 1968 describe the excavation methods employed at the Grissom site through troweling until excavators reached 60 cm below the surface at which point shovel scrapes could be employed as there was no screening (Shea 2012:68). Each of the artifacts found during excavation were plotted using a datum in the northwest corner of each unit (Shea 2012:69). Excavation records all describe a 20 cm baulk left around all sides of each unit, creating a 40 cm baulk between units which was excavated before 1969 (Shea 2012:69).

In 1969, the Smyths sold the property to Greenacres Inc. who allowed excavations to continue until 1971 (Shea 2012). Dr. William “Bill” Smith excavated the Grissom site for Central Washington during the 1969-1970 field seasons. Under Dr. Smith’s guidance, excavators began using 1/4 inch mesh screens and used 10 cm arbitrary levels. During this time, Dr. Smith also tried to superimpose a meter grid over Dr. Denman’s 2 m grid (Shea 2012). However, the 1971 field leader was not named in the excavation log. As a result or lack thereof, the field notes from this year’s excavation lack crucial information such as the depth of recovery (See Figure 16).



Excavation Timeline:
(Shea 2012: 65-70)

- 1967: **Dr. Denman** Q1W, R1W, S1W, T1W, V1W.
- 1968: **Dr. Denman** F0E, G0E, H0E, I0E, J0E, K0E, L0E, O0E, P0E, Q0E, R0E, S0E, U0E, V0E.
- 1969-1970: **Dr. Bill Smith** J2W, M0E, R0E, R3E, R4E, R5E, S3E, S4E, S5E, T3E, U0E, X0E
- 1971 **Unknown** H5E, J5E, L4E, L5E

Figure 16: Map indicating the main excavation grid at the Grissom site (45KT301). Map reconstructed by Holly Shea (2012:67).

Shea's contribution to the Grissom site include summarizing the history of excavations at the site, organizing site records, synthesizing the years of research, and finally assessing the site's significance using the National Register of Historic Places (NRHP) criteria (Shea 2012:3). Through this work Shea cataloged 13,622 bags of artifacts (Table 2), subsequently rehabilitating this archaeological collection for further researchers. Recent archaeological work (Burris 2015; Finley 2013; Parfitt 2013; Vassar 2012) brought new insights into our understanding of the Grissom site. The following section goes over their contributions.

Table 2: Summary of catalogued artifacts by number of bags from the Grissom site (Shea 2012:102).

Material	Catalogued Number Count	Description
Fauna, Unmodified	5,231	3,514 non-fish (3 missing), 626 fish, 1,091 shell (1 missing)
Flora	568	566 charcoal, 2 macrobotanical sample
Historic Artifacts	1,379	10 ammunition and other firearm artifacts, 9 glass beads, 83 ceramics, 39 fasteners/buttons (3 missing), 538 glass (1missing), 656 metal (11 missing), 2 building material such as brick, 42 unspecified (5 missing)
Lithics	5,770	1,335 unspecified lithics (8 missing), 794 non-projectile point bifaces (4 missing), 2,034 unspecified chipped stone (16 missing), 553 debitage, 58 ground stone (3 missing), 15 lamellar flakes (2 missing), 637 projectile points (80 missing), 2 thermally altered stone, and 342 uniface (6 missing)
Ceramics, Not Historic	10	(These are questionable and need evaluation)
Tools/Ornaments	267	208 modified bone (8 missing), 13 modified shell (1 missing), 45 lithic (presumably beads, etc. not chipped stone; 6 missing), 1 unspecified
Fill/Float/Sediment/ Other Sample	97	92 fill/float/sediment, 5 other
Unknown Material	294	(281 numbers appeared unassigned)
Discarded Material	6	Bags of material catalogued but then discarded, like dirt clods or roots
TOTAL	13,622	

Parfitt's (2013) study questioned the cultural mechanisms at work at the Grissom site. In this study, all 167 obsidian artifacts were analyzed using a similar lithic code (See Methods Section). From these 167 artifacts, 51 obsidian artifacts were geochemically analyzed through X-ray fluorescence spectrometry, or XRF (See Figure 17). This geochemical analysis helps to fingerprint each piece of obsidian to it's raw material source. By understanding just how far these artifacts may have been transported, traded, or harvested from their initial raw material source, archaeologists can begin to understand the cultural influence of a site. A goal of Parfitt's (2013) research was to better understand the cultural transmission and how trade, migration, and the transfer of ideas were affected by the types of raw materials selected and how these results might compare to other sites.

The results of Parfitt's (2013) study revealed nine total geochemical locations being utilized by the inhabitants of the Grissom site. The tool types noted from this obsidian study revealed that the types of obsidian material included bifaces, flaked tools, chunks, and cores. The majority of the obsidian cores were sourced to the Stray Gulch Tachlyte a source one mile away from the Grissom site (Parfitt 2013) (See Figure 18). The nine sources link the Grissom site to the surrounding region in Washington, Idaho, and Oregon (See Table 3, Table 5, Table 4). As mentioned briefly the most common source of obsidian was found at a local area called Stray Gulch Tachylyte in Washington, which was the source of 18 artifacts. Indian Creek, Oregon, was the second most common area for the obsidian used at this site, accounting for 12 pieces (Parfitt 2013). Her findings from this study resulted in no noticeable difference in the distance traveled for raw material between seasonal camps like the Grissom site or other sites along the major river during this time period. Much of the sources found are within the greater Plateau culture area.

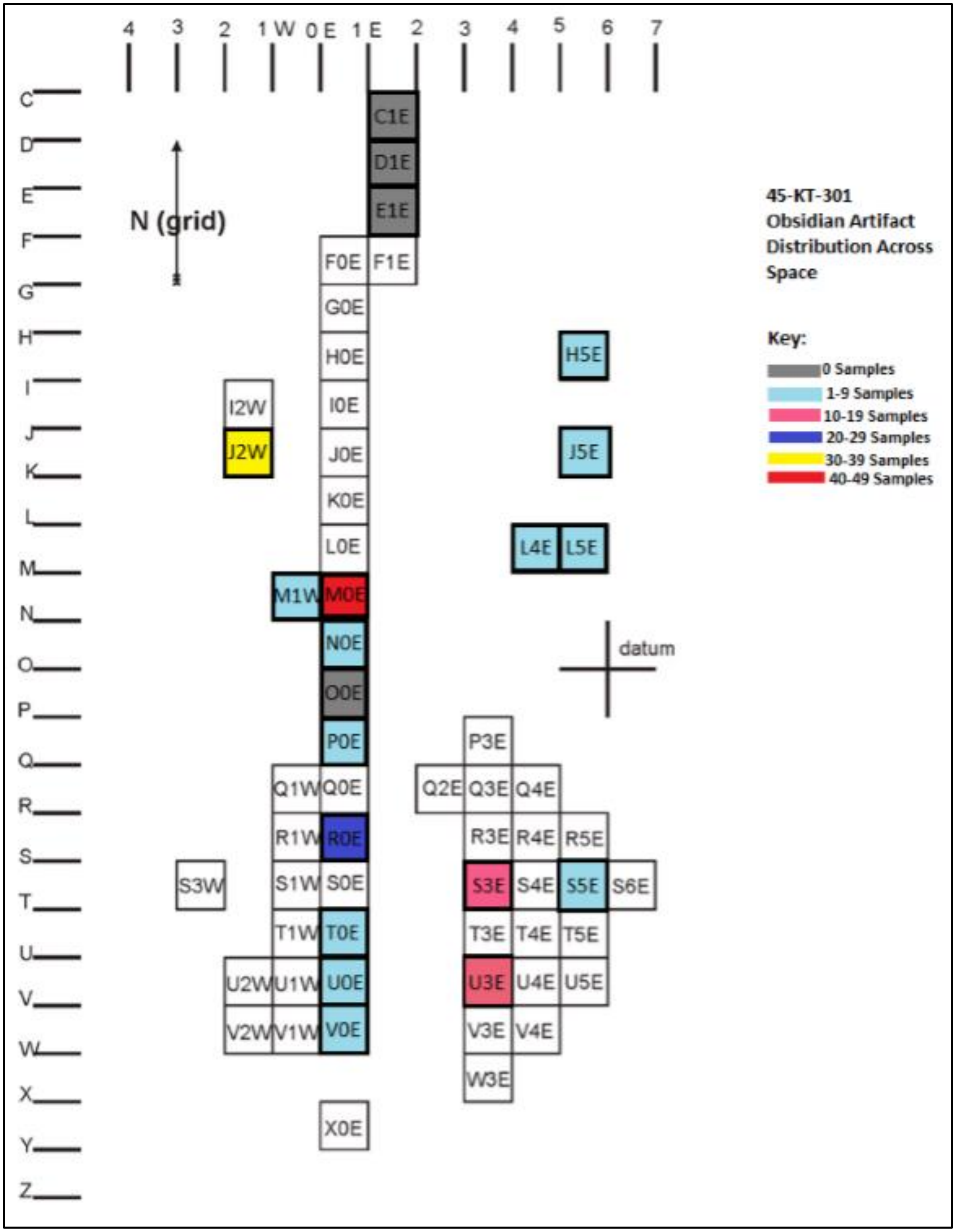


Figure 17: Map displaying the distribution of obsidian frequencies across the Grissom site main excavation studied by Parfitt (2013:40).

Table 3: Geochemical sources obtained through Parfitt's study (2013:45).

Geochemical Source	Number of Samples
Bickleton Ridge, WA	7
Glass Buttes, OR	1
Indian Creek, OR	12
Indian Rock (Unknown Variety A), WA	4
Obsidian Cliffs, OR	1
Quartz Mountain, OR	1
Stray Gulch Tachylyte, WA	18
Timber Butte, ID	2
Whitewater Ridge, OR	3
Total Number of Samples	49

Table 5: Proportions of object types sourced in Parfitt's study (2013:55).

Object Type	Total	Total Sourced	% Sourced
Bifaces	11	11	100%
Flakes	122	26	21.3%
Chunks	18	1	5.6%
Cores	14	11	78.6%
Total	165	49	29.7%

Table 4: Geochemically sourced artifacts from Parfitt's (2013) study and their connection to the Grissom excavation units (Burris 2015:21).

Source	Units
Bickleton Ridge WA	L5E, M0E,M1W, N0E,R0E, U0E
Glass Butte, OR	M0E
Indian Creek, OR	J2W, L4E, L5E, M0E, R0E, T0E, U3E, V0E
Indian Rock, WA	R0E, S3E
Obsidian Cliffs, OR	V0E
Quartz Mountain, OR	U3E
Stray Gulch Tachylyte, WA	M0E, U0E
Timber Butte, ID	J5E, M0E, N0E
Whitewater Ridge, WA	J2W, J5E, S3E, T1W

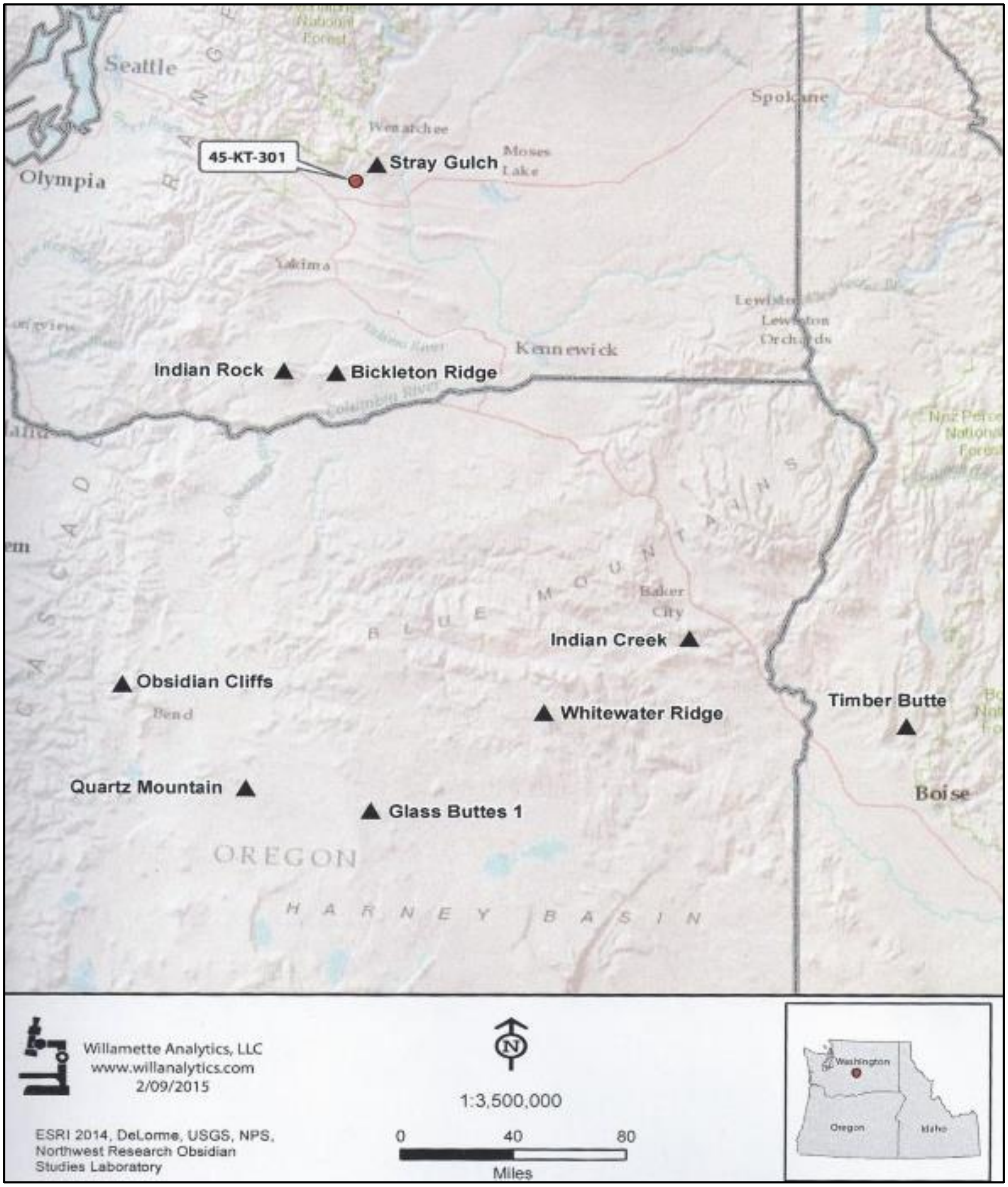


Figure 18: Location of obsidian raw material sources that have been identified at the Grissom site (45KT301) (Burris 2015; Parfitt 2013; Thatcher 2015).

Dan Burris' (2015) obsidian hydration study was an examination of thirty-five artifacts. This sample was pulled from Parfitt's (2013) sourced artifacts that were sent off for obsidian hydration analysis (Burris 2015; Thatcher 2015). Obsidian hydration is a technique that measures the water absorption rate within the obsidian artifact. This new surface will show a constant rate of water absorption at the microscopic level measured in microns.

The results from this obsidian hydration are found in Table 6 and Table 7. The full list of the rim measurements involved in this study is located in Table 7. From these results, Burris concludes that the entire site was occupied during the entirety of the site use (2015:27). These results were compared to a recent obsidian hydration study at the Beech Creek (45LE415) archaeological site within the Gifford Pinchot National Forest (Mack et al. 2010). The comparison made attributed Grissom to using more obsidian sources more recently in time (Burris 2015). Both the Grissom site and the Beech Creek site appear to occupy a similar period but the sample size difference between these two studies reveal that more information is needed.

Table 6: Number of Hydration Rims Identified by Source (Thatcher 2015).

GEOCHEMICAL SOURCES	SAMPLES WITH MEASURABLE OH RIMS (N=)	SAMPLES WITH NO MEASURABLE OH RIMS (N =)	TOTAL
Bickleton Ridge	5	2	7
Glass Buttes 1	--	1	1
Indian Creek	11	1	12
Indian Rock	4	--	4
Obsidian Cliffs	1	--	1
Quartz Mountain	1	--	1
Stray Gulch Tachylyte	--	2	2
Timber Butte	3	--	3
Whitewater Ridge	4	--	4
TOTAL	**29**	**6**	**35**

Table 7: Hydration rim measurements by source (Burris 2015; Thatcher 2015).

GEOCHEMICAL SOURCES	HYDRATION MEASUREMENTS (MICRONS)	TOTAL
Bickleton Ridge	2.2, 2.3, 2.5, 2.6, 2.8	5
Glass Buttes 1	--	0
Indian Creek	1.0, 1.1, 1.2, 1.2, 1.2, 1.2, 1.3, 1.3, 1.3, 1.4, 1.4	11
Indian Rock	1.2, 1.3, 1.4, 1.7	4
Obsidian Cliffs	2.6	1
Quartz Mountain	1.3	1
Stray Gulch Tachylyte	--	0
Timber Butte	1.0, 1.4, 1.5	3
Whitewater Ridge	1.5, 1.7, 2.1, 4.5	4
TOTAL	**--**	**29**

My previous work (Finley 2013) on the Grissom site resulted in a complete analysis of the ground stone artifacts and cobble tools recovered during excavation. This ground stone classification was adapted from the archaeological investigations at the Priest Rapids and Wanapum areas (Greengo 1982). During the excavation of the Grissom site, these ground stone artifacts were bagged and later catalogued with initial observations denoting tool type. Of the artifacts recovered 59 were described as ground stone tools in the Grissom Access database. However, cobble tools were included in this analysis to further the analysis of all ground stone artifacts. In total 99 artifacts were selected for this previous analysis. These ground stone and cobble artifacts were examined for use wear, lithic elements, and artifact dimensions (length, width, weight). Once this analysis was completed, the data had to be adapted to assist in a comparison between two archaeological assemblages encompassing house pit sites at 45OK11 (Lohse 1984) and the archaeological sites within the Priest Rapids project (Greengo 1982), both of which are lowland sites. These comparisons would address any similarities found between the upland sites such as Grissom to lowland sites along the Columbia River.

The initial results focused on the data gleaned from the paradigmatic classification. From these initial results the artifacts in question indicated that 84 of the 99 artifacts showed no signs of use-wear (See Table 8); some items have clear evidence revealing two uses for these artifacts. Another result (See Table 9), displays the evidence of thermal alteration on these artifacts. The evidence of the crenulated surface leads to a speculation of the act of stone boiling at the Grissom site (See Figure 19). Figure 20 shows the distribution of these ground stone artifacts throughout the Grissom site. The comparisons made between upland sites and lowland sites lacked a similar sample size to yield significant results.

Table 8: Frequency and count of ground stone artifacts showing evidence of wear (Finley 2013).

