University of Nevada, Reno

Paleoindian Occupations in the Great Basin: A Comparative Study of Lithic Technological Organization, Mobility, and Landscape Use from Jakes Valley, Nevada

A thesis submitted in partial fulfillment of the
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By

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Abstract

Previous research on Paleoindian occupations in the Great Basin has provided many more questions than answers. Central to understanding this early period is the relationship between its Western Fluted and Western Stemmed Tradition occupants. Little is known of the temporal, cultural, and technological behaviors of Western Fluted peoples, while the Western Stemmed Tradition inhabitants are only slightly better understood. This thesis presents the results of intensive technological studies that focused on determining raw material provisioning strategies, lithic conveyance zones, and landscape use to identify mobility and settlement patterns. Lithic assemblages from 19 Paleoindian era occupations, encompassing several environmental zones within Jakes Valley in eastern Nevada, provide data on the technological organization and movement patterns of early humans in the Great Basin, and reveal previously unknown behaviors that help differentiate the early hunter-gatherer groups who made Fluted and Stemmed projectile points.

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Table of Contents

List of Tables

List of Figures

Chapter 1

Introduction

This study examines Paleoindian lithic technology and settlement systems in a small valley located in eastern Nevada called Jakes Valley (Figure 1.1) that was once home to pluvial Jakes Lake (Garcia and Stokes 2006; Mifflin and Wheat 1979). The goal is to close some sizeable gaps in the current state of knowledge regarding Paleoindian lifeways in the Great Basin. Of primary interest in this thesis is the cultural and technological relationship between Western Fluted and Western Stemmed Tradition projectile point makers. Related to this is the temporal and ancestral relationship between fluted and stemmed projectile points, which are commonly found in the same assemblages in the Great Basin. Another notable and frustrating gap in knowledge is the lack of secure dating of fluted projectile points, which are morphologically similar in appearance to Clovis points found in the American Southwest, but occur nearly exclusively as surface finds in the Great Basin, disallowing any chance for accurate radiometric dating of related deposits. Subsistence remains are also uncommon from Paleoindian sites in the Great Basin. The few that have been recovered (all from Western Stemmed Tradition sites) suggest a highly variable diet, substantially different from the supposed “Big Game Hunters” of the American Southwest and Plains areas. Paleoindian settlement systems in the Great Basin constitute yet another series of questions. Clearly, much work needs to be done to sufficiently fill in these gaps.

For this thesis, 19 site assemblages containing diagnostic Paleoindian tools (both fluted and stemmed) were analyzed using morphological, metric, and statistical methods. This study is unique because of the number of examined site assemblages and plotted locations of all known Paleoindian sites (from Bureau of Land Management records) within a single valley to help visualize the "Big Picture" of landscape use and settlement systems employed by early Great Basin hunter-gatherers. This allows a wider look at the technologies and landscapes utilized by early people and will help fill in some gaps in Great Basin archaeology.

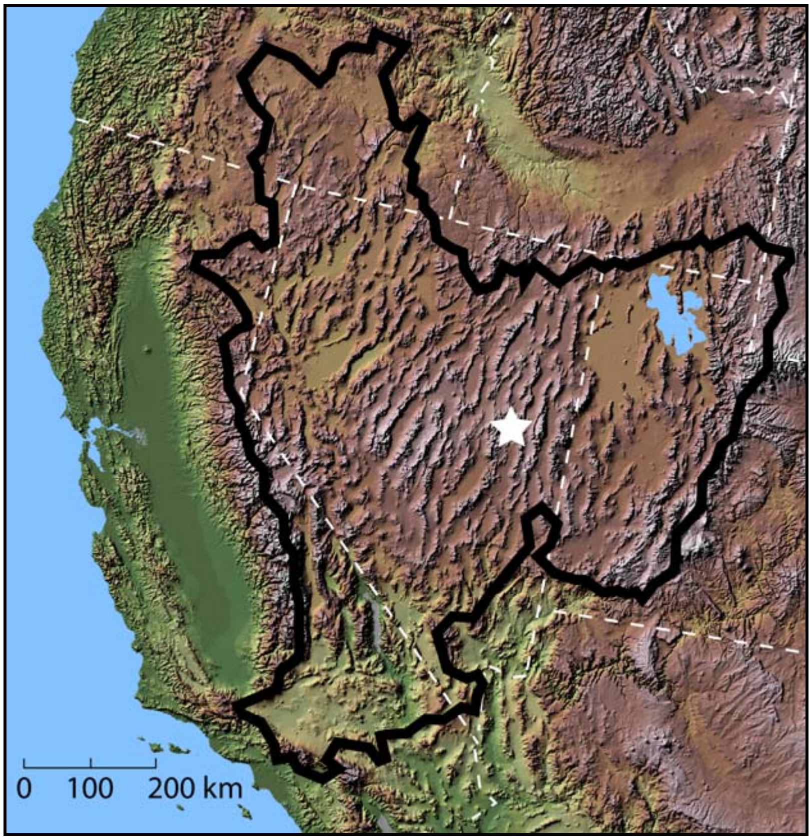


Figure 1.1. Relief map (adapted from United State Geological Survey 2004: http://www.nationatlas.gov/atlasftp.html) of the Hydrographic Great Basin and location of Jakes Valley, indicated by the white star.

In the remainder of this chapter I discuss the current models of adaptation proposed to explain Great Basin Paleoindian lifeways and the role of lithic technology in understanding the relationships between mobility, technological provisioning, and landscape use, and then conclude with a list of the major objectives of this study. In later chapters, I describe the environmental and cultural history of Jakes Valley and the Great Basin, the methods used to analyze the lithic assemblages, and the results of extensive lithic analyses, and then draw conclusions regarding past lifeways of Paleoindian groups in Jakes Valley.

Models of Adaptation

We know that Paleoindians were present in the Great Basin. Their lithic tool assemblages have been found in many of the valleys and intervening mountain ranges that make up this area of the Far West. But it is not enough for archaeologists simply to know they were here; rather, we are interested in understanding how they utilized this landscape, how they moved around, what subsistence resources they survived on, and what adaptations were needed to survive in the Great Basin during the Pleistocene-Holocene transition.

Archaeological research in the Great Basin reveals that the majority of Paleoindian occupations are found on relict beach ridges and other areas immediately surrounding extinct pluvial lakes created during the Pleistocene. Often both Western Fluted and Western Stemmed Tradition projectile points co-occur at the same locations in mixed-component sites surrounding extinct pluvial lakes. This observation spurred

Bedwell (1970, 1973) to hypothesize a specialized adaptation to lacustrine or marshy environments in the western Great Basin that he called the Western Pluvial Lakes Tradition. Other researchers believe Bedwell's model is defective because first it fails to consider evidence of landscape use farther away from lacustrine environments, and second it is based on contradictory data. A model that includes the negated data is called the Highly Mobile Forager in this thesis. I expand on both models below.

Western Pluvial Lakes Tradition or the Tethered Forager Model

Working with assemblages recovered from the Fort Rock area of southern Oregon (including Fort Rock Cave, Cougar Mountain Cave, the Connley Caves, and Table Rock Caves), Bedwell (1970) drafted a projectile point chronology. The earliest (11,000-8,000 B.P.) type was a stemmed variety. Morphologically similar projectile points to those of the Fort Rock area were identified in the Black Rock Desert of northwestern Nevada and the Mohave Desert of southeastern California, all connected by way of the Lahontan Lake system and the eastern side of the Cascade-Sierra Nevada uplift. Noting these similar technologies spread across such a large area, Bedwell hypothesized:

> *This region presented an environment which was probably somewhat similar throughout. There were no doubt area differences, but, most importantly, the region was one in which, because of the numerous lakes, a similar environmental adaptation could be made throughout by the inhabitants. In other words, once an economic adaptation had been made which specialized in the exploitation of a lake, marsh, and grassland environment, groups could travel north and south along the Cascade-Sierra-Nevada uplift and never leave the lacustrine environment which the hundreds of viable lakes at that time provided* [Bedwell 1970:231].

The similar toolkits and environments used throughout these areas led Bedwell to conclude that these groups developed an economic system "…directed to the complete understanding and exploitation of a lake environment" (Bedwell 1970: 231). He referred to this system in the western Great Basin as the Western Pluvial Lakes Tradition (hereafter WPLT). The onset of the Early Holocene brought warming and drying conditions causing the WPLT to decline with the desiccation of the lakes and marshes after about 8,000 B.P. (Bedwell 1970, 1973).

Further research in other areas of the Great Basin began to show similarities to Bedwell's findings. Stemmed projectile points (Western Stemmed Tradition) were found among the same environmental settings in central and eastern Nevada and western Utah, leading Hester (1973) to expand the boundaries of the WPLT to encompass the entire Great Basin. Later, Price and Johnston (1988) noticed that other environmental areas (such as riverine settings) were exploited by stemmed point makers and included them as well.

Around the time of the rising popularity of the WPLT expansion, another model was being formulated by Judith Willig. She suggested that human groups were not specialized lake and marsh dwellers, but were instead "tethered" to these wet locales but with a flexible strategy allowing them to exploit a broad range of resources (Willig 1988, 1989). These "Tethered Foragers" placed their home bases (or "pivots") near littoral and semi-aquatic shallow lake/marsh environments and ranged out from there in search of resources (Willig 1988, 1989). However, "tethered foraging" still suggests these early groups were economically tied to specific environments containing lake or marsh resources, as in the Western Pluvial Lakes Tradition model. Unfortunately, subsistence remains are lacking from occupations during this time period and researchers are unable to demonstrate the importance of lakeside or marsh resources in Paleoindian diets.

Because these two models require lake-side placement of Paleoindian occupations and imply a more sedentary population, I treat them as a single model.

The Highly Mobile Forager Model

Other researchers believe the models proposed by Bedwell (1970, 1973) and Willig (1988, 1989) are overly simplistic, include inaccurate pluvial lake system chronologies, and ignore the use of a variety of different environments, including upland, riverine, and cave systems (Beck and Jones 1997). Subsistence remains from Paleoindian sites in the Great Basin suggest a diverse diet (Hockett 2007; Pinson 2007) and do not indicate specialized lake or marshland adaptation.

The character of lithic tool assemblages carried by Paleoindians may provide some insight into adaptation and subsistence strategies. Large projectile points (fluted and stemmed), bifaces, and scrapers are dominant tools in Paleoindian assemblages, suggesting that subsistence strategies were narrowly focused on the capture and processing of large mammals (Beck and Jones 1997; Elston 1982, 1986; Elston and Zeanah 2002; Jones et al. 2003; Kelly and Todd 1988; Tuohy 1968, 1974). The apparent disconnect between the character of Paleoindian tool assemblages and the diversity of actual subsistence remains (Beck and Jones 1997) suggests to Elston and Zeanah (2002) that Paleoindian males were focused on big game retrieval, while women stayed closer to the wetlands, hunting smaller game, fish, and waterfowl, and probably collecting some plant foods. At the same time, a scarcity of grinding equipment and high-cost foods (like hard seeds) at Paleoindian sites (Rhode and Louderback 2007) indicates subsistence strategies were focused on low-cost, high-return foods such as animals that would congregate at wetland environments (Beck and Jones 1997; Elston 1982, 1986; Elston and Zeanah 2002; Jones et al. 2003; Kelly and Todd 1988; Tuohy 1968, 1974).

Tool assemblages can also inform on Paleoindian mobility and range. Raw materials used to manufacture formal tools often consist of high quality extra-local toolstone (Amick 1997; Basgall 1988; Beck and Jones 1990, 1997; Duke and Young 2007; Estes 2008a, 2008b; Goebel 2007; Graf 2001; Jones et al. 2003; Kelly and Todd 1988; Smith 2006, 2007). Tools frequently occur in a finished state and appear heavily resharpened, indicating a highly curated technology carried by very mobile groups (Ames 1988; Basgall 1988; Beck and Jones 1990, 1997; Estes 2008a, 2008b; Goebel 2007; Graf 2001; Jones and Beck 1999; Jones et al 2003; Smith 2006, 2007).

The aforementioned characteristics are formulated into a model of Paleoindian adaptation, here called the Highly Mobile Forager model (HMF) (Graf 2001; Smith 2006). By being far-ranging in search of resources, collecting high quality raw materials, manufacturing a flexible and curated technology based on biface production, and focusing subsistence strategies on low-cost high-return food items in rich resource patches, HMF people made frequent residence shifts and created small sites with minimal functional differentiation (Elston 1982, 1986). The lack of functional differences at these sites indicates that camps were utilized for a variety of activities that were similar across a wide area. Tool maintenance and resource processing tasks were conducted at each site, suggesting that these sites represent residential base camps.

Lithic Technology

At first glance, chipped stone tools appear to be mute, inanimate objects. However, with the right questions in mind and the best analytical methods, stone tools can be made to speak volumes. The study of lithic technology has advanced from mere description and measurements in earlier years, to detailed studies that reveal information regarding level of mobility, lithic conveyance zones, and provisioning strategies, to name a few themes. In this section I detail the relationship between lithic technology, mobility, technological provisioning, and landscape use.

Mobility

Kelly (1988:717) defines Mobility as "…the way in which hunter-gatherers move across a landscape during their seasonal round, and largely is related to the structure of food resources in a region." No single factor determines how a group arranges their mobility patterns; rather, multiple influences and variables (such as foraging strategies, perceived costs/benefits of moving, sociopolitical organization, territoriality, trade, demography, etc.) can affect how, why, when, and who in a group moves (Kelly 1992). So how can we operationalize and utilize the concept of mobility using the archaeological record?