Wear	All Units	%
None	15	15.15%
Crushing	32	32.33%
Abrasion	16	16.16%
Crushing/Abrasion	15	15.15%
Polishing	21	21.21%
Grand Total	**99**	**100%**

Table 9: Frequency and count of ground stone artifacts showing evidence of thermal alteraition at Grissom (Finley 2013).

Thermal Alteration	All Units	%
No Heating	87	87.87%
Thermal Shock	12	12.12%
Grand Total	**99**	**100.00%**

Figure 19: Ground stone artifact catalog # 108, most likely re-used as a boiling stone for cooking purposes. Pit depressions denoted by the arrows along with the color stain are evidence of thermal alteration.

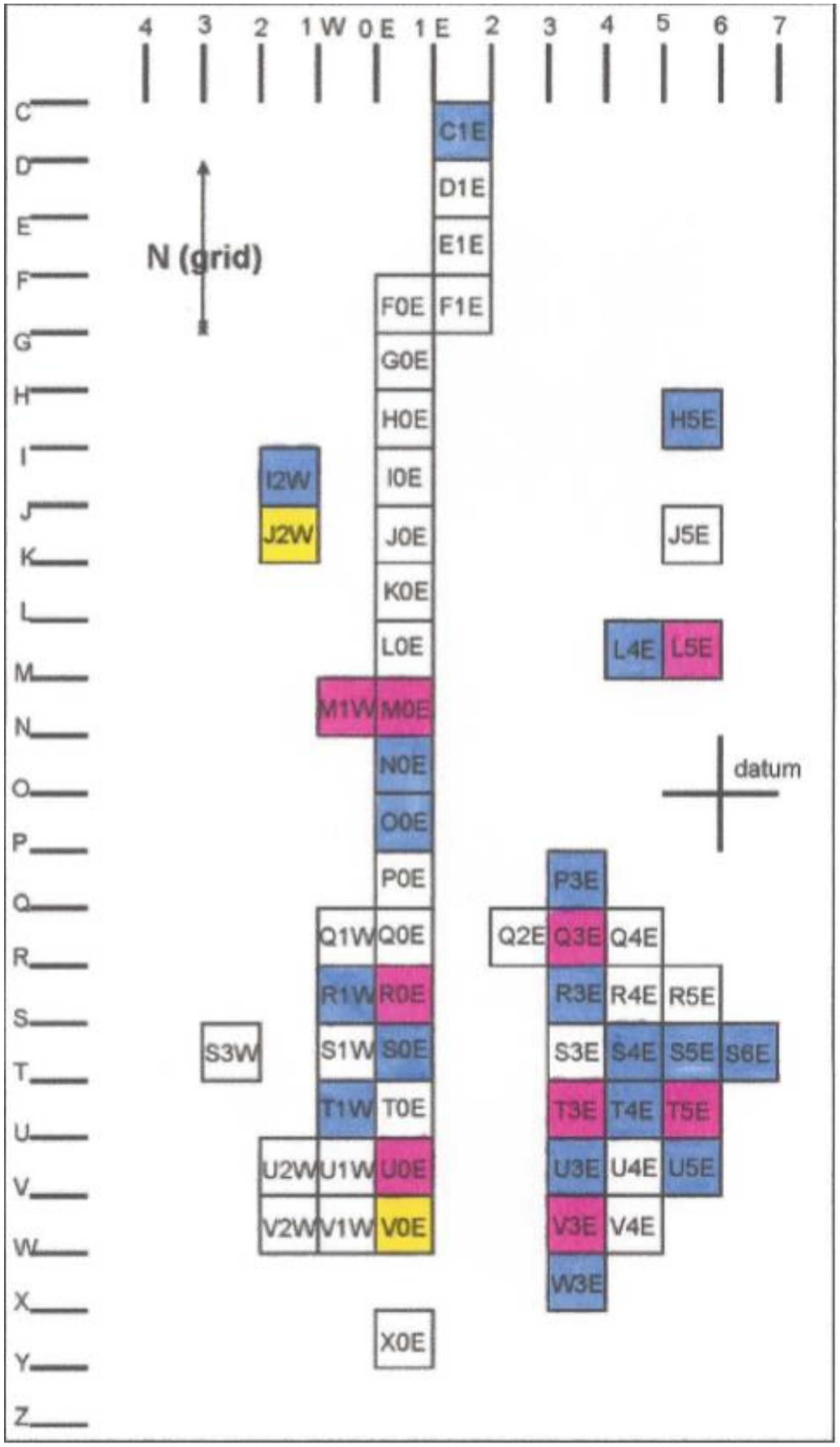


Figure 20: Ground stone frequencies across the Grissom site (45KT301) denoted by color: blue units have a range of 1-3 ground stone, pink units have a range of 4-6 ground stone, and yellow units have a range of 7-9 ground stone. Map adapted from Shea (2012:67).

Vassar's (2012) report on the Grissom site used a cross-site comparison following McCombs (2003) earlier research model: selecting and analyzing the lithic artifacts within five test units. In this research Vassar looked at five test units (J2W, S3E, S5E, U0E, V0E) analyzing all of the lithic artifacts that rested within them, totaling 525 stone tools (Figure 21). Six AMS radiocarbon dates (Table 10) were gathered from bone specimens placing the five units within the Cayuse Phase (2.500 B.P. to the historic period). For a quick summation of the Cayuse Phase (See Table 11).

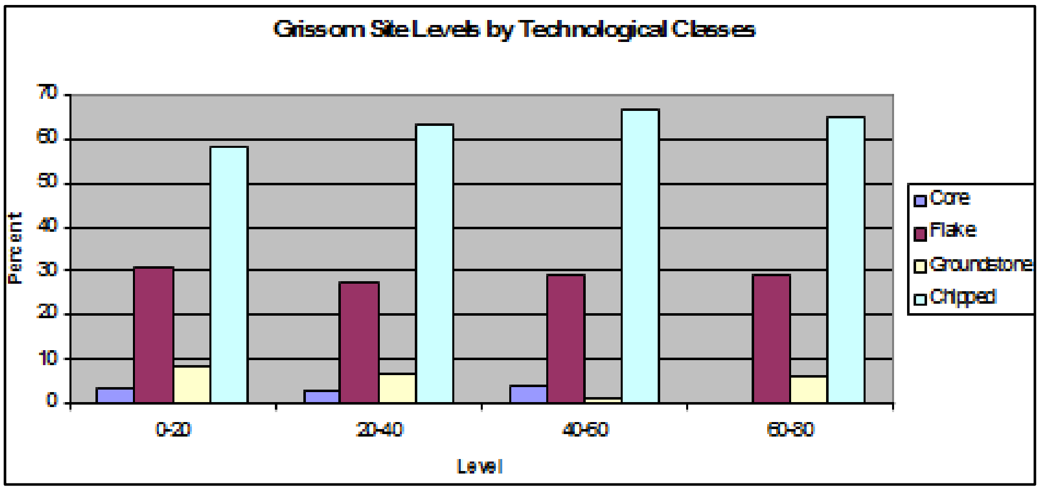


Figure 21: As the label projects this is the type of artifact found in each of the five units (J2W, S3E, S5E, U0E, V0E) selected by Vassar (2013:42).

Table 10: The AMS Radiocarbon Dates acquired from five units (Vassar 2013:14).

Unit	Level 20-40	Level 40-60	Level 60-80	Level 80-100	Level 100-120	Level 140-160
J2W	400±40			1580±40		1810±30
S3E		1540± 30	890±30			
S5E	1150±40			880±30		
U0E				130±30	1080±30	
V0E	210±40					

Table 11: Brief overview of the Plateau Culture Area Chronology (Orvald 2009).

250-Modern Era (Years ago)	**Historic Period** – Introduction of the horse, non-indigenous diseases, and Euro-American technology lead to major cultural change. Settlement patterns change due to the need to pasture horses and the ability horses provided for long-distance transportation. Diseases brought about significant population collapse. Euro-Americans settle in the region.
2,500-250 (Years ago)	**Cayuse/Harder phase** – Population concentrated in large, nucleated winter pit-house villages. People dispersed in spring to gather roots and in the fall and winter to hunt. Seasonal round became increasingly diverse and well organized over time. Use of highland areas greatly increased during this period. Trade with coastal and interior groups also became increasingly common.
4,500-2,500 (Years ago)	**Frenchman Springs/Tucannon phase** – Appearance of semi-subterranean houses and more specialized camps for hunting, roots collecting, and plant processing (Chatters 1984). Several types of contracting-stemmed and split-stemmed, corner-removed points dominate (Nelson 1969). Many have argued for that the ethnographically observed "Plateau Culture" had emerged by the end of the phase.
8,000-4,500 (Years ago)	**Cascade/Vantage phase** – Characterized by mobile opportunistic foragers primarily adapted to riverine environments and micro-environments (Chatters 1986; Galm et al. 1981). Increasing reliance on fish. Sites are located along drainage margins and projectile points are typically leaf-shaped (Cascade_ and large side-notched (Nelson 1969).
10,500-8,000 (Years ago)	**Windust phase** – Characterized by small, mobile bands of foragers/collectors exploiting a wide range of resources using a seasonal settlement system (Chatters 1986). Sites are generally small and exhibit low artifact densities. Large shouldered or basal notched lanceolate projectile points are diagnostic (Rice 1972).
12,000-10,500 (Years ago)	**Clovis period** – Characterized by small, mobile bands of hunter-gatherers who exploited a wide range of subsistence resources, including bison and elk. Sites are small, exhibit low artifact densities, and are associated with early landforms, particularly upland plateaus. Large lanceolate, fluted projectile points (Clovis points) are diagnostic.

Further placing the Grissom site within the Cayuse Phase is an analysis of 181 points by numerous undergraduate researchers and compiled by Holly Shea (Figure 22). These point types correspond to a trending time of popularity among the cultures on the Plateau. The associated dates at the bottom of Figure 22 mark the time range within which these point types existed. From this point typology, the majority of the occupation of the Grissom site dates within the Cayuse phase.

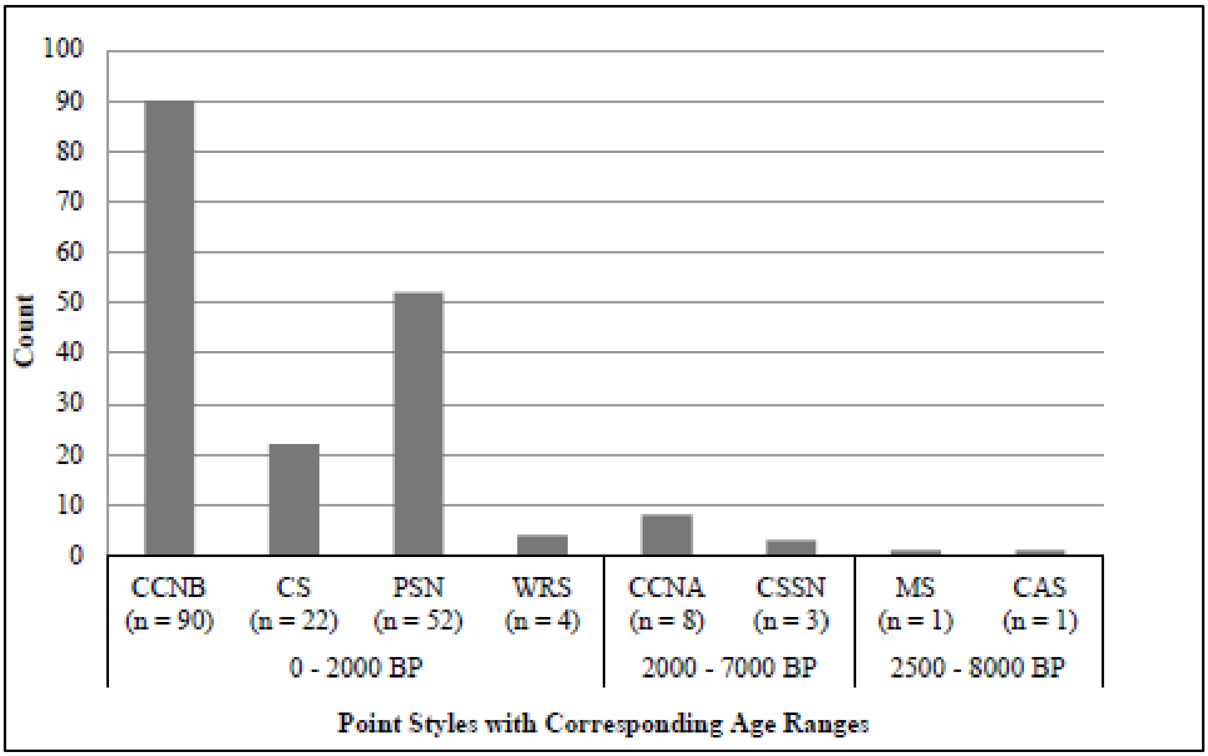


Figure 22: Distribution of 181 analyzed projectile points recovered from the Grissom site that were compiled from undergraduate researchers by Holly Shea (2012:111).

CHAPTER 7: THEORETICAL CONSIDERATIONS

The precursor for this research was the archaeological work done by Fumi Arakawa (2000, 2013) in the American Southwest. In the initial study, Arakawa (2000) followed Joan Gero's (1991) criticism of archaeology as a discipline. In this critique, Gero (1991) strikes at the male-dominated narrative surrounding archaeology, specifically the male users/creators of lithic artifacts and tools. This critique would establish criteria to identify women as lithic tool creators and users. The criteria for Gero's *Genderlithics* (1991) is in three parts; longevity of occupation, access to local tool stone, and a large assemblage of expedient flaked tools.

The various geological processes that have affected the Kittitas Valley have left the area with ample tool stone. The deposits from the Columbia River Group (CRBG) provided multiple sources for future basalt lithic tools (Miller and Powell 1997). Deposits within the Ellensburg formation have yielded an abundance of CCS tool stone (Miller and Powell 1997; Shea 2012:9). Each of these deposits would have yielded multiple sources for raw material acquisition for future tools.

The third point is a bit more complex than a "large assemblage of expedient flaked tools." According to Gero (1991), these tools need no retouch; any evidence of retouch on these tools would fall into the formal standards of tool morphology and are granted higher social value (Arakawa 2000). Since the artifacts recovered from the Grissom site have not been formally analyzed there was no way of knowing what was recovered without looking at the artifacts themselves. From the tool types recovered from the Grissom site, the uniface tool type was selected for this study. Over the summer of 2015 with the help of Dr. Patrick Lubinski, all of the tools labeled as uniface were located within the catalog and retrieved from curation.

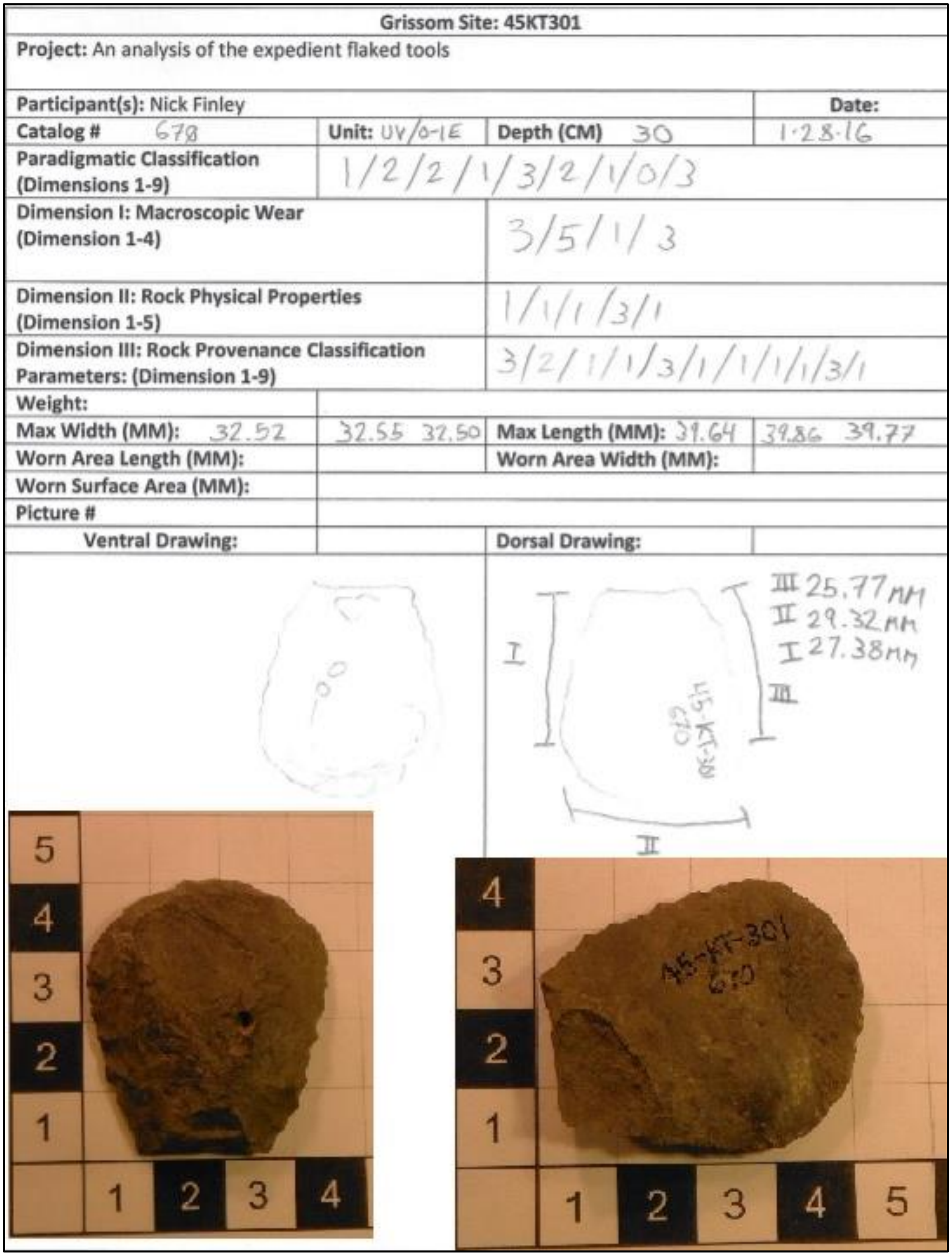
The longevity of the occupation at the Grissom site, according to the work shown by Burris (2015) and Vassar (2012) reflects a history of continued use. The ethnographies and the ethnographic record reflect a history of known use in the form of Chelohan. Chelohan from the ethnographic and historic record show signs of use for each biological sex. However, from the ethnographic record there does appear times of gendered separation to acquire different foodways. The recovery of ground stone tools, boiling stones, bone awls, and the importance of known plant lifeways within this area makes the Grissom site in this thesis a gendered site. The assumption goes that the appearance of these women's tools can provide a lens to further study women's role as a tool user and creator.