Applying ethnographic data gathered from the Nunamiut Eskimo (Inuit) of north-central Alaska and the /Gwi San (among others), Binford (1980) described two different subsistence-settlement patterns employed by hunter-gatherers in various environments. One is termed “mapping on” (used by foragers practicing a residentially mobile system), and the other is “logistical” (used by collectors practicing a logistically mobile system). These settlement systems actually belong on a continuum of strategies with the opposite ends being of logistically organized collectors and residentially organized foragers. In actuality, no group is organized as one or the other; rather, a group may function like one during certain periods of time, but may switch and organize themselves like the other if and when needed according to the variables listed by Kelly (1992). Through an understanding of how living groups currently create sites through subsistence-settlement patterns, Binford applied his systems to the material remains of archaeological sites to explain their formation processes. These categories (detailed below) are used in this study to identify settlement and mobility systems of Paleoindians in Jakes Valley.

According to Binford (1980) residentially mobile foragers make seasonal moves (involving the entire group) through, or among, numerous resource patches to required resources and gather food daily on an encounter basis, typically not storing food. Further, residentially mobile foragers generally produce extremely ephemeral accumulations of archaeological debris resulting in very low archaeological visibility, unless there is redundant use of sites or specific land features (e.g., watering holes) where archaeological debris may accumulate. Such mobile foragers create two types of sites: (1) residential bases, the hubs of subsistence activities where foragers process resources and manufacture and maintain stone tools; and (2) locations, short occupation sites where resources are extracted in low bulk, with low tool abandonment, often widely scattered across the landscape consisting of isolated artifacts.

When describing the other end of the spectrum, logistically mobile collectors, Binford (1980) notes organization into small task groups that radiate out to procure quantities of a single resource and return with the bulk to the group, occasionally storing food for part of the year. Residential bases tend to be located near single critical resources, and far from others, thus creating the need for logistic task-specific groups who specialize in the acquisition of certain resources, dissimilar to the encounter basis used by foragers. The people who use this system, called collectors, also create locations, but because task groups collect resources in bulk for the entire group, their sites tend to have a higher archaeological visibility. Collectors create three other site types: (1) field camps, the temporary camps used by task groups while out on a logistic excursion; (2) stations, reconnaissance sites used to track movement of game or other humans, and/or to plan hunting strategies; and (3) caches, the locations of bulk resource storage.

Issues of mobility have been tackled using lithic tool assemblages in various manners, seemingly demonstrating a strong correlation (Andrefsky 1991; Bamforth 1986, 1990; Jones et al. 2003; Kelly 1988; Parry and Kelly 1987; Shott 1986). Technological organization, however, does not account for mobility strategies alone, but must also account for the abundance and quality of raw materials (Andrefsky 1994). While exact provenance information of utilized raw materials (specifically obsidian and fine-grained volcanics) provides a rough measure of the range through which certain toolstone moved, when used in conjunction with the manner of raw material movement across the landscape (e.g., tool manufacture, use, and discard patterns) it can be also be useful in measuring mobility (Jones et al. 2003).

Another argument suggests that the limited data provided by lithic tool assemblages cannot identify settlement systems and/or mobility strategies alone (Madsen 2007). For instance, where Jones et al. (2003) identify long-distance residential moves, Madsen (2007) argues this may actually reflect men's movement to acquire toolstone while women, children, and the elderly remained near the wetland patches procuring resources near their residential bases. Settlement strategies, and therefore, length of stays, would then vary according to the productivity of specific marsh resource patches (Elston and Zeanah 2002; Madsen 2007). Populations could stay longer in large marsh patches (e.g., the Old River Bed Delta of the Bonneville Basin) rather than in the smaller, more isolated, and widely-scattered wetland patches found in the central Great Basin during the Pleistocene-Holocene transition (Madsen 2007; Oviatt et al. 2003). Longer stays in one patch may result in increased and extensive tool resharpening (Schmitt et al. 2007) creating assemblages similar to the provisioning individuals strategy (see below).

I apply the approaches mentioned in the preceding paragraphs of lithic technological organization to the lithic assemblages in this study to determine mobility practices of Paleoindian groups in Jakes Valley.

Provisioning Strategies

Related to Binford's study of subsistence-settlement systems among extant groups is the study of how these or other groups collected raw material, and the patterns of tool manufacture, use, and discard. Planning is an essential aspect of human nature likely employed by ancient hunter-gatherers every day. Tools are needed for survival, and planning for toolstone acquisition ensures that you aren't caught off guard without sufficient materials (Kuhn 1991, 1992). Planning, however, can be based on predictable or unpredictable needs, each requiring different raw material procurement strategies that can be linked to different types of settlement systems (*sensu* Binford 1980) and mobility patterns (Kuhn 1991, 1992, 1994, 1995). Planning for predictable needs, or knowing that you will soon need raw material for future tasks at a specific spot, allows one to acquire the needed toolstone and supply that location, and is referred to as provisioning places (Kuhn 1991, 1992, 1994, 1995). On the other hand, unpredictable needs, or traveling through areas of unknown raw material sources, forces a hunter-gatherer to self-supply with needed toolstone and tools to survive—this is called provisioning individuals (Kuhn 1991, 1992, 1994, 1995) and is similar to what Binford (1979) referred to as "personal gear."

Deciding which provisioning strategy to employ would depend on the particular mobility pattern used by the group. It only makes sense to stock a specific location with raw material if you intend on staying at that location, or practice some form of sedentism. Groups staying in one spot for some amount of time could send logistic groups (Collectors) to go out and acquire enough toolstone to fill their needs. Highly mobile populations that change residences frequently would prefer to equip themselves with toolkits that can be curated, and that are reliable, maintainable, and flexible for unpredictable situations when raw materials may be scarce. Raw material procurement would likely commence in an embedded strategy while moving between or within resource patches.

In this view, provisioning strategy is directly linked to settlement and mobility patterns and can be identified through technological organization and the patterns of raw material acquisition, use, and discard.

Landscape Use

Examination of nineteen Paleoindian assemblages within a single valley allows for an extraordinary and dynamic view of landscape use in a restricted area. According to the WPLT model, Paleoindian residential bases should occur within a single environmental zone: the lake/marsh edge of Jakes Lake. I propose that if/when sites occur in other environmental areas of the valley they should appear functionally distinct from residential bases. Site type diversity should be relatively higher (including site types outlined above for Collectors) according to the WPLT model, and relatively lower (similar to Foragers) according to the HMF model. Site function is determined through analysis of the number of tool classes present in an assemblage (e.g., high numbers of tool classes reflect a more diverse set of activities performed at that site, and vice versa). However, sample size is a key component that can affect the number of tool classes present in an assemblage and may alter site interpretation if left unaccounted for (Jones et al. 1983; Jones et al. 1989; Kintigh 1984; Rhode 1988). To combat this potential source of error, other methods for determining diversity and inter-assemblage comparison have been developed that rely on statistical analyses (Jones et al. 1983; Kintigh 1984), each with their own merits (Rhode 1988).

A major theme of this study involves identifying the functions of Paleoindian sites and how those functions relate to size (here measured by number of tools within a specific assemblage) and environmental location of that particular site. Landscape use is thus linked to settlement and mobility patterns through the use of technological organization.

Research Goals

The primary goal of this study is to analyze and describe Paleoindian settlement systems in Jakes Valley. Additionally, I operationalize two current Great Basin adaptation models to identify the likeliest manner in which Paleoindians in Jakes Valley, and by extension the Great Basin, adapted to their environments.

To identify the settlement system(s) and adaptation model(s) utilized by Jakes Valley Paleoindians, I developed a series of research questions to aid in the collection of information pertinent to these goals:

(1) What technological activities occurred at these sites, and what are the differences between Western Fluted and Western Stemmed occupations?

(2) What raw material provisioning strategies were employed at Western Fluted and Western Stemmed occupations?

(3) Did landscape use differ between Western Fluted and Western Stemmed occupations?

Chapter 2

Background

In this section I discuss the literature related to previous work done within Jakes Valley and the surrounding Great Basin. I describe environmental conditions in the Great Basin during the Pleistocene-Holocene transition to provide a context for what the earliest inhabitants may have had to deal with to survive. I also describe previous archaeological work conducted in the general area and within Jakes Valley using prehistoric, ethnographic, and historical documentation.

Environmental Setting

First I provide a general overview and context of the entire Great Basin during the Pleistocene-Holocene transition. This section covers paleoenvironmental changes in the Great Basin, including lacustrine resources and the flora and fauna available during this period.

The Great Basin

The Great Basin is located in the far western United States, covering much of Nevada, and extending into Oregon, California, Utah, Idaho, and Wyoming. It can be defined in different ways depending on specific criteria (see Figure 2.1). Grayson (1993) identifies four definitions: (1) hydrographic (Fremont 1845), covering ca. 165,000 square miles of internally draining land in the arid west, bounded to the west by the Sierra Nevada and southern Cascade mountain ranges, to the east by the Wasatch range, to the north by the Columbia River drainage and to the south by the Colorado River drainage; (2) physiographic (Hunt 1967), including wide desert valleys interrupted by often high mountain ranges (ca. 2,042-3,962 m above sea level) that trend roughly north-south and parallel each other, bounded similarly as the hydrographic Great Basin except that it extends further northwest and south; (3) floristic (Cronquist et al. 1972), marked by shadscale and sagebrush communities in the valleys , conifer woodlands on the slopes, and pine forests in the uplands (Minckley et al. 2004), bounded similarly to the east and west as the hydrographic Great Basin, but extending further north past the Snake River in Idaho; the southern boundary is located relatively far north of the Colorado River; and (4) ethnographic (d'Azevedo 1986), based on a culture area of pre-contact Native American groups with subsistence, sociopolitical, linguistic, and material similarities; the boundaries exceed all other Great Basin descriptions, extending into Colorado and north into Idaho and Wyoming.

The Pleistocene is defined as the geologic epoch that dates between about 2.5 million and 10,000 radiocarbon years ago ending with the transition into a warm interglacial epoch known as the Holocene, which we are presently in (Bowen 1978; Riser 2001; Walker 2005). The Terminal Pleistocene is here referred to as the period from 12,000 to 10,000 B.P. and the Earliest Holocene is the period from 10,000 to 8,000 B.P.

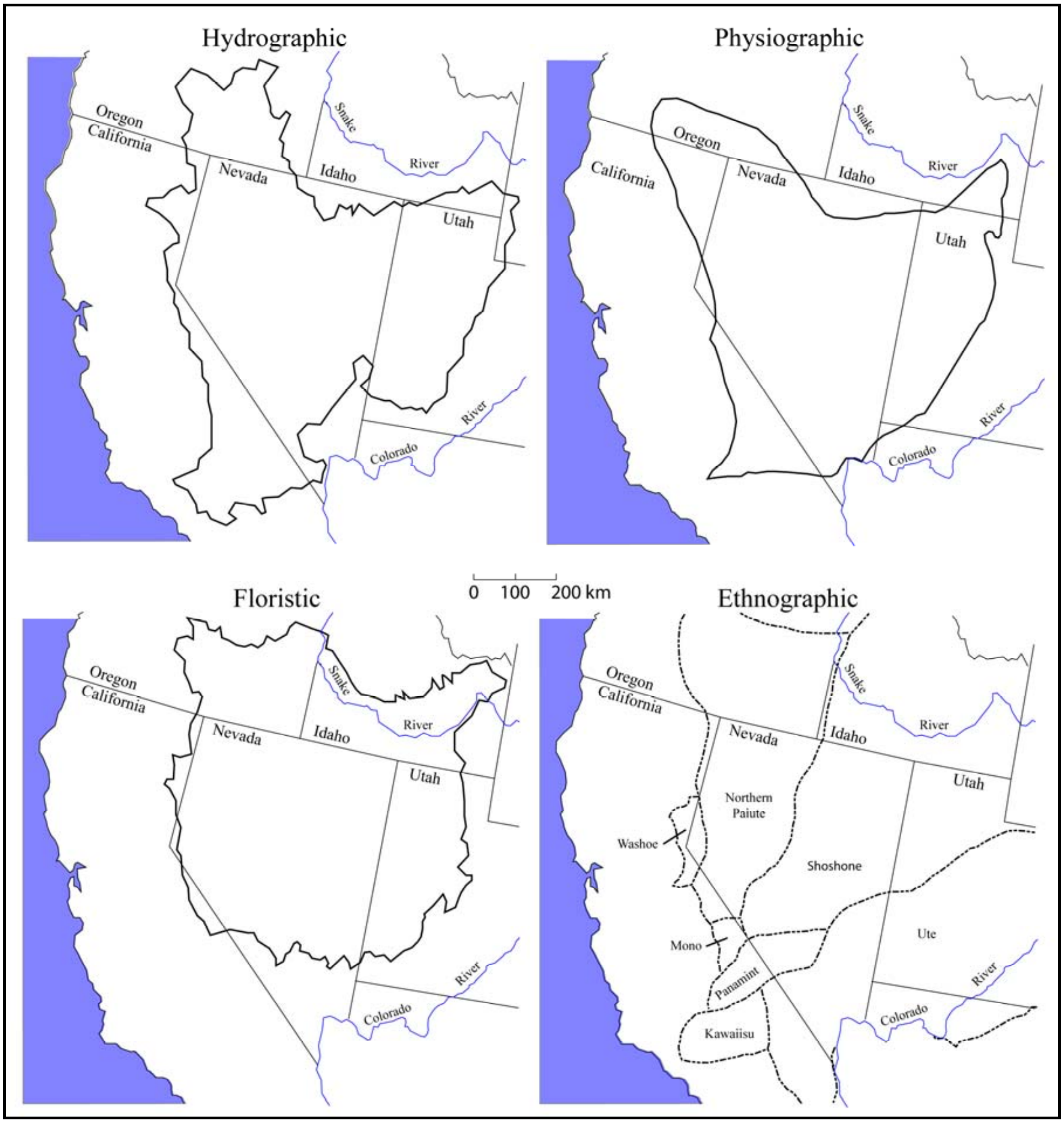


Figure 2.1. Four views of the Great Basin, (after Grayson 1993).