The purpose of this research is to address the role of women in prehistory in respect to acquiring, manufacturing, and using lithic technology. Fumi Arakawa's (2000, 2013) work proposed a model to look at gender in prehistory by comparing archaeological assemblages in the American Southwest. My primary goal with this study is to analyze the expedient flaked tools or uniface tools. This analysis will follow the paradigmatic classification that is commonly used at Central Washington University (McCutcheon 1997). My analysis will describe the various landmarks that will be explained further in the next section. Each of these artifacts were drawn, photographed, and measured. My goal for the Grissom site is to establish a better look at uniface tools that have garnered little attention from archaeologists until recently.

CHAPTER 8: METHODOLOGY EMPLOYED FOR THIS STUDY

The study began in the summer of 2015. With the help of Dr. Patrick Lubinski we found 342 uniface artifacts within the Grissom Access database. When these 342 uniface artifacts were pulled from the repository, four artifacts were found to be already on loan to another researcher. Over the summer 2015, all of the 338 artifacts were photographed individually from both sides (dorsal and ventral) with a scale under lights. Each set of photographs were later attached to the digital copies of the analysis record from this work.

Through this form of record keeping, each artifact was described through all classifications employed within this study with an individually specific form (See Figure 23). Each artifact was described through all classifications on a hand-written recording sheet in addition to the artifact dimensions. A succinct description would be given to describe the artifact formed out of this tool stone. This description would take into account the material properties such as color, luster, and inclusions described in the rock provenance dimension. Once this work was completed each of the data sheets were scanned into a pdf. The photos for each corresponding artifact were then superimposed into the pdf to help establish a complete analysis of these artifacts. This work was then entered into Dr. Lubinski's Access database. The files, photos, and a copy of this thesis will be given to Dr. Lee Sappington and chief curator of the Grissom site Dr. Lubinski at the completion of the analysis.



Grissom Site: 45KT301			
Project: An analysis of the expedient flaked tools			
Participant(s): Nick Finley			**Date:**
Catalog # 678	**Unit:** UV/0-1E	**Depth (CM)** 30	1·28·16
Paradigmatic Classification (Dimensions 1-9)	1/2/2/1/3/2/1/0/3		
Dimension I: Macroscopic Wear (Dimension 1-4)		3/5/1/3	
Dimension II: Rock Physical Properties (Dimension 1-5)		1/1/1/3/1	
Dimension III: Rock Provenance Classification Parameters: (Dimension 1-9)		3/2/1/1/3/1/1/1/1/3/1	
Weight:			
Max Width (MM): 32.52	32.55 32.50	**Max Length (MM):** 39.64	39.86 39.77
Worn Area Length (MM):		**Worn Area Width (MM):**	
Worn Surface Area (MM):			
Picture #			
Ventral Drawing:		**Dorsal Drawing:**	

Figure 23: Example of the record form for the individual artifact number 670.

These artifacts were analyzed both macroscopically and microscopically at a secure facility at the University of Idaho. Each artifact was weighed and measured using metric scale and spreading calipers. Using hand lens and a microscope, these 338 artifacts were analyzed following a paradigmatic classification created by Dr. Patrick McCutcheon (1997). This formal classification has been adapted to projects in central Washington; as such, this information created from this analysis would assist in the efforts of researchers like Parfitt (2012) and other researchers, with hopes for the complete analysis of the entirety of the lithics recovered from this archaeological site. This information will be discussed in the results section but will also assist the purposes of this study to understand the use of the Grissom site. The following sections explore the analytical tactics employed in this study.

Technological Lithic Classification

This section explains my laboratory protocol for the analysis conducted on these 338 artifacts. These artifacts were individually photographed, drawn, measured, and described through a paradigmatic classification. These numbered dimensions describe an element of an artifact such as the presence of wear; if the artifact has evidence of wear, I would select the number one, if no wear, two. Through these following paragraphs, I will describe each dimension and the corresponding answers. This technological classification compliments Parfitt's (2013) work on the Grissom site as both samples of artifacts have analyzed using an analysis adapted from Dr. Patrick McCutcheon's (1997) dissertation (See Appendices C and D).

Object Type: This classification criterion includes a common language for lithic tools. Under this classification object, types can be labeled: biface, flake/flake fragment, chunk, cobble, core, and spall. A *bifacially* flaked lithic artifact exhibits conchoidal fracture on both sides of the artifact in question. A *flaked/fragment* refers to a lithic artifact that exhibits conchoidal fracture on only one side of the artifact. A *chunk* refers to a lithic artifact that exhibits nonconchoidal fracture. These first two definitions are common language amongst flintnappers who use the process of conchoidal fracture to create tools out of lithic material.

Material Type: This classification criterion includes chert, obsidian, igneous, and 'other.' Under this classification, all materials such as flint, agate, chalcedony, and jasper are seen as varieties of chert (Kooyman 2000:28).

Amount of Cortex: refers to the outer part of the rock that has been chemically altered by weathering. Under this classification all materials would be labeled by 'primary' (entire surface is cortex except for point of impact), 'secondary' (artifact exhibits both cortex and flake scars), 'tertiary' (artifact exhibits no cortex except for the area of impact), and 'none' (no cortex present on any surface).

Presence of Wear: refers to either the presence or absence of wear on an artifact. Through careful study of a tool's worn surface, one can often conclude how these tools were used. Noting this information may help to identify areas of intensified use at the Grissom site.

Platform Type: refers to the area of impact on a flake. The first option is defined as a 'cortical' platform, evident when the platform has cortex present on its surface. The second option is defined as a 'simple,' platform, evident when the platform has only one flake scar, in respect to the third option 'faceted platform,' which has more than one flake scar present. The fourth option 'fragmentary platform' describes a flake with the entire platform absent. The fifth and last option refers to 'technologically absent' platform which results from indirect percussion. No samples were selected due to the evidence of bifacial characteristics. If such a flake was found showing bifacial characteristics it would be important to document.

Completeness: refers to differences between whole flakes, broken flakes, flake fragments, and lithic debris (shatter, pressure flakes, and chunks) (Sullivan and Rozen 1985). 'Whole flake' is defined by exhibiting a point of force, a single interior surface or platform and having no broken edges; if the edges were broken, the artifact would be characterized as a 'Broken flake.' 'Flake fragment' are flakes with missing flake platforms and finally 'Other' refers to an object type that are more formalized in the tool creation (e.g., bifaces and projectile points).

Thermal Alteration: refers to evidence of heating. One option is the existence of intersecting 'Lustrous and non-lustrous flake scars' along the dorsal surface. Second option is 'Lustrous flake scars' which contain only lustrous flake scars along the surface of the artifact. The third option is 'High-temperature alteration,' which is an object exhibiting potliding, crazing, and/or crenulated surfaces. The fourth and final option is evidence of 'No heating' on any of the artifacts' surface.

Reduction Class: is the amount of cortex and the number and size of flake scars present on the dorsal surface of a flake. The modes are as follows: initial reduction, intermediate reduction, terminal reduction, and not applicable. Through these characteristics, this study includes 'unifacial resharpening' indicating that the flake has a unifacial platform, which has been worn and resharpened. This trait would acknowledge reuse of a uniface.

Kind of *Use-wear*: is a functional dimension that, on uniface artifacts, may have evidence of chipping, crushing, abrasion, or polish. 'Chipping' is evident by a broken surface due to the removal of tiny flakes along the edge of an artifact (Parfitt 2012:17). Crushing shows evidence of minute particles that have been removed from the surface that lack conical indentations. Abrasion also removes minute particles, but these removed particles will have parallel striations present on the working surface of the artifact. Polishing exhibited on tools that are used heavily and differ from other use-wear, as the working surface shows a lustrous sheen from plant material or silica. These three use-wear traits can describe how the tool form articulated with its environment of work, which can help identify the range of variation in stone tool use.

Location of Wear: is the dimension of worn locus or the location of the worn surface area. These include eight defined points. The modes 'angular point,' 'angular edge,' and 'angular plane' refer to the intersection of points, edges, or a flat surface. The modes 'curvilinear point,' 'curvilinear edge,' 'curvilinear plane' refers to points, edges or planes that are curved. The last two points are 'non-localized' refers to a closed curve and 'none' as in no use wear present.

Shape of Plan or Worn Area: described as the actual shape of the worn surface area. The options for shape of plan include 'convex' arc curving away from a flat surface, 'concave' curving toward a flat surface), 'straight,' 'point' oblique notch' (where two lines of intersection form an angle greater 90 degrees), 'acute notch' (two lines of intersection form an angle less than 90 degrees), and 'none.'

Orientation of wear: illustrates the actual orientation of the wear. 'Y-plane', or in simpler terms refers to the flat surface parallel to the horizontal surface of the object on which the wear is found. Terms included in this dimension consist of 'Perpendicular to the Y-plane,' oblique to the Y-plane,' 'variable to the Y-plane,' 'parallel to the Y-plane,' 'no orientation,' and 'none'.

Rock Physical Property Classification

To examine the provenance information of these material types' two physical property classifications (Appendices E and F) were employed to note the stone tool type represented in these 338 tools. This first rock physical properties classification in this study focused on and documented the groundmass characteristics on the artifact, noting the rate of inclusions (solid, void, or none), and their corresponding rate of dispersion (random, uniform, structured, or none) shown on the material. The second classification marks the groundmass of the material whether there are weather surfaces or cortex on the material to describe. If no cortex is present on the artifact being analyzed the artifact would be filed under not applicable. A physical description of the material was done after the initial analysis to describe material color, inclusions, and luster in detail. A clear description of the raw material will help to identify what lithic material was utilized at the Grissom site

Residue Analysis

When a tool is used, residual proteins from animals or plants can adhere to the worn surface of lithic material (Kooyman 2000). Residue analysis is a technique to analyze the artifact for residue information along a worked or worn edge. Other studies have used this method within the Plateau (Longstaff 2013). Within this study residue analysis is a technique that could tie spatial use to specific tasks if given enough evidence for this pattern. There remain diagnostic analytical criteria that calls into question the validity of trace residue. These questions stem from whether or not traces are contaminated, altered, or removed in the archaeological sediment and environment in which the site rests (Kooyman 2000:151). Since the excavation of the Grissom site artifacts have been washed during the curation process, the viability of this archaeological inquiry needs to be tested. Ten worn artifacts were selected for residue testing.

CHAPTER 9: RESULTS

Within this section, each classification is examined one by one, describing the information and the resulting data for relevant information. The first section will go over the results from the lithic tech code, followed by the raw material information, a closer examination of the kinds of use wear evident on the sampled artifacts, and the sampled artifacts for residue analysis. Unlike previous work that tried to compare the Grissom site to other pit house villages on the Plateau, this thesis will compare these results to other results found at the Grissom site (Burris 2015; Parfitt 2012; Shea 2012; Vassar 2013). Each section will build on the information known about the Grissom site.

To gain further insight into the lithic technologies employed at the Grissom site a study focused on uniface tools employed lithic classifications. First, the information from this initial analysis was placed within an Excel database. The provenience information was converted from the unit notes to the actual excavation unit (See Table 12). These sampled uniface artifacts totaling 338 were recovered from 43 1x1 m units within the main excavation blocks (See Figure 24). As every artifact was measured using spreading calipers to the nearest millimeter, once converted to centimeters these artifacts are an average size of 2 cm in width and length (See Figure 25 and Figure 26). In width, these artifacts range from 0.5 to 4 cm while the length of these artifacts ranges from 1 to 6.5 cm.

Table 12: Grissom site main block unit designations and the abbreviations for each corresponding unit (Shea 2012:67).

Unit Designation	Abbreviation	Unit Designation	Abbreviation
CD12E	C1E	RS01W	R1W
DE12E	D1E	RS34E	R3E
EF12E	E1E	RS45E	R4E
FG01E	F0E	RS56E	R5E
FG12E	F1E	ST01E	S0E
GH01E	G0E	ST01W	S1W
HI01E	H0E	ST23W	S3W
HI56E	H5E	ST34E	S3E
IJ01E	I0E	ST45E	S4E
IJ12W	I2W	ST56E	S5E
JK01E	J0E	ST67E	S6E
JK12W	J2W	TU01E	T0E
JK56E	J5E	TU01W	T1W
KL01E	K0E	TU34E	T3E
LM01E	L0E	TU45E	T4E
LM45E	L4E	TU56E	T5E
LM56E	L5E	UV01E	U0E
MN01E	M0E	UV01W	U1W
MN01W	M1W	UV12W	U2W
NO01E	N0E	UV34E	U3E
OP01E	O0E	UV45E	U4E
PQ01E	P0E	UV56E	U5E
PQ34E	P3E	VW01E	V0E
QR01E	Q0E	VW01W	V1W
QR01W	Q1W	VW12W	V2W
QR23E	Q2E	VW34E	V3E
QR34E	Q3E	VW45E	V4E
QR45E	Q4E	WX34E	W3E
RS01E	R0E	XY01E	X0E

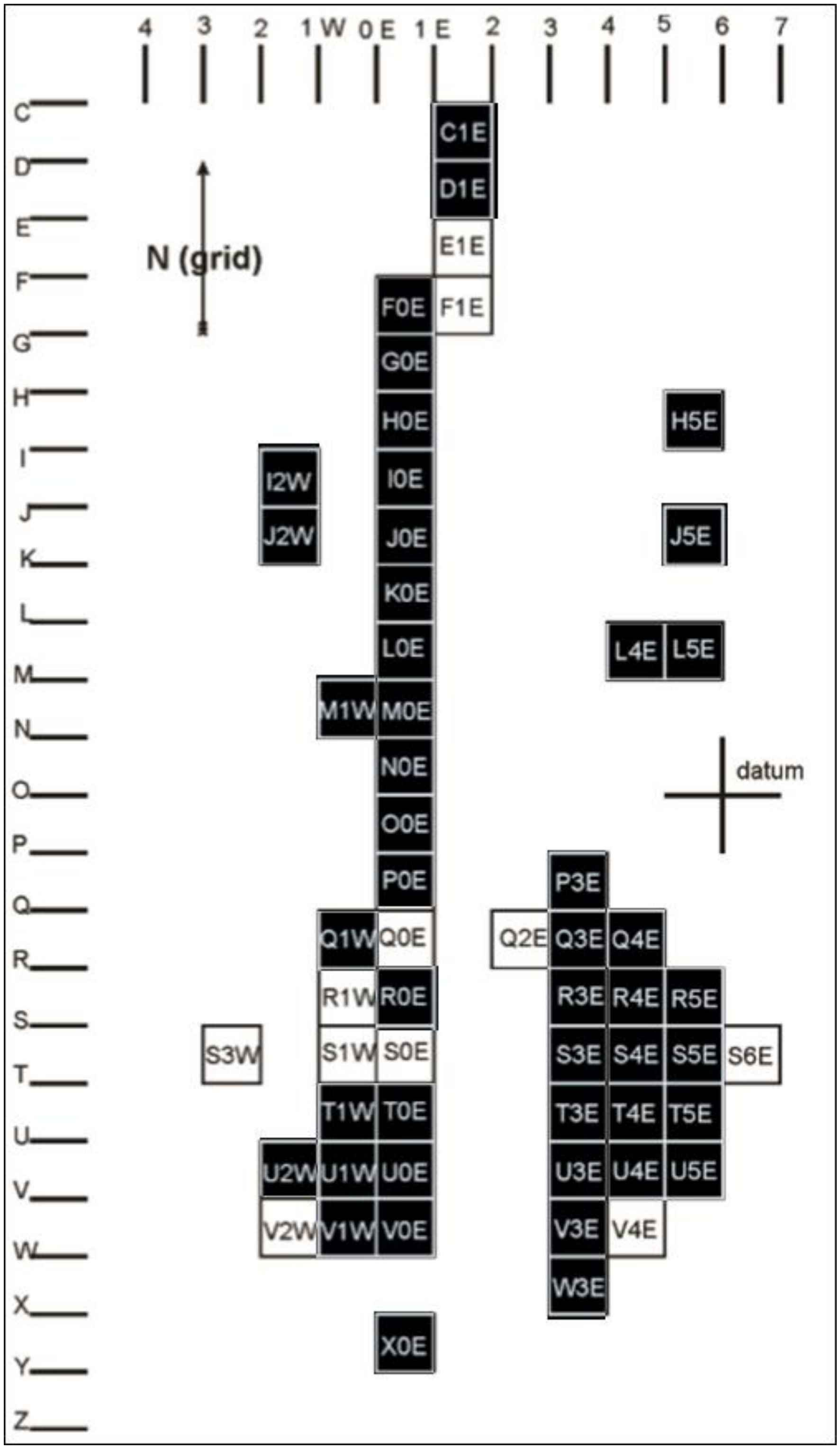


Figure 24: Provenience information of the 338-uniface artifacts sampled in this study. Those units shaded in black encompass 43 1x1 m excavation units from the main excavation block (Adapted from Shea 2012:67).

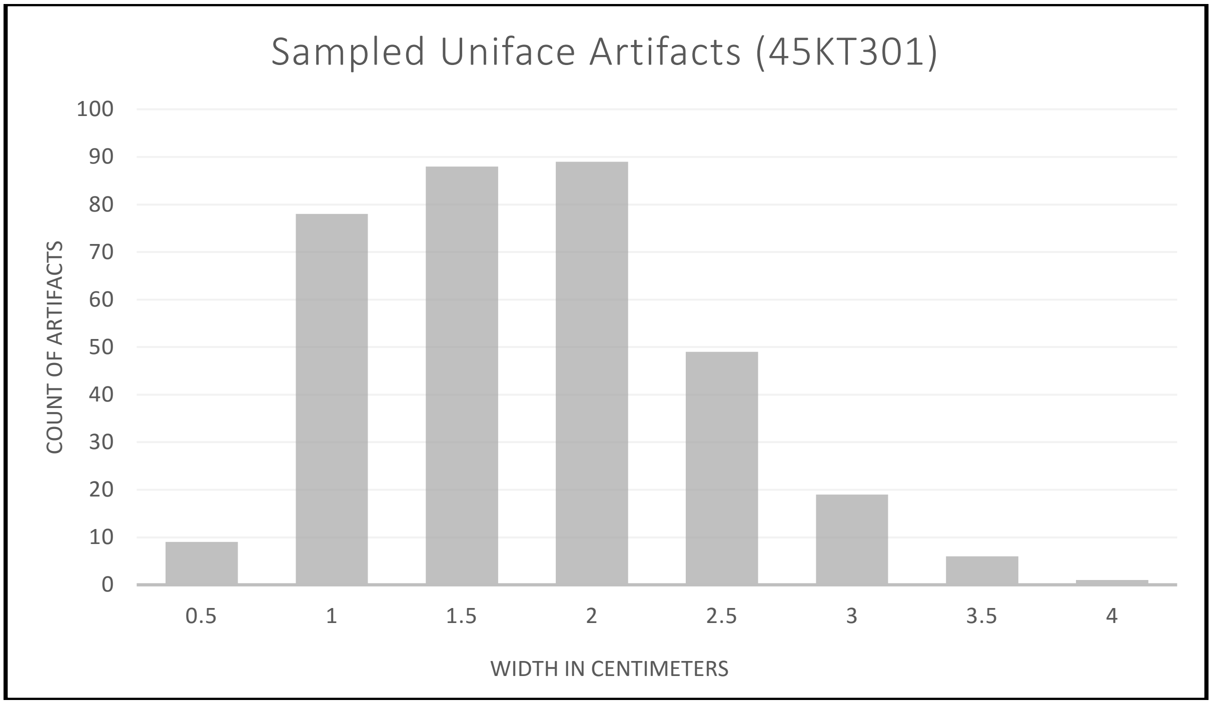


Figure 25: Displays the count of the sampled uniface artifacts by width (CM).