A distinctive attribute of the Pleistocene in the Great Basin is the appearance of pluvial lakes in many of the valleys between mountain ranges, formed by greater precipitation and lower evaporation than present conditions (Grayson 1993; Minckley et al. 2004). Pluvial lakes in the Great Basin grew in size due to their confined locations with little or no outlet for water runoff, and would either stabilize due to increased evaporation caused by increased lake surface area or spill over into adjacent valleys when water levels breached the appropriate mountain passes (Grayson 1993). Southward displacement of the polar jet stream caused by the existence of the Laurentide continental ice sheet ensured greater effective moisture as Pacific cyclonic storms were diverted across the Great Basin; along with increased cloud coverage and lower annual temperatures (up to 10-12° C), a result was the formation of pluvial lakes (COHMAP Members 1988; Grayson 1993; Huckleberry et al. 2001; Madsen 1999; Minckley et al. 2004).

Increased effective moisture allowed forests to move downslope as much as 1,000 m lower than present; however, they likely never reached basin floors (Minckley et al. 2004). Evidence of Pleistocene vegetation is provided from two main sources: pollen cores from lakes and macrofossil plant parts in packrat middens (Grayson 1993). Lake core pollen records must be taken with a grain of salt since airborne pollen can travel up to hundreds of miles from its source and settle in the lake, while tributaries can also carry pollen from a local setting often at higher elevations into the lake, each giving a false indication of non-local plant species (Grayson 1993). Despite this, pollen cores allow for the vegetation of a broad area to be analyzed within a long temporal period that can reveal continuous transitions in plant communities. Packrat middens are far more localized than pollen cores and much less continuous. These middens accumulate as packrats gather plant fragments from species growing within a limited range of a few hundred feet to build their nests (Grayson 1993). Once plant fragments are identified they can be radiocarbon dated to identify when each plant species survived near that particular midden at the given elevation (Grayson 1993).

After the Last Glacial Maximum (18,000 B.P.), the ice sheets began retreating, sea surface temperatures began to rise, and a greater contrast in seasonal temperatures occurred (Minckley et al. 2004). Desiccation began affecting pluvial lakes by 14,000 B.P. due to the northward migration of the polar jet stream caused by the shrinking of the ice sheets (Benson and Thompson 1987; COHMAP Members 1988; Wright 1991). By 12,000 B.P. the polar jet stream was near its present day location as the ice sheets continued to melt, resulting in decreased effective moisture in the Great Basin and increase in average annual temperatures (5-7° C lower than present), although a gradient existed with more moisture in the north and less in the south (COHMAP Members 1988; Madsen 1999; Minckley et al. 2004). Pine and conifer woodlands began retreating upslope following the moisture as the basin floors became dominated by sagebrush. Pluvial lake decrease resulted in the formation of marsh and shallow lake conditions that continued into the Early Holocene (Grayson 1993).

Elevation, temperature, and moisture throughout the Great Basin from north to south and east to west are highly variable and must be summarized by geographic divisions to show all the paleoenvironmental shifts from the Terminal Pleistocene to Earliest Holocene. These divisions are: (1) northern, the northwestern protrusion including parts of California, Oregon and Nevada; (2) southern, the Mojave Desert in southern California and Nevada; (3) eastern, the Bonneville Basin of western Utah and parts of eastern Nevada, and; (4) central, all other portions of central Nevada.

Northern. Less well known than other portions of the Great Basin, the northern division shows a continually changing mosaic of plants with spruce, juniper, and whitebark pine dominating the lower slopes intermixed with sagebrush and little evidence for limber pine at low elevations (Madsen 1999; Minckley et al. 2004). Pine retreated upslope during the Pleistocene-Holocene Transition and was replaced by juniper, sagebrush, and other mesic scrub species on the lower slopes with greasewood occurring along the valley margins (Madsen 1999).

Southern. During the full glacial at 19,000 B.P. packrat evidence shows the Mojave Desert was covered in shadscale, Joshua trees, Utah juniper, and Whipple yucca as low as 425 m above sea level (asl), and when combined with other data suggests a summer temperature possibly 7° C lower than present (Grayson 1993). Two thousand years later (from the same sample) the Joshua trees and juniper were gone, and today they are located at 1,219 and 1,829 m (respectively) suggesting a retreat upslope of up to 1,404 m (Grayson 1993). Recovered fauna from Pintwater Cave (pika, vole, and northern pocket gopher) suggest a cool, wet environment prior to 10,100 B.P., with increased warming from 10,100-9,000 B.P. based on the appearance of the desert kangaroo rat (Hockett 2000).

Eastern. Woodrat middens from the western margin of the Bonneville Basin indicate that below 2,012 m montane scrub vegetation consisting of sagebrush, snowberry, and currant with some juniper and ryegrass, existed from 14,000-13,000 B.P., whereas the eastern margin contained coniferous forests (Rhode and Madsen 1995). Between 13,000 and 11,000 B.P., limber pine, with spruce and juniper, descended to 1,798 m in the northern Bonneville Basin; at lower elevations juniper, sagebrush and other shrubs dominated, with shadscale appearing in only one sample older than 11,000 B.P. (Rhode and Madsen 1995). The presence of pika and cold freshwater fish—sucker, whitefish and large salmonid—in several of the middens at this time suggests a cooler temperature and large cold lake at low altitudes (Rhode and Madsen 1995). By 9,000 B.P. desert scrub vegetation of sagebrush and shadscale dominated the landscape once covered in pine and juniper (Rhode and Madsen 1995).

Central. Grayson (1993) notes that valley floors in the central Great Basin are much higher in elevation than around the periphery, allowing conifers to extend further down toward the valley floors, many of which contained pluvial lakes. Packrat middens from the Snake, Confusion, and Wah Wah ranges suggest that bristlecone pine, limber pine and juniper extended as low as 1,600 m until ca. 12,000 B.P.; a decrease in elevation between 609 to nearly 914 m. Understory plants of this subalpine coniferous zone included species that continue to occupy that elevation, including sagebrush, winterfat, mountain mahogany, and shadscale. Summer temperatures may have been as low as 8°-9° C lower than present. As temperatures rose at the end of the Pleistocene the conifers moved upslope and shadscale began to replace the sagebrush steppe across the valley floors.

In general, vegetation communities in the Great Basin during the Pleistocene were located much lower in elevation, with coniferous forests extending down towards the valley floors which were covered in a sagebrush steppe environment. As warming and drying continued towards the Terminal Pleistocene and into the Earliest Holocene, these vegetation communities retreated upslope allowing the desert scrub species seen today to fill the valley floors.