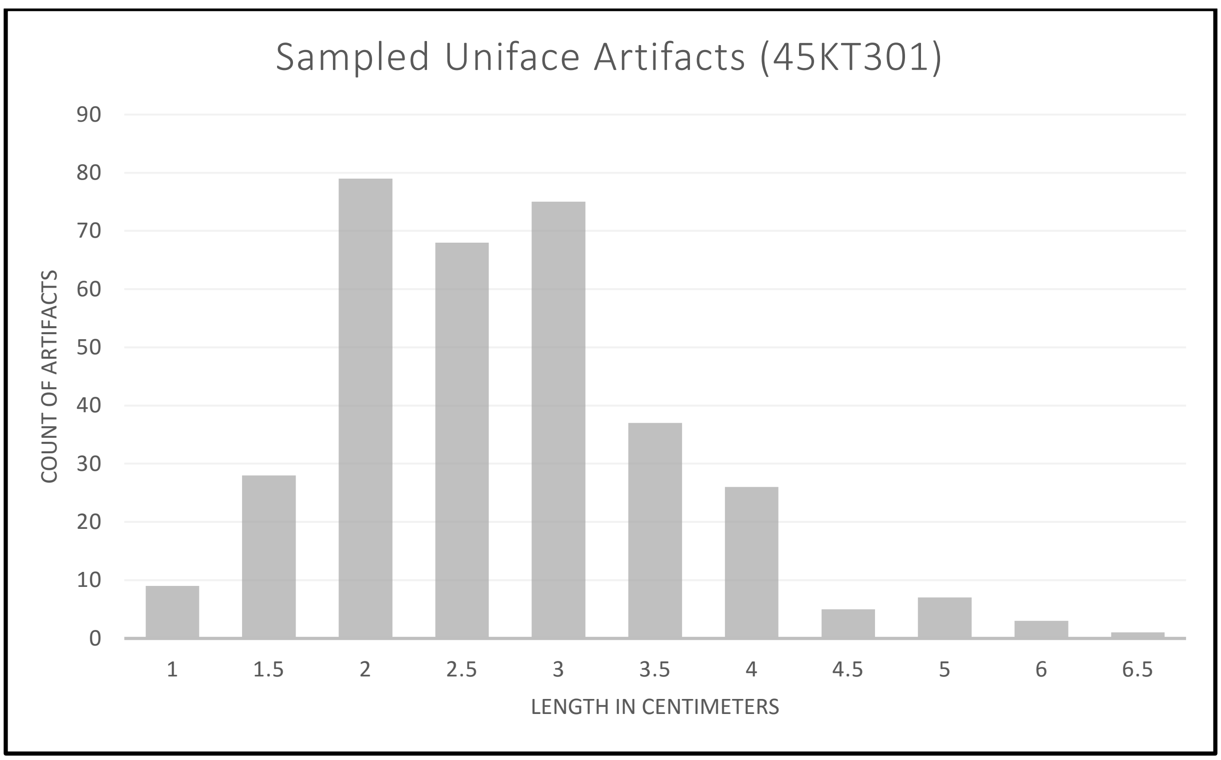


Figure 26: Displays the count of the sampled uniface artifacts by length (CM).

Results from Technological Lithic Classification on the Sampled Uniface Artifacts

All 338 uniface artifacts within the Grissom catalog were analyzed using a paradigmatic lithic classification (See Appendix C). These dimensions were described in the previous chapter; however, this information was placed within an Excel workbook to help describe the cultural complexity of the Grissom site when looking at this specific tool type. Of the main excavation block for the Grissom site 43 1m x 1m units represent the sampled uniface artifacts within this study (See Figure 24). The following sections describe the artifact type by percentage of totaled artifacts sampled and the total count of artifacts with elements describing each artifact in the count. As such, each dimension will be described to give a clear description of site use across the Grissom site.

The first dimension describes the tool type. Within this sample, flakes and flake fragments make up the majority of the uniface artifacts at 81.66%; bifaces, both finished and unfinished at 11.24%; and lithic chunks of raw material making up the remainder of the assemblage at 7.10% (See Table 13). Looking across the entire Grissom site it appears that the largest concentration of artifacts are within the first levels of the Grissom site.

These levels correspond to depth categories grouped to 0-20 cm, 20-40 cm, and so forth. Since the Grissom excavation notes were not consistent throughout the archaeological work, the recorded information were lumped together into the levels shown in these tables, when in fact there could perhaps be more accurate provenience information (e.g., 56 cm, 0-10 cm). Across the site, the majority of these artifacts were found within the first levels mainly from 0 cm to 60 cm, at which point there is a dramatic drop off of cultural material at 60-80 cm. Minimal artifacts within the deeper levels of this excavation were recovered (See Table 14).

The biface and chunk information will not be included in the broader discussion later in this section as these artifacts will not reflect expedient flaked tools as defined in Chapter Seven. Since this information was gleamed from this analysis, the results should be freely shared to explain the variety of the artifacts analyzed within this study. In fact, these bifacially flaked artifacts were located from these specific units shown in Figure 27.

Table 13: Artifact type by count and frequency exhibited on the sampled uniface artifacts.

Dimension 1: Type of Artifact	Count of Sampled Uniface Artifacts	Percentage of Sampled Uniface Artifacts
Biface	38	11.24%
Flake/Flake Fragment	276	81.66%
Chunk	24	7.10%
Grand Total	338	100.00%

Table 14: Artifact type frequencies and the associated depth (CM).

Dimension I: Type of Artifact Depth by (CMBD)	Biface	Biface (%)	Flakes	Flakes (%)	Chunk	Chunk	Grand Total	Depth by (%) of Artifact Count
NA	0	0.00%	15	4.44%	1	0.30%	16	4.73%
Surface	2	0.59%	14	4.14%	0	0.00%	16	4.73%
0-20	8	2.38%	71	21.01%	5	1.48%	84	24.85%
20-40	10	2.96%	70	20.71%	3	0.89%	83	24.56%
40-60	11	3.25%	69	20.41%	7	2.07%	87	25.74%
60-80	7	2.07%	29	8.58%	7	2.07%	43	12.72%
80-100	0	0.00%	4	1.18%	1	0.30%	5	1.48%
100-120	0	0.00%	3	0.89%	0	0.00%	3	0.89%
Cleanup	0	0.00%	1	0.30%	0	0.00%	1	0.30%
Grand Total	38	11.24%	276	81.66%	24	7.10%	338	100.00%

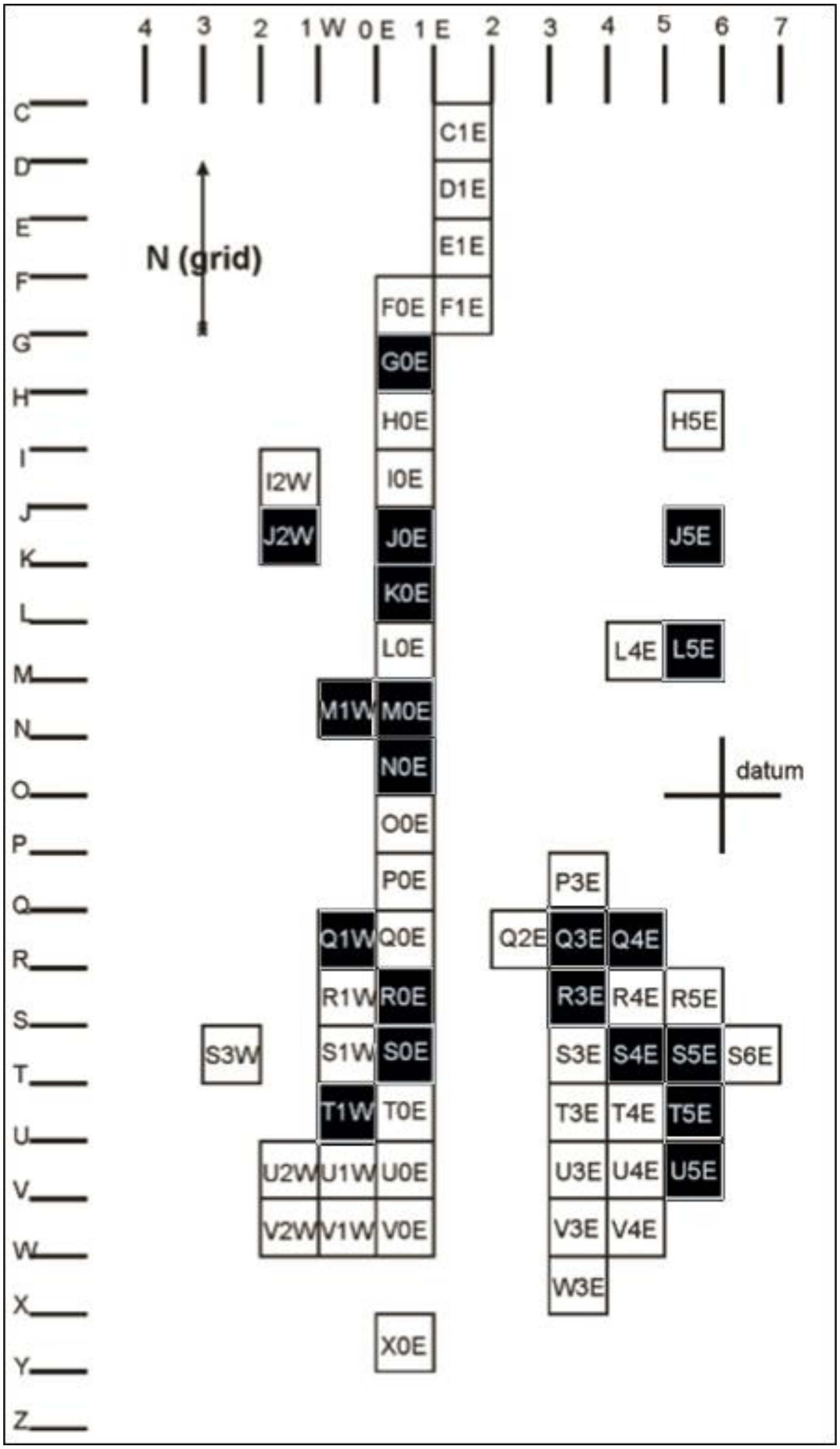


Figure 27: Provenience information of the 38 biface artifacts in this study. Those shaded in black encompass 20 1x1 m unit excavation units from the main excavation block (Adapted from Shea 2012:67).

The second dimension describes the amount of cortex present on the artifacts. Cortical surfaces include worn surface from weather commonly associated with the initial steps in tool creation. From the sample in this analysis, 66.86% of the artifacts exhibit no cortex. While the second highest percentage of the artifacts sampled have secondary amounts of cortex describing both cortical and non-cortical surfaces at (30.77%). The remaining amounts of cortex both primary (1.78%) and secondary (0.59%), make up the remainder of the artifacts sampled (Table 15).

These types are evenly dispersed throughout this assemblage (Table 16). Interestingly enough from this spread of information notice that only a count of six artifacts exhibiting primary amounts of cortex and two artifacts exhibit tertiary amounts of cortex these artifacts are mainly found within the first 60 cm. One can assume that these artifacts are indeed expedient in terms of secondary amount of cortex reaching 30% of the assemblage. Few artifacts within this sample exhibit a high amount of cortex, on the same note there are only two artifacts that exhibit tertiary amount of cortex. Artifacts exhibiting a high amount of cortex (primary) could be associated with the chunk artifacts or the artifacts made from petrified wood. The lack of cortex over the majority of the assemblage supports evidence that these artifacts were either highly prepared or these are smaller amounts of tool stone material utilized/recycled for a multitude of uses leaving little trace of cortex. Dimension one covered the artifact typology which appears to be mainly flaked or flake fragment in nature, albeit 38 of the artifacts are bifacially flaked (See Table 13).

Table 15: Cortex amount by count and frequency exhibited on the sampled uniface artifacts.

Dimension II: Cortex Amount	Count of Sampled Artifacts	Percentage of Sampled Artifacts
Primary	6	1.78%
Secondary	104	30.77%
Tertiary	2	0.59%
None	226	66.86%
Grand Total	**338**	**100.00%**

Table 16: Cortex amount frequencies and the associated depth (CM).

Dimension II: Cortex Amount by Depth (CMBD)	Primary	Primary Treatment (%)	Secondary	Secondary Treatment (%)	Tertiary Treatment	Tertiary Treatment (%)	No Cortex	No Cortex (%)	Grand Total	Depth by (%) Sample
NA	0	0.00%	8	2.37%	0	0.00%	8	2.37%	16	4.73%
Surface	1	0.30%	4	1.18%	0	0.00%	11	3.25%	16	4.73%
0-20	1	0.30%	24	7.10%	0	0.00%	59	17.46%	84	24.85%
20-40	2	0.59%	24	7.10%	1	0.30%	56	16.57%	83	24.56%
40-60	2	0.59%	29	8.58%	1	0.30%	55	16.27%	87	25.74%
60-80	0	0.00%	13	3.85%	0	0.00%	30	8.88%	43	12.72%
80-100	0	0.00%	2	0.59%	0	0.00%	3	0.89%	5	1.48%
100-120	0	0.00%	0	0.00%	0	0.00%	3	0.89%	3	0.89%
Cleanup	0	0.00%	0	0.00%	0	0.00%	1	0.30%	1	0.30%
Grand Total	6	1.78%	104	30.77%	2	0.59%	226	66.86%	338	100.00%

The third dimension is marked by the evidence of use-wear denoted by the presence or absence of wear. As such, the majority of the artifacts in this study have use-wear evident on the edges. In total, the amount of artifacts within this sample that have use-wear is 80.19% while the remaining 19.82% of the sample does not (See Table 17). Looking across the Grissom site Table 18 reflects the depth (cm) from which these sampled uniface artifacts were recovered. The largest concentration of use appears from 0 cm to 60 cm below the datum making up 74.53% of all worn artifacts.

The distribution of these worn artifacts is displayed on Figure 28. The largest frequency of artifacts were recovered from units R0E, J2W, N0E and S5E, each of which held 16 or more worn artifacts. The second highest frequency were recovered from units M1W, M0E, T3E, U0E and X0E, each of which held between 11 and 15 worn artifacts. The third highest frequency of artifacts were recovered from units H4E, L5E, J5E, Q3E, J0E, K0E, I2W, each of which held between 6 and 10 worn artifacts. The rest of the units' labeled blue in Figure 28 indicate less than five worn artifacts.

With the count of worn artifacts known, a sample can be created to send in artifacts for residue analysis. As the analysis requires use to adhere residual proteins to the lithic material, the artifacts exhibiting use will be sampled for further analysis. From the 271 artifacts with use wear, a sample of ten artifacts were chosen. A later section will discuss the results from analysis by further examining the type of use wear evident on these artifacts. The "kind of use wear" or type of use wear will focus on how these artifacts were used and this information will be included in the sampling process for the residue analysis.

Table 17: Use-wear by count and frequency exhibited on the sampled uniface artifacts.

Dimension III: Use-Wear	Count of Sampled Uniface Artifacts	Percentage of Sampled Uniface Artifacts
Absence of Use-Wear	67	19.82%
Presence of Use-Wear	271	80.18%
Grand Total	338	100.00%

Table 18: Use-wear frequencies by the associated depth (CM).