Fauna in the Great Basin during the Pleistocene include several now extinct mammals. As with archaeological deposits, dating faunal remains in the Great Basin is a problem due to the lack of buried sites. Taxa that have been identified include *Megalonyx, Nothrotheriops shastensis, Glossotherium, Brachyprotoma brevimala, Arctodus simus, Smilodon fatalis, Panthera leo, Miracinonyx trumani, Equus* sp., *Platygonus, Camelops hesternus, Hemiauchenia macrocephala, Capromeryx, Oreamnos harrington, Euceratherium, Bootherium bombifrons, Mammut americanum,* and *Mammuthus columbi* (Grayson 1993). Very few associations of humans and extinct Pleistocene mammals have been identified in the Great Basin, all of which are equivocal (Beck and Jones 1997). Bovid and camel hair dating to 10,840 and 12,060 B.P. (respectively) were identified in Smith Creek Cave that may be associated with Western Stemmed Tradition tools, although a date from the same level of 14,200 B.P. on artiodactyl hair was considered as too old and removed from consideration (Bryan 1988; Goebel et al. 2007). The Sunshine Locality yielded camel bones and artifacts from an alluvial deposit dating between 10,000 and 10,700 B.P., but the lack of cultural modification suggests humans and camels co-existed at this time without evidence of interaction such as hunting (Beck and Jones 1997; Huckleberry et al. 2001). Other faunal species that still exist in the Great Basin and that have been found at archaeological sites include mountain sheep, mule deer, pronghorn antelope, and numerous species of waterfowl, amphibians, and lizards (Beck and Jones 1997).

The Terminal Pleistocene saw increased warming and drying conditions around much of the northern hemisphere. In North America the spatial gap between the Laurentide and Cordilleran ice sheets continued to widen during this period. This warming trend was interrupted by a brief return to glacial conditions between 10,900 and 10,000 B.P., referred to in Europe as the Younger Dryas chronozone (Quade et al. 1998; Roberts 1998). A peak in "Black Mat" formation in the southern Great Basin coincides with the Younger Dryas cooling event and may be related (Quade et al. 1998). Black mats are organic layers produced by increased spring discharge occurring in lake, marsh, wet ground, and other poorly drained settings such as paleo-springs (Quade et al. 1998). Dated black mats in the southern Great Basin suggest that spring discharge was at its highest between 10,500 and 9,500 B.P., which correlates with the rise in lake level of the Bonneville Basin to the Gilbert shoreline at 10,300 B.P. (Oviatt et al. 2003) and the rise to the Russell shoreline in the Lahontan Basin between 11,100 and 10,000 B.P. (Adams et al. 2008; Madsen 1999), suggesting that pluvial lakes of the Great Basin were affected by this event (Grayson 1993; Quade et al. 1998). However, this increased moisture was too little, too late to restore the pluvial lakes. Today only 45 of the roughly 80 Pleistocene pluvial lakes still exist, representing approximately one eleventh of the total area once covered, and now they survive mainly around the periphery of the Great Basin near major mountain ranges (Grayson 1993; Minckley et al. 2004). The beginning of the Holocene coincides with a very abrupt transition to warmer temperatures at the end of the Younger Dryas, around 10,000 B.P. (Fiedel 2002; Madsen 1999; Roberts 1998).

Jakes Valley

Jakes Valley is a relatively small, narrow, and hydrologically-closed, oval-shaped valley located on the eastern edge of the central Great Basin, approximately 30 miles west of Ely, Nevada, in White Pine County (Figure 2.2). The basin has a high valley floor at 1,913 m asl (6,276 ft) and a basin area of approximately 1,039 km^2 that is bounded to the east by the Egan Range, to the west by the White Pine Range, to the north by the southern extension of the Butte Mountains, and to the south by a low, unnamed range. Peaks in these ranges vary from 2,347–3,275 m (7,700-10,745 ft) in elevation.

Figure 2.2. Overview of Jakes Valley facing northeast from approximately 2,164 m (7,100 ft) in elevation.

Permanent water in Jakes Valley is scarce, but several small, intermittent drainages and springs flow into the middle of the valley floor, including Illipah Creek from the north, and Hayden and Circle Wash from the southwest. Three man-made ponds are found in

Jakes Valley: Jakes and Waldy Pond towards the north end of the playa, and an impoundment of Circle Wash created by the Railroad Crossing Dam in the southern end of the playa. Climate in Jakes Valley is sub-arid with the majority of precipitation falling during spring and winter (Houghton et al. 1975). The majority of Jakes Valley rests in the Upper Sonoran life zone, with winterfat (*Eurotia lanata*) and big sagebrush (*Artemisia tridentata*) dominating the valley floor and slopes. Upper slopes and the surrounding hills and mountain ranges contain mixed pinyon-juniper woodland with Utah juniper (*Juniperus osteosperma*) and single-needle pinyon (*Pinus monophylla*) dominating (Polk 1982).

Like other valleys in the Great Basin, Jakes Valley was affected by the increased effective moisture brought about by the southward displacement of the polar jet stream during the Pleistocene allowing the formation of a small pluvial lake called Jakes Lake (COHMAP Members 1988; Mifflin and Wheat 1979). Although many pluvial lakes in the Great Basin were subject to groundwater levels in addition to the greater effective moisture, the high altitude of Jakes Valley likely precluded it from being affected, as the water table is now 120 m below the playa floor (Garcia and Stokes 2006). The highstand surface of pluvial Jakes Lake reached an altitude of 1,943 m, making it the fourth highest Pleistocene lake in the Great Basin, and it had a maximum surface area of 163 km^2 producing strongly developed shore lines that can be followed up to 5,000 m along the eastern, southern, and western edges of the valley as 1.5-3.0 m rises above the adjacent alluvial fan surfaces (Figure 2.3) (Mifflin and Wheat 1979; Garcia and Stokes 2006).

Two areas of beach ridges dissected by alluvial fans (Lincoln and Yamaha Fans) located on the eastern edge of the valley were studied by Garcia and Stokes (2006) to