Dimension III: Use Wear Depth by (CMBD)	Absence	(%) of Absence	Presence	(%) of Presence	Grand Total	(%) of Total
NA	4	1.18%	12	3.55%	16	4.73%
Surface	2	0.59%	14	4.14%	16	4.73%
0-20	25	7.40%	59	17.46%	84	24.85%
20-40	11	3.25%	72	21.30%	83	24.56%
40-60	16	4.73%	71	21.01%	87	25.74%
60-80	9	2.66%	34	10.06%	43	12.72%
80-100	0	0.00%	5	1.48%	5	1.48%
100-120	0	0.00%	3	0.89%	3	0.89%
Cleanup	0	0.00%	1	0.30%	1	0.30%
Grand Total	67	20.71%	271	79.29%	338	100.00%

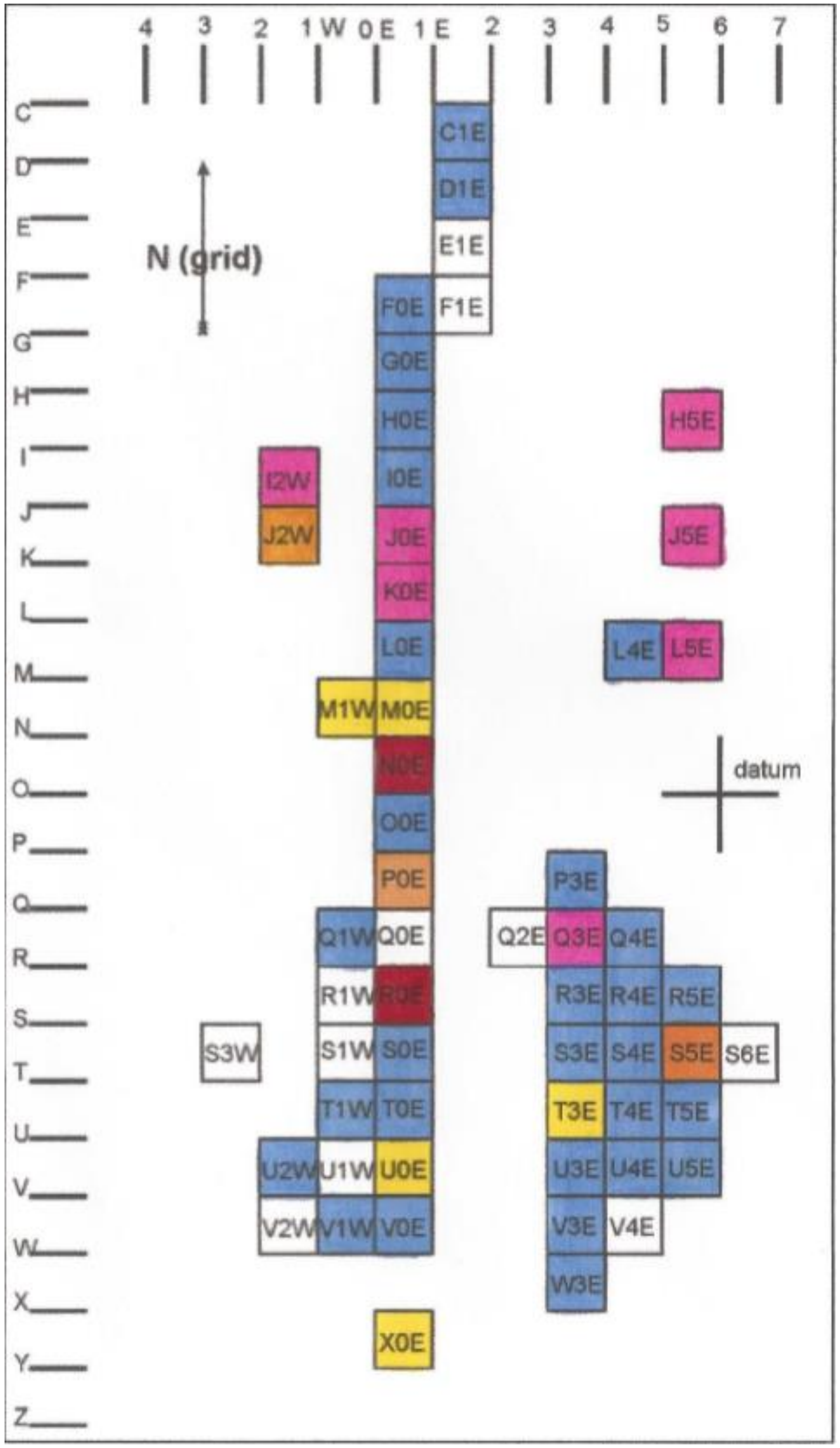


Figure 28: Spatial distribution of worn artifacts by frequency. Each color correlates to the frequencies of artifacts recovered: Blue units=1-5; Pink units=6-10; Yellow units=11-15; Orange units=16-20; and Red units; N0E=22, R0E=33.

The fourth dimension covers the act of other modification on these artifacts. Of the artifacts sampled 240 (71.01%), show no sign of tool modification (See Table 19). The second highest frequency of the type artifact modification includes the process of flaking a tool through conchoidal fracture to create an edge making up (28.70%) of the sampled assemblage. Grinding by act of abrasion was evident on one artifact making up the remainder 0.30% (Table 19), in fact, this artifact was recovered at 60-80 cm below the surface (See Table 20).The total count of artifacts with modification is 11. Artifacts exhibiting flaked attributes include bifaces or expedient/modified flaked tools totaling 110. As 38 artifacts are bifaces, the remaining 65 artifacts have the potential to be expedient/modified flaked tools (See Figure 29).

Table 19: Other lithic modifications by count and frequencies exhibited on the sampled uniface artifacts.

Dimension IV: Other Modification	Count of Sampled Uniface Artifacts	Percentage of Sampled Uniface Artifacts
None	227	67.16%
Flaking/Chipping	110	32.54%
Grinding	1	0.30%
Grand Total	338	100.00%

Table 20: Distribution of Other lithic modifications frequencies by associated depth (CM).

Dimension IV: Other Modification By Depth (CMBD)	None	(%) None	Flaking	(%) Flaking	Grinding	(%) Grinding	Count of Sampled Artifacts	Percentage of Sampled Artifacts
NA	13	3.85%	3	0.89%	0	0.00%	16	4.73%
Surface	13	3.85%	3	0.89%	0	0.00%	16	4.73%
0-20	60	17.75%	24	7.10%	0	0.00%	84	24.85%
20-40	56	16.57%	27	7.99%	0	0.00%	83	24.56%
40-60	51	15.09%	36	10.65%	0	0.00%	87	25.74%
60-80	29	8.58%	13	3.85%	1	0.30%	43	12.72%
80-100	4	1.18%	1	0.30%	0	0.00%	5	1.48%
100-120	0	0.00%	3	0.89%	0	0.00%	3	0.89%
Cleanup	1	0.30%	0	0.00%	0	0.00%	1	0.30%
Grand Total	227	67.16%	110	32.54%	1	0.30%	338	100.00%

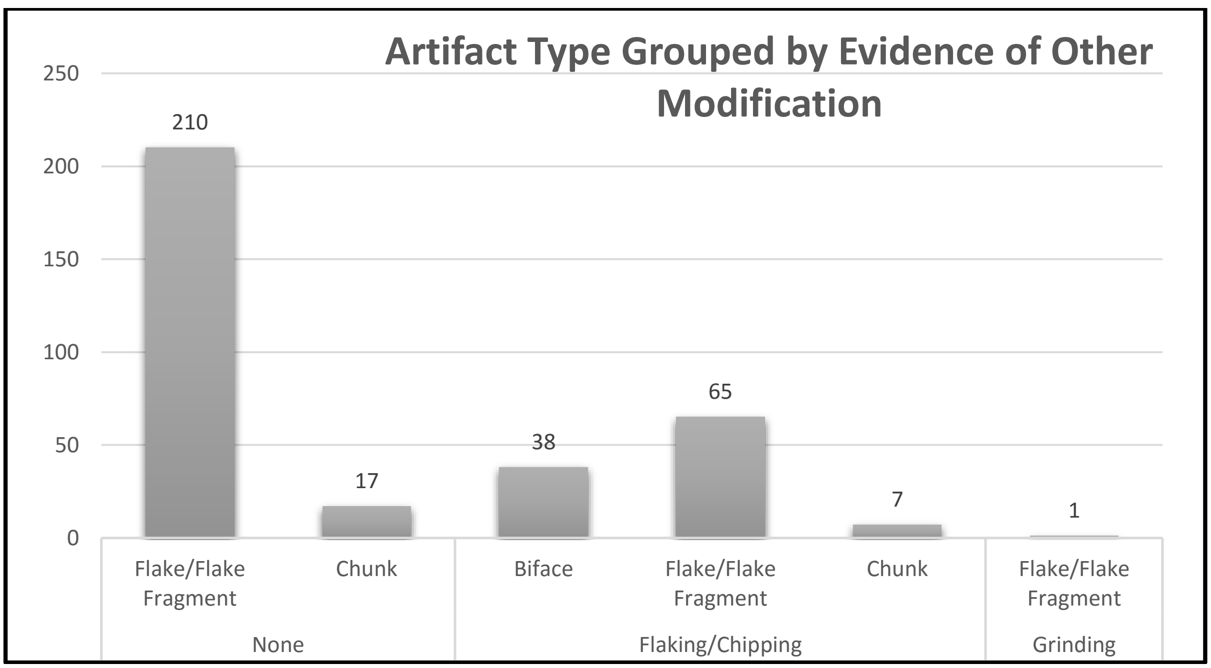


Figure 29: Sampled uniface artifacts by artifact type and other modification.

Dimension five marks the types of raw materials utilized at the Grissom site. From the sampled artifacts, 94.67% are chert or cryptocrystalline silicate (Table 21). The remaining types include obsidian (1.48%), igneous (2.66%), and other (1.18%) (Table 21).

These obsidian artifacts were recovered among the first levels of excavation, specifically 0 to 80 cm (Table 22). Unfortunately, none of the obsidian sampled in this study are related to the study employed by Burris (2015) and Parfitt (2013). When additional obsidian artifacts are sourced the small amount of obsidian information gleaned from this study can further explain the lithic technologies utilized at the Grissom site.

Table 21: Raw material type by count and frequencies exhibited on the sampled uniface artifacts.

Dimension V: Raw Material	Count of Sampled Uniface Artifacts	Percentage of Sampled Uniface Artifacts
Chert	320	94.67%
Obsidian	5	1.48%
Igneous	9	2.66%
Other	4	1.18%
Grand Total	**338**	**100.00%**

Table 22: Raw material type frequencies by the associated depth (CM).

Dimension V: Raw Material Type By Depth (CMBD)	Chert	Obsidian	Igneous	Other	Grand Total
NA	16	0	0	0	16
Surface	14	0	1	1	16
0-20	80	2	2	0	84
20-40	78	1	3	1	83
40-60	84	2	0	1	87
60-80	39	0	3	1	43
80-100	5	0	0	0	5
100-120	3	0	0	0	3
Cleanup	1	0	0	0	1
Grand Total	320	5	9	4	338

Dimension six marks the variety of platform types evident on the sampled artifacts in this study (Table 23 and Table 24). The largest frequency of platform type among these sampled artifacts have fragmentary platforms (44.38%). The second highest percentage the artifacts have a simple platform exhibiting only one flake scar (33.14%). Third highest comes in at 10.54% with 'not applicable' marking the artifacts that are bifaces, chunks or cores. The remainder of the sample are dispersed throughout the other types shown in Table 23. On the next page, Table 24 shows the diversity throughout the excavation of the Grissom site.

To reiterate from the method section, these platform types can correspond with the level of energy exerted in the creation of said artifact. These results with the skews toward simple and fragmentary lead towards a quickly made artifact or expedient tools that are not highly specialized to those tools used heavily and discarded missing elements such as the tool platform in this case. When combined, these two types of platforms, simple and fragmentary, make up 77.52% of the sampled assemblage.

Table 23: Platform type by count and frequencies evident on the sampled uniface artifacts.

Dimension VI: Platform Type	Count of Sampled Uniface Artifacts	Percentage of Sampled Uniface Artifacts
Cortex	7	2.07%
Simple	112	33.14%
Faceted	18	5.33%
Bifacial Unfinished	2	0.59%
Bifacial Unfinished with wear	1	0.30%
Bifacial Finished with wear	5	1.48%
Fragmentary	150	44.38%
Not Applicable	36	10.65%
Tech. Absent	7	2.07%
Grand Total	338	100.00%

Table 24: Platform type count by the associated depth (CM).

Depth (CMBD) Platform Type	NA	Surface	0-20	20-40	40-60	60-80	80-100	100-120	Clean up	Grand Total
Cortex Present on platform	1	1	0	2	3	0	0	0	0	7
Simple platform w/ single scar	4	6	29	32	22	14	2	2	1	112
Faceted platform w/ multi flake scar	1	0	3	6	6	1	1	0	0	18
Bifacial Unfinished	0	0	0	0	1	1	0	0	0	2
Bifacial Unfinished w/ wear	0	0	0	1	0	0	0	0	0	1
Bifacial Finished w/ wear	0	0	0	2	2	1	0	0	0	5
Fragmentary	10	7	40	32	41	18	1	1	0	150
Not Applicable (chunk; biface, core).	0	2	11	7	9	6	1	0	0	36
Technologically absent	0	0	1	1	3	2	0	0	0	7
Grand Total	16	16	84	83	87	43	5	3	1	338

The seventh dimension corresponds with the level of completeness of the artifact in question (Table 25). The two highest frequencies among this sample are flaked fragments (34.62%) and whole flakes representing (31.66%). The remaining third of the assemblage include; broken flakes (14.50%), other (11.24%), and debris (7.10%).

Table 26 shows the frequency of depth these artifacts were recovered at with the associated level of completeness. A noticeable bimodal frequency occurs 20-40 cm for flake fragments, which decreases as the amount of complete flakes (n=32) increases (Table 26). This is the only level in which this transition occurs.

Table 25: Completeness of sampled uniface artifacts by count and frequency.

Dimension VII: Completeness	Count of Sampled Uniface Artifacts	Percentage of Sampled Uniface Artifacts
Whole Flake	107	31.66%
Broken Flake	41	12.13%
Flake Fragment	117	34.62%
Debris	25	7.40%
Other: e.g., bifaces, cores	48	14.20%
Grand Total	338	100.00%

Table 26: Completeness of the sampled uniface artifacts by frequency and the associated depth (CM).

Dimension VII: Completeness by Depth (CM)	Whole Flake	Broken Flake	Flake Fragment	Debris	Other: e.g., bifaces, cores	Grand Total
NA	4	3	8	1	0	16
Surface	7	2	4	1	2	16
0-20	24	10	34	4	12	84
20-40	32	12	20	7	12	83
40-60	22	10	36	5	14	87
60-80	13	3	13	6	8	43
80-100	3	0	1	1	0	5
100-120	2	0	1	0	0	3
Cleanup	0	1	0	0	0	1
Grand Total	107	41	117	25	48	338

The eight dimension covers thermal alteration (Table 27; Table 28). The majority of items do not have any evidence of thermal alteration (82.54%). Only 5.33% of the assemblage exhibited a mixture of lustrous and non-lustrous flake scars. Another 11.83% of the assemblage has only lustrous flake scars exhibited across the surface of the artifact. These descriptions are necessary to show the diversity of the raw material selected and to further understanding lithic technology of the past. Heat treatment of lithic material has been shown to help propagate and predict lithic flakes for tool creators (McCutcheon 1997).

One artifact within this sample has evidence of high heat thermal alteration. This one artifact is labeled 260 in the catalog exhibiting evidence of staining from natural processes or thermal alteration. Also noted from this artifact is the presence of voids within the materials body due to the process of potlidding during high temperature that ejects pieces of the material. This process can occur during tool creation however if the raw material itself is of poor quality (Figure 30).

Table 27: Thermal alteration count and frequency evident on the sampled uniface artifacts.

Thermal Alteration Evident	Count of Sampled Artifacts	Percentage of Sampled Artifacts
No Heat	279	82.54%
Mix of Non and Lustrous	18	5.33%
Lustrous Flake Scars	40	11.83%
High Heat	1	0.30%
Grand Total	338	100.00%

Table 28: Thermal alteration evident on the sampled uniface artifacts by count and the associated depth (CM).

Platform Type	No Heat	Mix of Non and Lustrous Flake Scars	Lustrous Flake Scars	High Heat	Grand Total
NA	14	1	1	0	16
Surface	15	1	0	0	16
0-20	72	6	6	0	84
20-40	73	3	7	0	83
40-60	69	4	14	0	87
60-80	30	2	10	1 (e.g., 260)	43
80-100	3	1	1	0	5
100-120	2	0	1	0	3
Cleanup	1	0	0	0	1
Grand Total	279	18	40	1	338

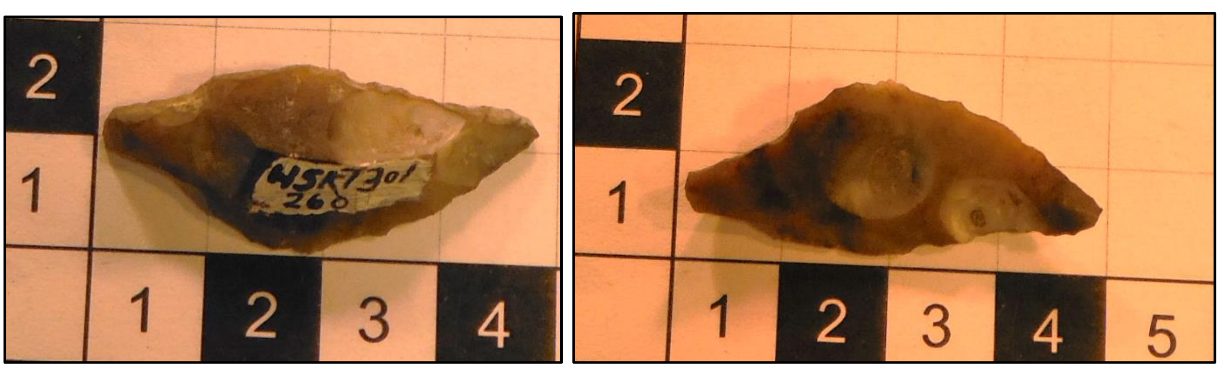


Figure 30: Two photographs of the cataloged artifact (#260), with the dorsal side (left) and the ventral side (right). Evidence of thermal alteration due to the discoloration on the artifact.

The ninth dimension within this classification describes the various stages of lithic reduction (initial, intermediate, and terminal). Not surprising for this archaeological assemblage the sampled uniface artifacts tend to be within the tertiary stage of reduction (73.96%) (Table 29), which indicates that these artifacts have multiple flake scars along the surface of the artifact. Based on this sampled assemblage the Grissom site seems to be a place that people bring their lithic material to, rather than procuring raw material from the area surrounding the site (See Table 30). If this were the case archaeologists would expect to see a higher amount of artifacts within the initial stages of reduction with a majority of the artifacts having cortex present

However, these sampled artifacts only make up 5.8% of the recovered lithic assemblage from the Grissom site excavation. These initial results should be considered tentative at best when considering raw material acquisition. With further investigation into the lithic artifacts recovered from the Grissom excavation archaeologists will be able to conclude with greater certainty what transpired here.

Table 29: Reduction class by count and frequency evident on the sampled uniface artifacts.

Dimension IX: Reduction Class	Count of Sampled Uniface Artifacts	Percentage of Sampled Uniface Artifacts
Initial	7	2.07%
Intermediate	32	9.47%
Terminal	250	73.96%
Bifacial Reduction	13	3.85%
Bifacial Resharpening	7	2.07%
Not Applicable	29	8.58%
Grand Total	338	100.00%

Table 30: Distribution of reduction classes exhibited by the uniface artifacts by depth (CM).

Dimension IX: Reduction Class **Depth by (CMBD)**	**Initial Reduction**	**Intermediate Reduction**	**Terminal Reduction**	**Bifacial Reduction**	**Bifacial Resharpening**	**Not Applicable**	**Grand Total**
NA	0	1	15	0	0	0	16
Surface	0	5	10	0	1	0	16
0-20	2	8	62	4	0	8	84
20-40	2	5	63	6	3	4	83
40-60	1	9	61	3	2	11	87
60-80	2	3	32	0	1	5	43
80-100	0	1	3	0	0	1	5
100-120	0	0	3	0	0	0	3
Cleanup	0	0	1	0	0	0	1
Grand Total	7	32	250	13	7	29	338

Results from Raw Material Provenience Classification

These sampled artifacts make up 5.8% of the 5,770 lithic artifacts recovered from the Grissom site. The sampled artifacts within this study yield little information to express the raw material utilized at the site nonetheless most of the artifacts utilize crypto-crystalline-silicate or chert sources (94.67% of the sample). From the remaining sampled artifacts include the material types; obsidian (1.48%), igneous (2.66%), and other (1.18%).