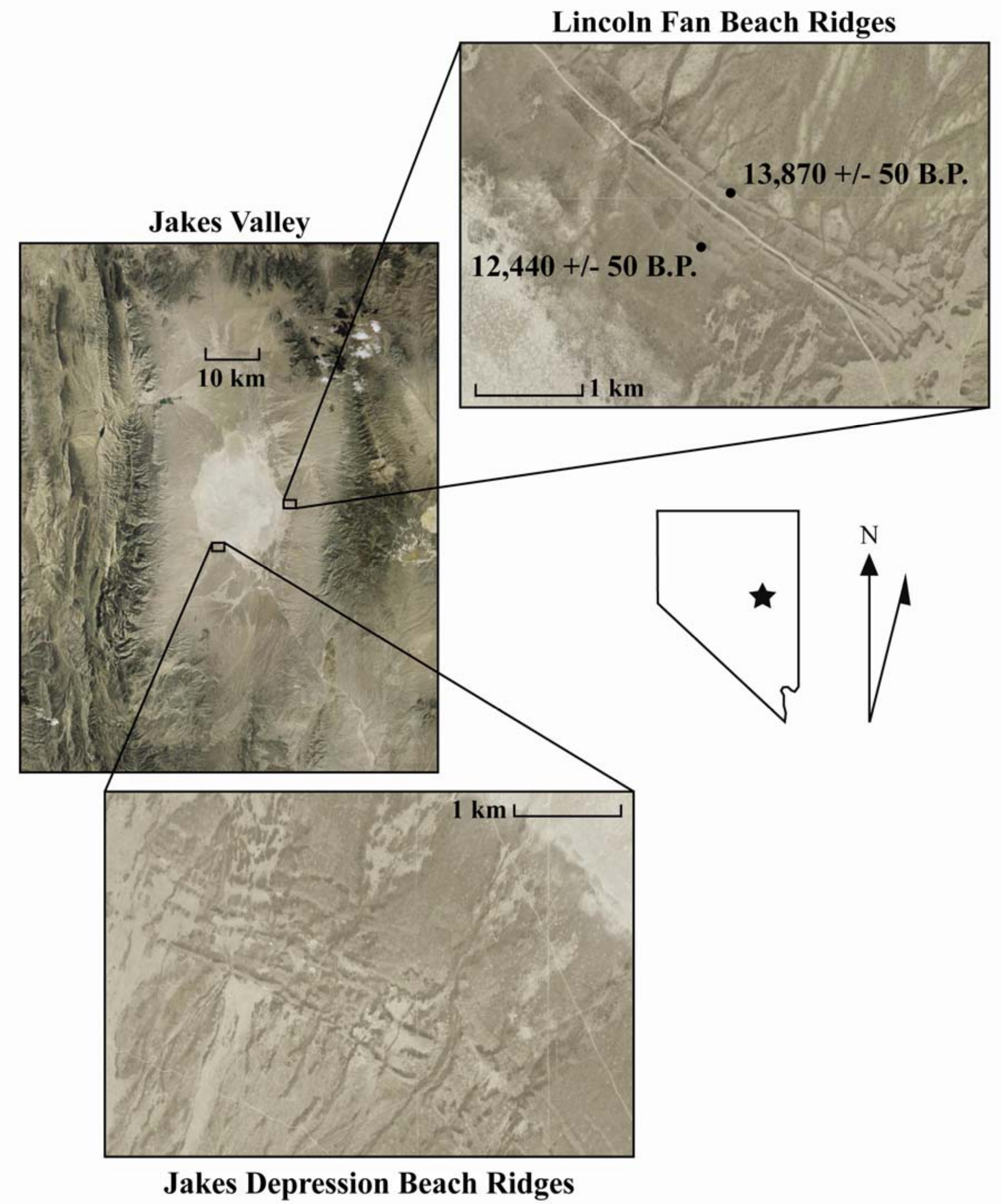


Figure 2.3. Locations of two areas of strongly developed shore lines and associated radiocarbon ages (dots) from Garcia and Stokes (2006) in Jakes Valley. Images modified from Google Earth v4.0.2416 (beta).

determine when Jakes Lake reached its maximum height. The highstand (1,943 m) of Jakes Lake was AMS radiocarbon dated at 13,870±50 B.P. by detrital gastropods and unnamed bi-valve mollusk shells from hand-dug pits in the beach ridges (Garcia and Stokes 2006). The middle and lowest beach ridges (at 1,940 m and 1,936 m) were dated at 13,510±40 B.P. and 12,440±50 B.P., respectively. These beach ridge formations are believed to represent lake standstills, after which Jakes Lake steadily receded until complete desiccation as the polar jet stream advanced too far northward to maintain a lake, beginning around 12,440±50 B.P. (Garcia and Stokes 2006).

Cultural Setting

To understand how the Jakes Valley assemblages fit into the generally accepted North American culture sequence it is necessary to detail a general Great Basin cultural context. The prehistoric, ethnographic, and historical data are summarized as relating to the central Great Basin, with examples from Jakes Valley. This thesis deals primarily with Paleoindian cultural remains, and thus my focus here is biased towards early North American inhabitants. Archaic period sites were encountered (and occasionally collected) during the 2003 and 2006 seasons but are less extensively described.

Prehistoric Record

Pre-Clovis. Numerous claims have been forwarded for ancient humans in the Great Basin. These claims almost always involve the apparent association of humans with extinct mammals (such as mammoth, horse, ground sloth, camel, and bison); for instance, the Tule Springs site in southern Nevada was claimed to date to greater than 28,000 B.P. (Harrington and Simpson 1961) based on a single obsidian flake, several “bone tools,” and reportedly burned remains of extinct animals. Extensive geologic trenching and profiling later disproved this 28,000 B.P. claim, showing that no cultural deposits clearly pre-dated 11,000 B.P. (Shutler 1967, 1968). Gypsum Cave appeared to contain numerous perishable artifacts, including atlatl darts, foreshafts, and torches embedded within giant ground sloth dung (Harrington 1933). Once the dung and dart shafts were independently dated, it was clear the darts were deposited over 7,000 years after the sloth dung (Heizer and Berger 1970). Other sites in the Great Basin and Far West have been cited as evidence for Pre-Clovis, but none have held up under intense scrutiny.

Recently a series of caves in the Northern Great Basin have received an enormous amount of national attention from the media and professionals alike. Paisley Five Mile Point Caves in southeastern Oregon were returned to by Jenkins (2007) in 2002-2003 to re-examine Luther Cressman’s (1942) claim of megafaunal remains as food for the first human occupants of the cave. However, during the excavations, Jenkins (2007) found something far more interesting: six coprolites containing human DNA that may date as early as 12,300 B.P. (Gilbert et al. 2008). This new finding is not without controversy, as detractors respond that (1) the coprolites also contain canid DNA, (2) possible DNA leaching may have occurred, (3) the deposits lack an assemblage of clearly associated artifacts, and (4) individual organic items within the coprolites may return different dates if they derive from a food chain affected by recycling dead carbon in the closed lake basin (Gary Haynes, personal communication 2008). It may be too early to say with any confidence that people were in the Great Basin a thousand years before Clovis, but if the Paisley evidence holds up to scrutiny, the timing of human presence of this area may have to be pushed back.