The rock provenience information describes the physical properties of these artifacts. These artifacts were microscopically analyzed to note the ground mass characteristics of the raw material as well as the solid and void inclusions and the distribution of these inclusions within the raw material itself. Figure 31 marks the ground mass characteristics of the raw material utilized for these sampled artifacts. The two highest frequencies noted were uniform structure denoting an unvarying distribution of color, texture or luster all of which are evenly distributed and mottled structure denoting abrupt and uneven variation in color or texture.

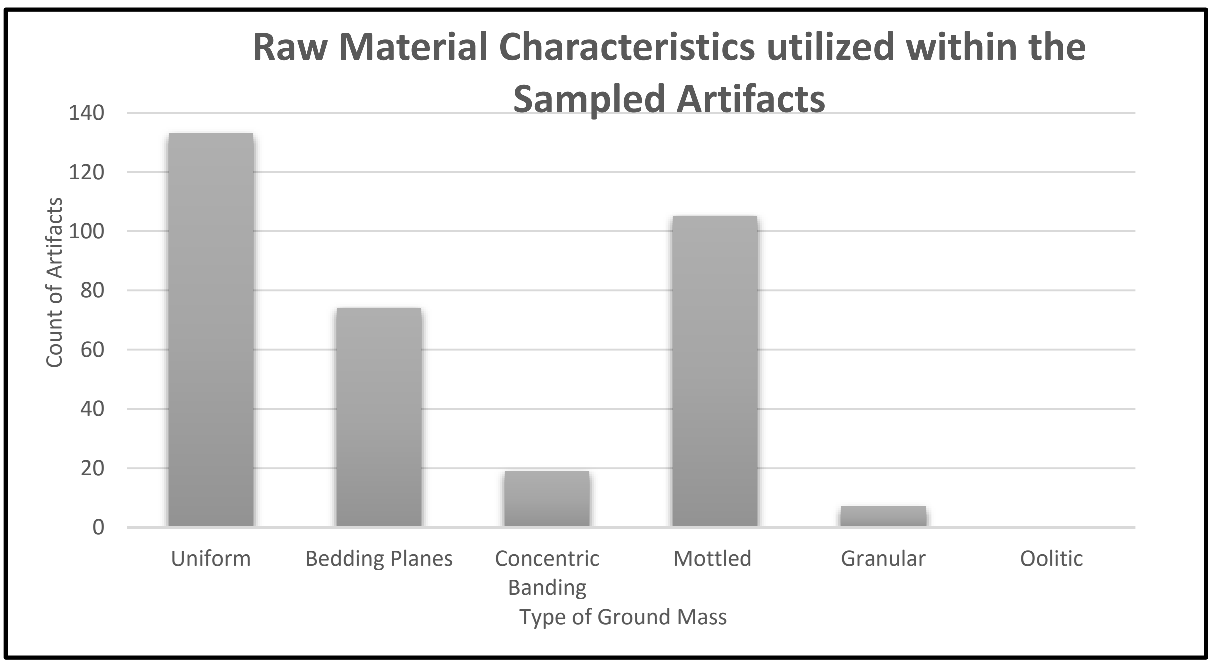


Figure 31: Displays the frequencies of artifacts exhibiting various types of ground mass characteristics within the raw material.

Due to the nature of these results, the majority of these artifacts revealed little to no information concerning the physical properties of the weathered or cortex rich surfaces. All of the data gleaned from this analysis will be given to faculty members at the University of Idaho and Central Washington University. This way when other archaeological investigations of the raw material utilized at the Grissom site the combined efforts can be used for a better understanding of the raw materials used at the site.

Discussion of Use Wear Results

The last two sections followed the paradigmatic classifications for the sampled lithic artifacts and the rock provenance classification. This subsections marks the use wear evident on these sampled artifacts, specifically what kind of use wear is evident (See Appendix D). For a reminder there are 271 artifacts with use wear present within this sample (See Table 31).

These 271 artifacts exhibit various kinds of use wear in the form of chipping, abrasion, crushing and polishing (See Table 32). The largest frequency of use wear is chipping making up 39.94% of the assemblage. The second highest frequency of use wear is crushing at 23.96%. The third highest frequency among this sample is none with a frequency of 20.42%. The remainder of the assemblage some 15.68% show signs of abrasion. Across the main excavation block for the Grissom site the bulk of the tools were recovered from the upper 60 cm (Table 33). The highest count of artifacts exhibiting worn edges with chipping occurs at 20 cm to 40 cm below the surface. When looking at the other use-wear such as abrasion the highest count of artifacts occur at 0 cm to 20 cm, while crushing tools occur at 40 cm to 60 cm below the surface in the highest frequency.

Comparing these flaked tools to the other artifact types, biface and chunks will allow for a further understanding of the diversity of artifacts selected in this sample (See Figure 32).

Figure 33 reflects the amount of worn area present on these artifacts. The highest frequency of artifacts exhibiting worn areas measuring 0 mm - 20 mm. The artifacts with a high amount of worn surface could be the result of multi-planes/edges of worn area. In total from the sampled artifacts there are 23 artifacts with two or more planes of worn area.

Table 31: Use-wear by count among the sampled uniface artifacts.

Evidence of Use-Wear	Count of Catalog
Absence of Use-Wear	67
Presence of Use-Wear	271
Grand Total	338

Table 32: Use-wear type by count and frequencies exhibited on the sampled uniface artifacts.

Kind of Use-Wear	Count of Sampled Uniface Artifacts	Percentage of Uniface Artifacts
Chipping	137	39.94%
Abrasion	53	15.68%
Crushing	81	23.96%
None	67	20.41%
Grand Total	338	100.00%

Table 33: Use-wear type evident on the sampled uniface artifacts by count and the associated depth (CM).

Kind of Use-Wear Depth by (CMBD)	Chipping	Abrasion	Crushing	None	Grand Total
NA	7	2	3	4	16
Surface	6	1	7	2	16
0-20	30	14	15	25	84
20-40	36	13	23	11	83
40-60	35	9	27	16	87
60-80	20	9	5	9	43
80-100	1	3	1	0	5
100-120	1	2	0	0	3
Cleanup	1	0	0	0	1
Grand Total	137	53	81	67	338

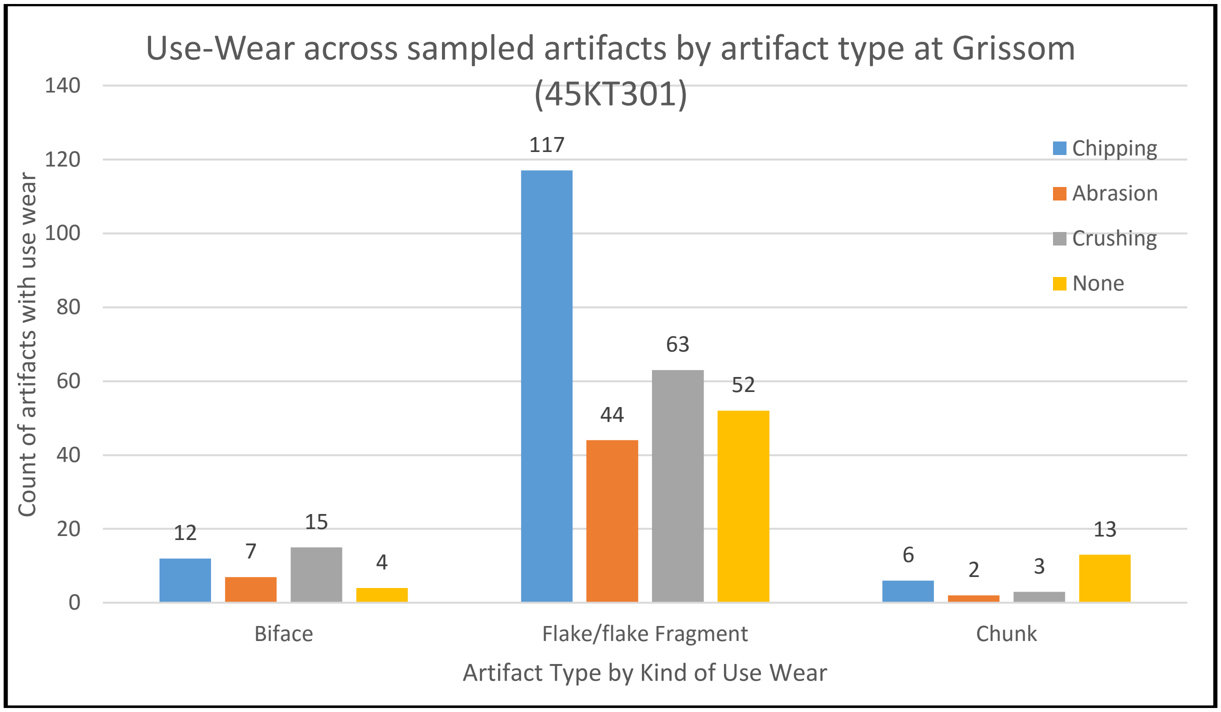


Figure 32: Artifact type by frequencies of the type of use-wear among all sampled uniface artifacts.

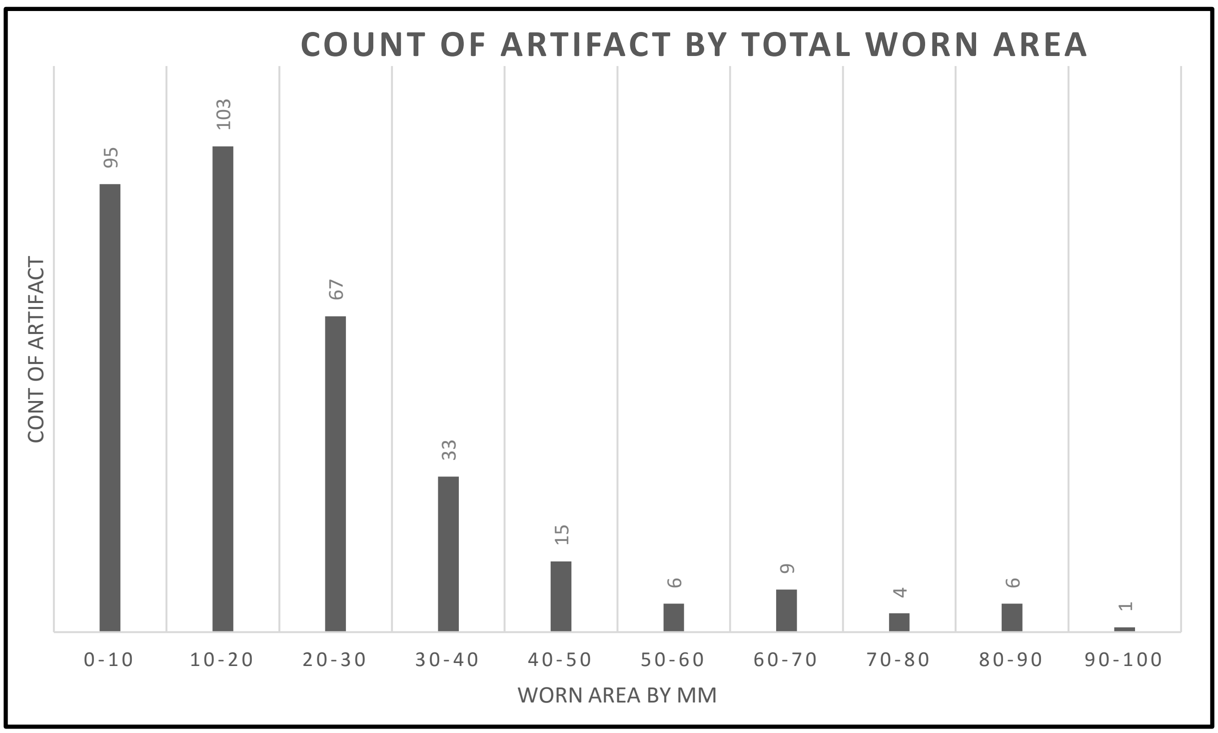


Figure 33: Worn area frequencies by count among all sampled uniface artifacts.

Figure 34 denotes the sum of use-wear (mm) for the sampled artifacts by the depth (cm) of recovery. The majority of use wear correlates with the high frequency of artifacts within the first 60 cm of excavation. Figure 35 displays the total sum (cm) of worn area from these artifacts by the provenience information. Each of the colors in Figure 35 correspond to the sum of worn area (cm) among all artifacts exhibiting use-wear recovered from the unit in question. The largest amount of use wear or the heaviest used artifacts within the Grissom site are focused around the red (J2W, R0E, S5E) and orange (J5E. M1W, M0E, N0E, U0E) units. R0E reflects the highest amount of worn artifacts at 33 artifacts the sum of the worn area from these artifacts reflect a total worn area of 65.8 cm. However, the high frequencies of artifacts does not consistently follow the highest amount of worn area comparing Figure 28 to Figure 35. Comparing these results by depth of recovery, Figure 34 reflects the trend of use wear among the individual depths. As noted in all depth tables present, within this study the highest amount of use wear correlates with the highest frequency of artifacts recovered from the upper levels.

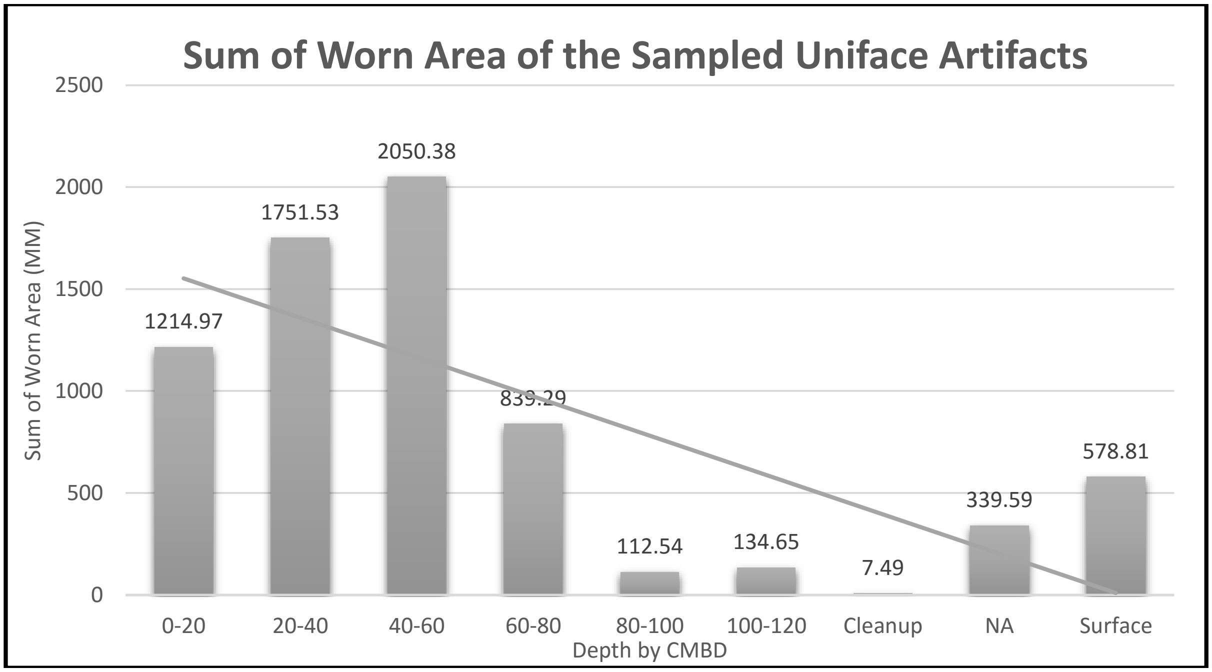


Figure 34: Worn area grouped by associated depth (CM) of recovery.

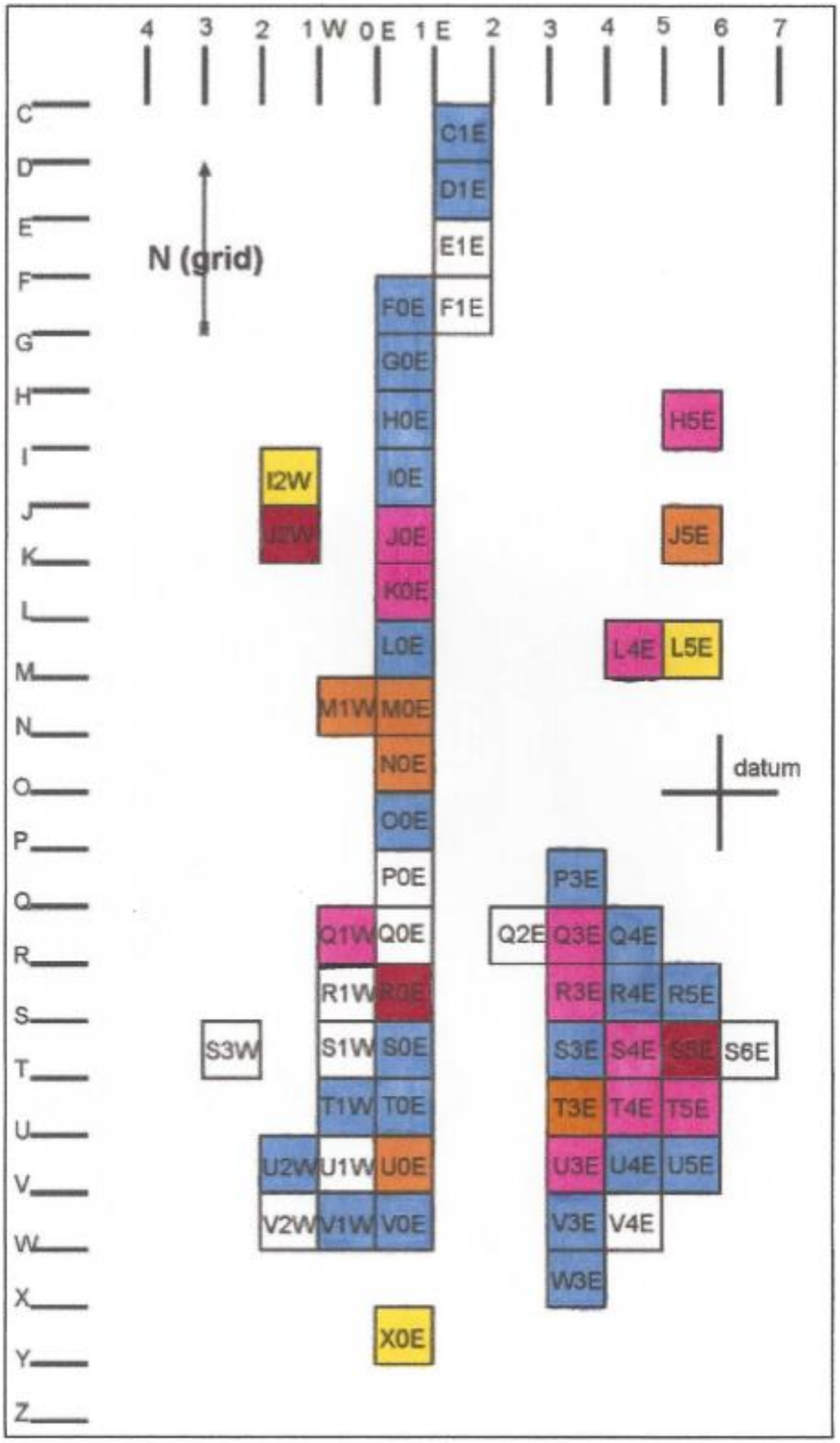
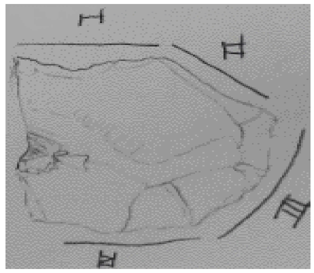
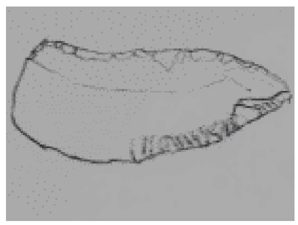
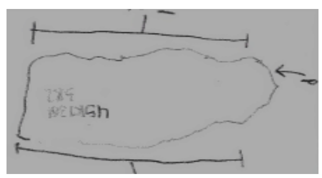
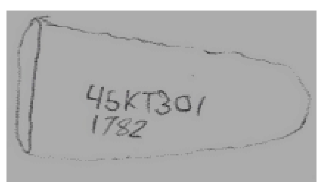
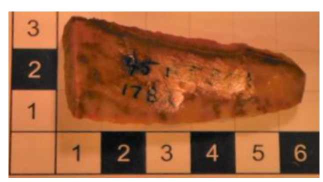
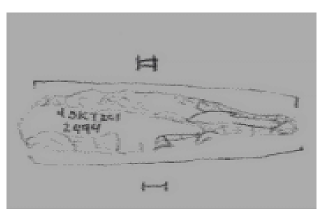
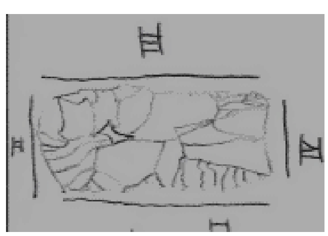
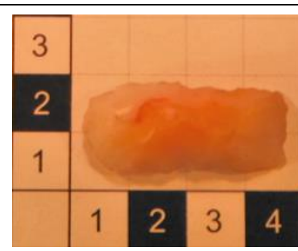


Figure 35: Spatial distribution of worn artifacts by worn area (CM) across the Grissom site: Blue correlates to 1-9 cm; Pink 10-20 cm; Yellow 20-30 cm; Orange 30-40 cm; Red 40-50 cm; and R0E 65.8 cm.

Table 34 shows a sample of unique artifacts recovered from the Grissom site. Each of these artifacts exhibit a large amount of use-wear ranging between 70 mm and 90 mm. The large amount of use wear is largely due to the multiple planes exhibited on these artifacts. These artifacts in question are displayed through a photograph and a drawing supporting a visual display of these worn edges. Each of these rows support the provenance of these artifacts from their depth and the unit that held the artifacts. Blade artifacts are found within this table as well as scrapers, utilized edge tools, and one turtle backed scraper. The uniface tools found within this sample show a diversity of use for these artifacts. Notice that each of these artifacts are found throughout the depths of the Grissom site's main excavation. This evidence supports the claims made by Burris (2015) that the Grissom site was occupied throughout the use of this archaeological site.

Are these bifacially flaked tools and other standardized tools skewing the data? To prevent this bias Figure 36 was included to show noticeable differences among the frequency of use at the Grissom site. Figure 36 shows the intensity of use through flaked and chunked tools. Both artifacts could be expedientially created for use at the site.

Table 34: Sample of heavily worn artifacts analyzed within this study.

Cat #	Unit	CMBD	Drawing	Picture	Worn Area Tool Type
2	Q1W	110			Utilized Flake 74.37 mm
188	J2W	30-40			Blade 73 mm
582	N0E	0-40			Expedient Flake 81.98 mm
1782	T4E	40-50			Utilized Flake 87.65 mm
2494	J5E	2			Scraper or Stone Awl 80.01 mm
16184	K0E	40-60			Turtle Back Scraper 83.35 mm

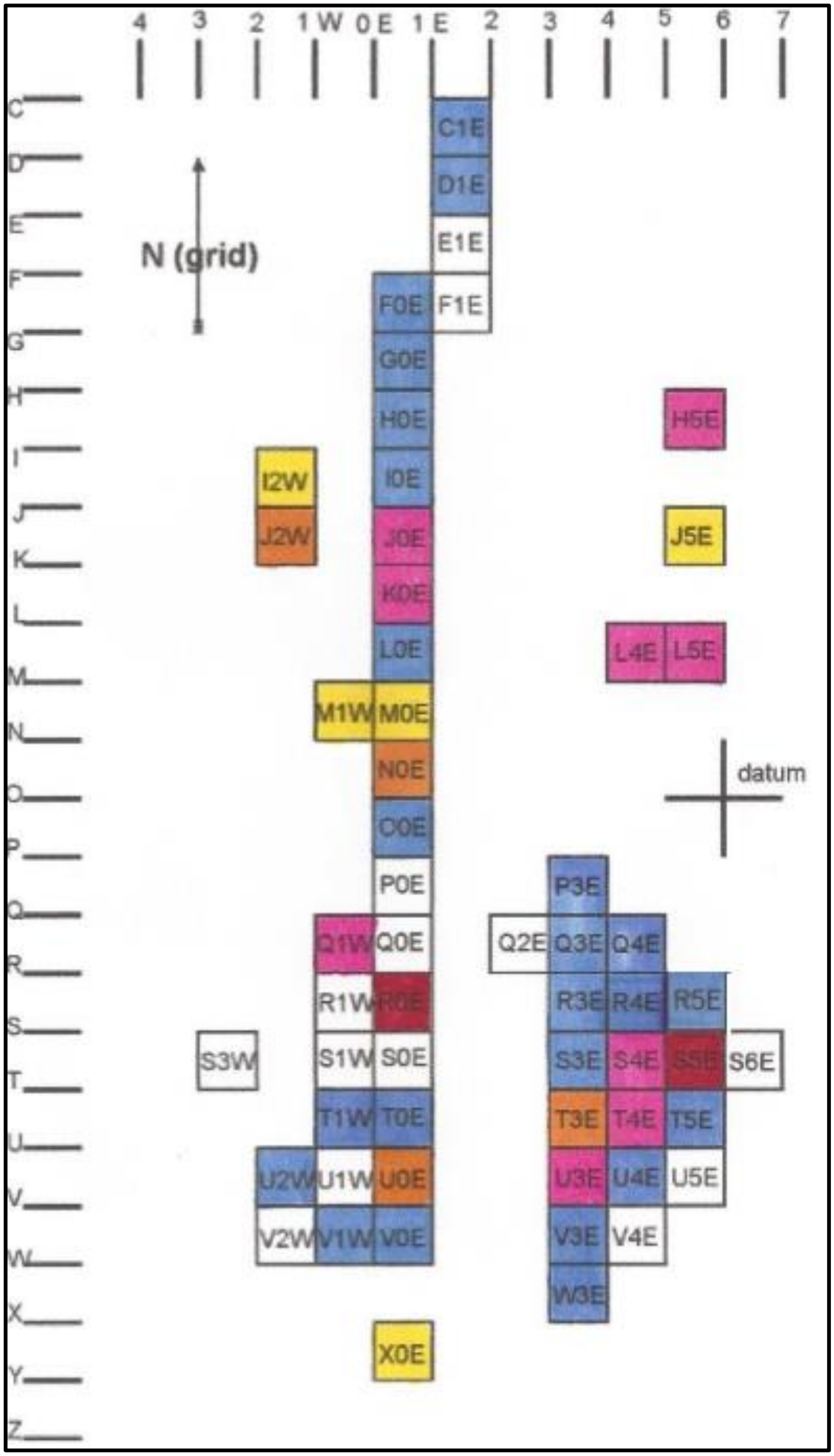


Figure 36: Spatial distribution of worn artifacts excluding biface artifacts within the sample. Worn area (CM) across the Grissom site: Blue correlates to 1-9 cm; Pink 10-20 cm; Yellow 20-30 cm; Orange 30-40 cm; Red 40-50 cm; and R0E 63 cm.

Comparing these results to the other work done on the Grissom site to other archaeological investigations that include the analysis of woman's tools (Finley 2013; Shea 2012). Ground stone artifacts grouped into tool categories were noted as; pestle, pestle-like, hammer stones, battered cobbles and other. Focusing on the hammer stones, pestles and pestle-like artifacts all of which can be association with women's tools. These artifacts were recovered throughout the excavation of the Grissom site (See Figure 37). The majority of these artifacts were found on the surface or within the first 10 cm of excavation.

Shea's synopsis of the artifacts recovered from the Grissom site reflected a number of undergraduate investigations of the modified bone tools (Bangeman 2007; Boyd 2007; Gould 2006, cited by Shea 2012:193-196). For our purposes, the awl and needle artifacts and the area of recovery are shown within Figure 38, which combines the ground stone tools and the culturally modified bone awls and needles.

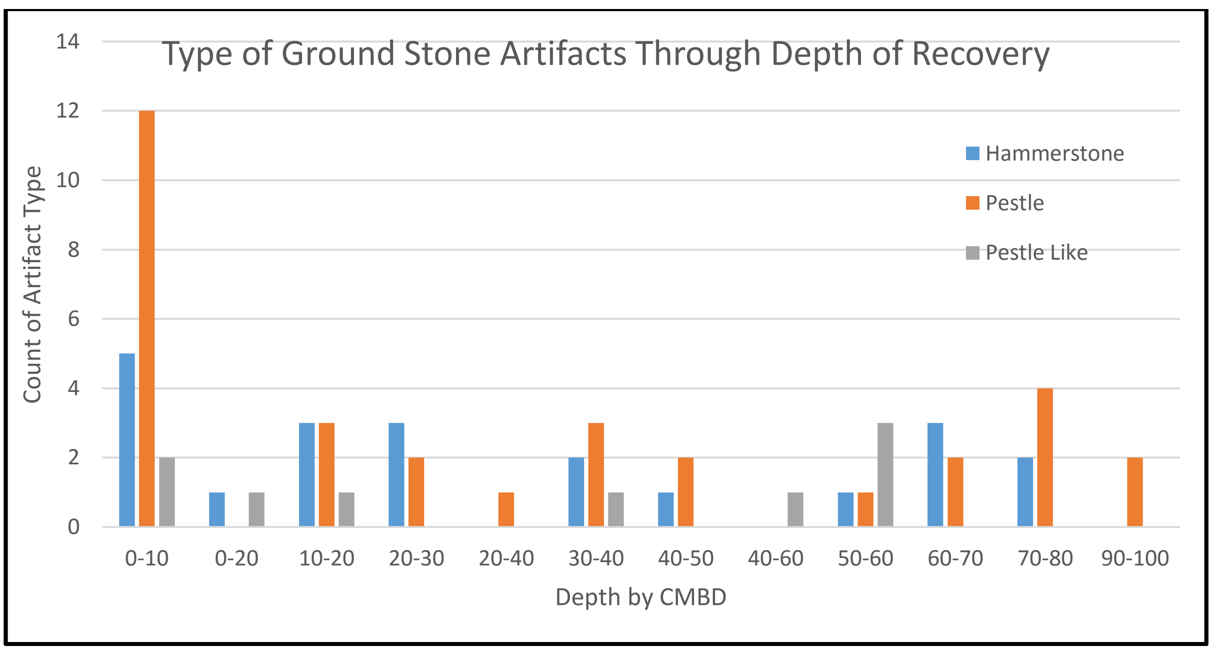


Figure 37: Ground stone artifacts specifically hammer stone, pestle and pestle like artifacts throughout the main excavation block at the Grissom site (Finley 2013).

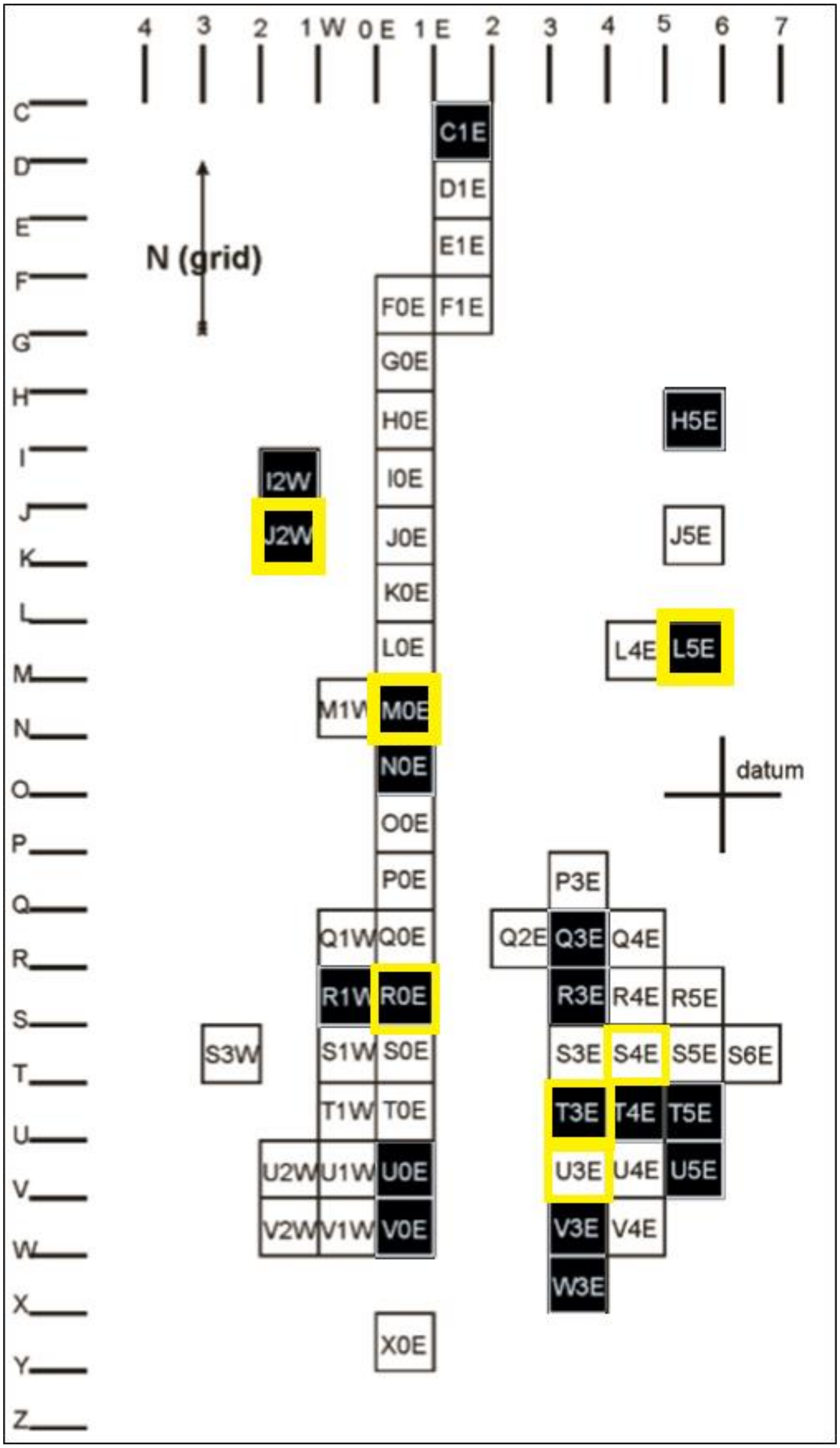


Figure 38: The Grissom site and the distribution of ground stone artifacts in black and units outlined in yellow displays the distribution of awls and needles. Data collected from Finley (2013) and Shea (2012:193-196). Map adapted from Shea (2012:67).

Sampling Technique for Residue Analysis

Through the use-wear analysis of these sampled artifacts, a number of intensely used areas were identified within the Grissom site. Due to the differing excavation methods employed during the excavation of the Grissom site, the units associated with Dr. Bill Smith will be the focal points for this study (See Chapter Six specifically Figure 16). The units excavated during Dr. Smith's tenure on the site include: J2W, M0E, R0E, R3E, R4E, R5E, S3E, S4E, S5E, T3E, U0E and X0E. Units that have ground stone artifacts, awls, and expedient flake artifacts from this list of units now is simplified to T3E, R0E, M0E, and J2W.

Figure 39: Photograph noting the excavation of J2W. Photo by Stan Riggle circa 1970, cited by Shea (2012:73).

Artifacts recovered from these units have associated radiocarbon dates. Specifically unit J2W held the only radiocarbon dates that follow the law of superposition where the artifacts found in lower layers are older than the layers near the surface (Figure 39). Because of the nature of how these artifacts were handled it becomes imperative to link associated tool use through a protein residue analysis with the radiocarbon dates gleamed from other archaeological investigations at the Grissom assemblage.

Table 35 marks the sampled artifacts sent off for protein residue analysis. Currently the results are pending. The results of the protein residue analysis will be published at a later date.

Table 35: Artifacts sampled for protein residue analysis and the associated radiocarbon dates with each depth of recovery within unit J2W.

Artifact Catalog Number	Unit	Depth CMBD	Kind of Wear	Associated Radiocarbon Dates
2303	J2W	8	Crushing	
2322	J2W	16	Chipping	
2314	J2W	17	Abrasion	
2319	J2W	19	Abrasion	
(-)	J2W	20-40	Bone	400+/-40
188	J2W	30-40	Chipping	
3240	J2W	30-40	Chipping	
1428	J2W	30-40	Chipping	
16195	J2W	40-50	Chipping	
383	J2W	67	Crushing	
1963	J2W	60-70	Chipping	
3850	J2W	60-70	Crushing	
(-)	J2W	90-100	Elk Bone	1580+/- 40

CHAPTER 10: CONCLUSION

Summary

The initial questions proposed through this research were the following: How intensively were these uniface artifacts used at the site? What were the trending raw materials utilized at the site? Is there a preferential selection of one raw material type? Was there residue evidence left on these edges of worn artifacts? From these artifacts sampled, the intensity of use is focused within three units at the Grissom site (R0E, J2W, and S5E), which are units that have recovered obsidian artifacts geochemically sourced to Bickleton Ridge, WA, Indian Creek, OR, Indian Rock, WA, and Whitewater Ridge, WA. The predominant raw material sources utilized within this sample are from chert material tool stone. No preferential selection of a given chert source was noted from this analysis. A future publication will show any evidence surmised from a residue analysis.

The main questions raised from this study included: Is there evidence of spatial patterns of site use present at the site? Are there similarities across the site? Are there locations of intensified use? From these questions, the biggest insights came from the review of other archaeological investigations at the Grissom site. Accordingly, the similarities of intensified use come with a higher frequency of artifacts recovered from these areas. The intensely used areas recovered all types of women's tools (ground stone, awls and expedient flaked tools) within units M0E, T3E, R0E, J2W and L5E. As the great saying goes, correlation does not equal causation. However, this association through this body of work does include insight into a tool type that is largely ignored. The majority of these artifacts do not follow the standardized tool creation such as projectile points or bifacially flaked tools, which can be perceived as women's tools. As our own understanding continues to grow it becomes imperative to examine all tools to expand our own knowledge of the lithic technologies within the contact and precontact periods.

The results of this study did not yield significant results to demonstrate a spatial pattern of gendered use at this site. These standardized locations of use at the Grissom site were revealed. Yet there is little information to explain the reasons for these intensified uses beyond the recovery of the bulk of the lithic assemblage from these areas. Each excavation unit highlighted within this study does create an association with women's tools and possibly women's role as a creator of these lithic technologies.

Future Research

The Grissom site has yet to be comprehensively analyzed. As this archaeological site likely has ties to the intertribal meeting ground known as Chelohan, this unique site still holds archaeological information that could help evaluate unique parts of the archaeological record within the Plateau culture area. This site needs continued assistance in the analysis of the lithic assemblage recovered during the excavation. A complete analysis of the technological, functional and material of the lithic artifacts recovered from years of excavation. There is still a large majority of the faunal remains from this assemblage that needs to be studied. Finally, I believe this site needs additional ethnographic information. As the majority of the literature on this area is from eyewitnesses and secondary accounts of traditional use of this area. Gaining a new insight of this archaeological site through its original cultural context to help explain the spatial use pattern at the Grissom site.

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Appendix A: A blank copy of the analytical sheet used in this analysis

Project: An analysis of the expedient flaked tools			
Participant(s): Nick Finley			**Date:**
Catalog #	**Unit:**	**Depth (CM)**	
Paradigmatic Classification (Dimensions 1-9)			
Dimension I: Macroscopic Wear (Dimension 1-4)			
Dimension II: Rock Physical Properties (Dimension 1-5)			
Dimension III: Rock Provenance Classification Parameters: (Dimension 1-11)			
Weight:			
Max Width (MM):		**Max Length (MM):**	
Worn Area Length (MM):		**Worn Area Width (MM):**	
Worn Surface Area (MM):			
Picture #			
Ventral Drawing/Side One:		**Dorsal Drawing/Side Two:**	

Appendix B: Complete list of radiocarbon dates for the Grissom site as of 2013 (Vassar: pp. 12-13).

Unit	**Depth** (cm)	**Conventional Age** (RCYBP)	**Calibrated Age** (intercept & 2 sigma range)	**Material**	**Lab Number**
J2W	20-40	400±40	AD 1460 (AD 1430-1630)	bone	Beta-167130[c]
J2W	90-100	1580±40	AD 450 (AD 400-570)	elk bone	Beta-190125[d]
J2W	130-150	4130±40	2820 BC (2880-2580 BC)[a]	charcoal	Beta-190126[d]
J2W	140-160	1810±30	AD 80 to 240 (BP 1870 to 1720)	bone	Beta – 321571[e]
O0E	40-60	710±40	AD 1290 (AD 1260-1380)[b]	bone	Beta-202534[d]
S3E	50-60	1540± 30	AD 430 to 600 (BP 1520 to 1360)	bone	Beta – 321573[e]
S3E	60-70	890±30	AD 1040 to 1110 (BP 910 to 840) AND AD 1120 to 1220 (BP 840 to 730)	bone	Beta – 321575[e]
S5E	20-40	1150±40	AD 890 (AD 870-960)	bone	Beta-167131[c]
S5E	80-90	880±30	AD 1040 to 1100 (BP 910 to 850) AND AD 1120 to 1140 (BP 830 to 810)	bone	Beta - 321574 [e]
			AD 1150 to 1220 (BP 800 to 730)		
U0E	90-100	130±30	AD 1670 to 1780 (BP 280 to 170) AND AD 1800 to 1900 (BP 150 to 50) AD 1900 to 1940 (BP 50 to 0) AND AD 1950 to post 1950 (BP 0 to post 1950)	bone	Beta - 324050 [e]
U0E	110-115	1080±30	AD 890 to 1020 (BP 1060 to 930)	bone	Beta - 321572 [e]
V0E	20-40	210±40	AD 1660 (AD 1640-1810)[b]	bone	Beta-167132[c]

[a] intercept given is the middle of three intercepts
[b] omits range
[c] obtained by Mary McCombs
[d] obtained by Patrick Lubinski
[e] obtained by Anne Vassar

Appendix C: Technological Paradigmatic Classification Modified from McCutcheon (1997), Parfitt (2012).

I. **Type of Artifact**

0. **Biface**: two-sided rock exhibiting negative flake scars only, which were initiated from the edge of the rock.
1. **Flake/Flake Fragment**: rock exhibiting attributes of conchoidal fracture, especially positive flake scars, bulb of percussion, eraillure scars, and/or point of impact.
2. **Chunk**: rock exhibits non-cortical surfaces but does not exhibit attributes of conchoidal fracture.
3. **Cobble**: rock that exhibits unbroken, cortical surfaces.
4. **Core**: rock exhibiting non-cortical surfaces with attributes of conchoidal fracture with only negative flakes scars.
5. **Spall**: A “flake” shaped chunk that exhibits evidence of thermal shock (e.g., pot-lidding, crazing, crenulation).

II. **Amount of Cortex**: cortex is that part of a rock that is the outer layer that forms as a transition zone between the chert body and its bedrock matrix (Luedtke 1992:150).

1. **Primary**: covers external surface (or dorsal side in the case of flake/flake fragments) of rock (with exception of point of impact, in the case of a flake).
2. **Secondary**: external surface has mixed cortical and non-cortical surfaces.
3. **Tertiary**: not cortex present on any surface, except point or area of impact.
4. **None**: no cortex present on any surface.

III. **Presence of Wear**: damage to an object's surface as a result of use.

1. **Absent**: no evidence of wear present on any surface of rock.
2. **Present**: wear is present on at least one surface.

IV. **Other Modification**

1. **None**: no attrition other than that explained by wear.
2. **Flaking**: Fragment removed by conchoidal fracture.
3. **Grinding**: Surfaces smoothed by abrasion.
4. **Pecking**: irregular or regular patterns of attrition due to dynamic non-conchoidal fracture.
5. **Incising**: linear grinding
6. **Other**: types of modification not described above.

V. **Material Type**

1. Chert: includes all cryptocrystalline silica (CCS), composed of one of the forms of quartz.
2. Obsidian: non-crystalline igneous glass with a bright, vitreous luster
3. Igneous: all igneous rocks excluding obsidian (basalt, andesite)
4. Other: carbonate and unidentifiable materials

VI. **Platform Type:** area struck to cause flake removal

1. **Cortex**: refers to cortical platforms.
2. **Simple**: platforms with only one flake scar.
3. **Faceted**: platforms with more than one flake scar.
4. **Bifacial, unfinished**: platform is bifacially flaked, exhibiting a single stratum of flake scars.
5. **Bifacial, unfinished, wear present**: platform is bifacially flaked, exhibiting wear superimposed over a single stratum of flake scars.

Appendix C: Technological Paradigmatic Classification (Continued)

6. **Bifacial, finished**: platform is bifacially flaked, exhibiting several strata of flake scars.
7. **Bifacial, finished, wear present**: platform bifacially flaked, exhibiting wear superimposed over several strata of flake scars.
8. **Potlids**: typically small, round flakes with convex side with the point of force located at apex of convex side. Parfitt 74
9. **Fragmentary**: platform is absent; "missing data."
10. **Not Applicable**: (e.g., bifaces, cores, chunks).
11. **Pressure Flakes**: Platform is very thin, bulb of percussion is intact, but very diffuse; this platform occurs on small flakes.
12. **Technologically Absent**: results from indirect percussion where a precursor focuses the force such that as the flake is detached an additional flake from the ventral side removes the bulb of percussion.

VII. **Completeness**
1. **Whole flake**: Discernible interior surface and point of force apparent; all margins intact; no broken edges.
2. **Broken flake**: Discernible interior surface and point of force apparent; margins of object exhibit step fractures (> 60o).
3. **Flake Fragment:** interior surface discernible, but point of force is not apparent
4. **Debris:** interior surfaces not discernible
5. **Other**: e.g., bifaces, cores

VIII. **Thermal Alteration**
0. **No Heating**: no attributes of thermal alteration exhibited.
1. **Lustrous/Non-lustrous flake scars**: object exhibits lustrous flake scars either intersecting or juxtaposed to non-lustrous flake scars.
2. **Lustrous Flakes scars**: lustrous flakes scars only, where the luster is equivalent to that exhibited on objects exhibiting mode 1 above.
3. **High-Temperature Alteration**: object exhibits pot-lidding, crazing, and/or crenulated surfaces (as defined in Purdy 1974).

IX. Reduction Class
1. Initial reduction: cortex present on dorsal surface
2. Intermediate reduction: simple/ non-complex: dorsal surface: exhibits few arises from prior flaking and all are of the same scale
3. **Terminal reduction:** complex dorsal surface: exhibits two or more arises and displays two or more scales of prior flaking.
4. **Bifacial Reduction/Thinning**: Complex surface, lipped striking platform; striking platform is sub- parallel with long axis of flake (rather than being more or less perpendicular to long axis) ad carries away a bit of bifacial edge with it.
5. **Bifacial Resharpening**: worn platform: bifacial edge is palpably smooth from chipping/abrasion/polish (compared by feel with other edges on same piece)
6. **Not applicable:** Debris, flake fragments, cobbles, cores, bifaces, spalls.

Appendix D: Macroscopic wear classification, Modified from McCutcheon (1997), Parfitt (2012).

I. **Kind of Wear**

1. **Chipping**: small conchoidal fragments broken from edge; a series of flake scars.
2. **Abrasion**: striations and/or gloss or polish on edge or point or surface.
3. **Crushing**: irregular fragments removed from object leaving pitted surface.
4. **Polishing** (as in Witthoft 1967).
5. **None** - no wear is visible.

II. **Location of Wear**

1. **Angular Point**: intersection of three or more planes at a point, including the point.
2. **Angular Edge**: intersections of two planes including the line of intersection.
3. **Angular Plane**: a single planar surface.
4. **Curvilinear Point**: a three-dimensional parabola or hyperbola. Parfitt 75
5. **Curvilinear Edge**: a curved plane bent significantly in only one axis (two-dimensional parabola or hyperbola).
6. **Curvilinear Plane**: a curved plane with spherical or elliptical distortion of large radius.
7. **Non-localized**: a closed curve.
8. **None**: wear absent.

III. **Shape or Plan or Worn Area**

1. **Convex**: an arc with a curve away from a flat surface.
2. **Concave**: an arc with a curve toward a flat surface.
3. **Straight**: a straight or flat surface.
4. **Point**: a point.
5. **Oblique notch**: two lines whose intersection forms an oblique angle.
6. **Acute notch**: two lines whose intersection forms an acute angle.
7. **None**: wear absent.

IV. **Orientation of Wear**: this dimension describes the linear orientation of the wear itself relative to the Y-plane of the object. The Y-plane will be taken to be a plane that is perpendicular to a line or plane connecting the wear to the body of the tool (X-axis or -plane). For example, if the object is a flake and is placed on a horizontal surface, ventral side down, the Y-plane is parallel to the horizontal surface for all edge damage (e.g., chipping, crushing).

1. **Perpendicular to Y-plane**: mainly pitting, edge-on crushing.
2. **Oblique to the Y-plane**: a single direction is noted (e.g., unifacial chipping).
3. **Variable to the Y-plane**: a number of different orientations, all linear, turning from a left oblique through perpendicular to right oblique (e.g., bifacial chipping, crushing, pounding).
4. **Parallel to the Y-plane**: precludes most percussive wear.
5. **No orientation**: non-linear wear (e.g., heating).
6. **None**: wear absent.

Appendix E: Rock Physical Properties and Rock Provenance Classifications, Modified from McCutcheon (1997), Parfitt (2012).

I. **Groundmass**

1. **Uniform**: a consistent and unvarying structure, where the distribution of color, texture, or luster is even.
2. **Bedding Planes**: linear striae superimposed upon and parallel to one another. Individual striae can be distinct in color and/or texture.
3. **Concentric Banding**: concentric layers of different color and/or texture.
4. **Mottled**: abrupt and uneven variations (e.g., swirled or clouded) in color or texture.
5. **Granular**: a consistent structure composed of many individual grains.
6. **Oolitic**: the matrix is composed of small round or ovoid shaped grains.

II. **Solid Inclusions**

1. **Present**: particles present that are distinct from the rock body (e.g., oolites, sand grains, filled cracks, grains, fossils, minerals).
2. **Absent**: particles are absent from the rock body at 40X magnification or lower (unaided eye).

III. **Void Inclusions**

1. **Present**: areas devoid of any material are present in the rock body (e.g., vugs, fossil and mineral casts, unfilled cracks).
2. **Absent**: areas devoid of any material are absent from the rock body at 40X magnification or lower (unaided eye).

IV. **Distribution of Solid Inclusions**

1. **Random**: the distribution of inclusions is irregular and not patterned in any fashion.
2. **Uniform**: the distribution of inclusions is unvarying and even throughout the rock body.
3. **Structured**: the distribution of inclusions is patterned or isolated within the rock body.
4. **None**: inclusions are absent from the rock body at 40X or lower magnification (unaided eye).

V. **Distribution of Void**

1. **Random**: the distribution of inclusions is irregular and not patterned in any fashion.
2. **Uniform**: the distribution of inclusions is unvarying and even throughout the rock body.
3. **Structured**: the distribution of inclusions is patterned or isolated within the rock body.
4. **None**: inclusions are absent from the rock body at 40X or lower magnification (unaided eye).

Appendix F: Rock Provenance Classification Parameters, Modified from McCutcheon (1997), Parfitt (2012).

I. **Material Type**

1. **Chert**
2. **Obsidian**
3. **Fine grained igneous**
4. **Other**

II. **Cortex-Grain size**

1. **Crypto-crystalline**: individual grains not visible even under a microscope
2. **Aphanitic**: individual grains not visible to naked eye
3. **Fine-grained**: small, evenly distributed individual grains visible to naked eye
4. **Coarse-grained**: large, interlocking grains
5. **No cortex present**

III. **Cortex-Solid inclusions**

1. **Present:** particles present that are distinct from the rock body (e.g., oolites, sand grains, filled cracks, grains, fossils, minerals).
2. **Absent:** inclusions are absent from the rock body at 40X or lower magnification (unaided eye).
3. **No cortex present**

IV. **Cortex-Void Inclusions**

1. **Present:** areas devoid of any material are present in the rock body (e.g., vugs, fossil and mineral casts, unfilled cracks).
2. **Absent:** inclusions are absent from the rock body at 40X or lower magnification (unaided eye).
3. **No cortex present**

V. **Cortex-distribution of solid inclusions**

1. **Random**: the distribution of inclusions is irregular and not patterned in any fashion.
2. **Uniform**: the distribution of inclusions is unvarying and even throughout the rock body.
3. **Structured**: the distribution of inclusions is patterned or isolated within the rock body.
4. **None**: inclusions are absent from the rock body at 40X or lower magnification (unaided eye).
5. **No cortex present**

Appendix F: Rock Provenance Classification Parameters (Continued)

VI. **Cortex-distribution of void inclusions**

1. **Random**: the distribution of inclusions is irregular and not patterned in any fashion.
2. **Uniform**: the distribution of inclusions is unvarying and even throughout the rock body.
3. **Structured**: the distribution of inclusions is patterned or isolated within the rock body.
4. **None**: inclusions are absent from the rock body at 40X or lower magnification (unaided eye).
5. **No cortex present**

VII. **Groundmass-Grain size**

1. **Crypto-crystalline**: individual grains not visible even under a microscope
2. **Aphanitic**: individual grains not visible to naked eye
3. **Fine-grained**: small, evenly distributed individual grains visible to naked eye
4. **Coarse-grained**: large, interlocking grains

VIII. **Groundmass-Solid inclusions**

1. **Present:** particles present that are distinct from the rock body (e.g., oolites, sand grains, filled cracks, grains, fossils, minerals).
2. **Absent:** inclusions are absent from the rock body at 40X or lower magnification (unaided eye).

IX. **Groundmass-Void Inclusions**

1. **Present:** areas devoid of any material are present in the rock body (e.g., vugs, fossil and mineral casts, unfilled cracks).
2. **Absent:** inclusions are absent from the rock body at 40X or lower magnification (unaided eye).

X. **Groundmass-distribution of solid inclusions**

1. **Random**: the distribution of inclusions is irregular and not patterned in any fashion.
2. **Uniform**: the distribution of inclusions is unvarying and even throughout the rock body.
3. **Structured**: the distribution of inclusions is patterned or isolated within the rock body.
4. **None**: inclusions are absent from the rock body at 40X or lower magnification (unaided eye).

XI. **Groundmass-distribution of void inclusions**

1. **Random**: the distribution of inclusions is irregular and not patterned in any fashion.
2. **Uniform**: the distribution of inclusions is unvarying and even throughout the rock body.
3. **Structured**: the distribution of inclusions is patterned or isolated within the rock body.
4. **None**: inclusions are absent from the rock body at 40X or lower magnification (unaided eye).