Paleoindian. The earliest unequivocal and widely accepted evidence for humans south of the Laurentide and Cordilleran ice sheets in the New World is that of Clovis fluted point assemblages (Kelly 2003; Tankersley 2004) found all across North America and even into portions of Central and South America (Jackson 2006; Morrow and Morrow 1999; Ranere 2006). The distinctive bifacial projectile point called the Clovis point is recognizable from its heavy lanceolate form and unique basal flute scar that extends from the base towards the tip, though never crossing the mid-point (Howard 1990). Recently, it has come to the attention of the archaeological community that many "fluted" points are in fact basally thinned, not fluted (Warren and Phagan 1988; Beck and Jones 1997; Beck et al. 2004; Musil 2004; Fagan 1975). This prompted Warren and Phagan (1988) to devise a set of criteria to define "fluting." True fluting is (1) produced by base-to-tip directed force; (2) extends at least 1/4 the length of the point; (3) extends at least 1/3 the width of the point; and (4) was produced relatively late in the production sequence, truncating at least some lateral edge scars (Warren and Phagan 1988:121). Throughout North America Clovis points have been dated between a fairly narrow window of 11,500 and 10,700 B.P. (corresponding to roughly 13,500 and 12,700 cal B.P.), although the extremes may not be reliable (Fiedel 1999, 2002; Kelly 2003; Taylor et al. 1996; but see Waters and Stafford 2007 for potential revised ages).

Morphologically similar projectile points have increasingly been recovered in the Great Basin and subsequently referred to as Clovis, implying a temporal relationship to the fluted points found in other parts of the country, which has yet to be demonstrated (Beck and Jones 1997). Tuohy (1974) refers to these points as Western Clovis, a cultural tradition uniquely adapted to Far Western environments. Pendleton (1979) combined all concave-based projectile points found together along ancient shorelines in the Great Basin into a category termed Great Basin Concave Base. This category lumps the fluted (Western Clovis) and unfluted (called Black Rock Concave Base by Clewlow [1968]) concave base projectile points that are assumed to date to the Paleoindian period. However, since true fluting is easily recognized using the key (Warren and Phagan 1988) and can help identify points that may be culturally separated in the Great Basin, I do not use the term Great Basin Concave Base in describing these projectile points, unless they are from collections outside my study area. I instead retain the terms 'Western Fluted' or 'fluted' to describe points that exhibit true flute scars found in the Far West. Using this term, however, does not imply that these hunter-gatherers were big-game specialists relying primarily on megafauna for subsistence, nor does it imply any cultural or temporal associations with other fluted points found throughout the Americas.

The prehistoric record of eastern Nevada in general, and Jakes Valley in particular, begins with the Paleoindian period (also referred to as the Pre-Archaic or Paleoarchaic). This period dates between roughly 11,000 B.P. and 8,000 B.P. (Beck and Jones 1997; Hockett et al. 2008; Madsen 2007; Pitblado 2003; Willig and Aikens 1988), and is distinguished by Western Fluted (WF) points and stemmed point varieties (i.e., Cougar Mountain, Haskett, Parman, Windust, Silver Lake, Lake Mohave, etc.) of the

Western Stemmed Tradition (WST) (Willig and Aikens 1988), as well as a general lack of groundstone. I use the term Paleoindian to refer to these types of assemblages, but recognize and separate the WF and WST traditions. It should be noted that while WF points in the Great Basin are not well dated, WST points have been found in many dated contexts and provide the range of dates (noted above) for this period.

The paucity of dated archaeological sites with fluted points in the Great Basin is not surprising considering the nature of the geological contexts in this area. Although fluted points have been found at all elevations within the Great Basin they are primarily located on or near ancient shoreline and beach features surrounding Pleistocene pluvial lakes (Beck and Jones 1997; Grayson 1993; Taylor 2002). These finds tend to be surface assemblages due to the low accumulation rate of sediment near lake shores after desiccation. Beck and Jones (1997) list five discoveries of buried fluted points. First, Bedwell (1973) reported a fluted point from the lower component at Fort Rock Cave. After further examination, Fagan (1975) concluded that it was a basally thinned preform. Second, Jennings (1957) reported that two fluted points from the lowest levels of Danger Cave were found in the 1940's by Elmer Smith of the University of Utah and subsequently lost before he excavated at the site (Grayson 1993). One was relocated in 1986, but it appears morphologically more similar to Folsom than Clovis. The lowest levels of Danger Cave have been dated to 10,080 B.P. (Madsen and Rhode 1990), a very late date for Clovis but near the end of the Folsom range of 10,900-10,200 B.P. (Beck and Jones 1997). Third, an undated fluted point fragment was recovered at the Old Humboldt site from deposits that predate the Mount Mazama eruption ca. 6,850 B.P. (Davis and Rusco 1987; Tuohy 1984). However, the dating is not specific to the artifact and represents only a limiting age. Fourth, a fluted point was recovered from the Henwood site in a level that produced radiocarbon dates of 8,470 and 4,360 B.P. (Douglas et al. 1988), both of which may be incorrect (Grayson 1993). Fifth, the Sunshine Locality produced a fluted point with a limiting radiocarbon date of 10,320 B.P. on materials 20 cm above the point (Jones et al. 1996). Based on this limited data set, fluted points in the Great Basin appear to date between roughly 10,300 and 8,500 B.P. These dates appear too young in age when compared to Clovis ages reported above, and if correct, suggest that fluted points occur much later in the Great Basin than elsewhere in North America.

Points from both of the WF and WST Paleoindian traditions are often found within the same assemblages and along the same geographic features (pluvial lake shorelines). This fact has led researchers to debate the cultural and temporal associations between the two traditions (Basgall and Hall 1991; Beck and Jones 1997). Occasionally, they are segregated at different elevations along the same geographic features (Campbell 1949; Willig 1988), suggesting that there may be temporal or cultural distinctions between them. Other than projectile points, Paleoindian site assemblages in the Great Basin may contain bifaces, end scrapers, side scrapers, knives, gravers, crescents, and other flake tools (Beck and Jones 1997).

The largest compilation and analysis of WF points in the Great Basin contains 221 fluted points that were studied by Taylor (2002, 2003). However, there are many more described in various publications (for instance, this report; Coffman and Noyes 2008; Rondeau and Coffman 2007). Many are found as isolates on the landscape, but there are several areas within the Great Basin and Far West that contain numerous fluted points. The Dietz site (35Lk1529) in the Northern Great Basin is a mixed component WF/WST site on the edge of Pluvial Lake Alkali in the Dietz Basin (Willig 1988). Willig (1988) reports the collection of 61 WF points or point fragments, 31 WST points or fragments, and five crescents. The WF and WST points at the Dietz site appear to be spatially separated, possibly representing fluctuations in lake level at the time of occupation (Willig 1988). Six fluted points and fluted point fragments have been recovered from the Sage Hen Gap site located in Oregon's Harney Basin (O'Grady et al. 2008). This site contains other aspects of fluted point culture including fluted bifaces, channel flakes, overshot flakes, and gravers as well as a stemmed point and a few Archaic dart and arrow points (O'Grady et al. 2008).

Other areas in the Great Basin that contain numerous WF points include Lake Tonopah, Long Valley, Mud Lake, China Lake, and the Mojave Desert. Lake Tonopah is located in Big Smokey Valley of southern Nevada and has produced at least 58 fluted points from over 70 sites (Tuohy 1988). These sites have also produced unfluted concave-based projectile points, various stemmed points, and later Archaic points. Many of these points come from private collectors such as P. Hutchinson and G. Noyes.

The Sunshine Well locality located on the margin of Pluvial Lake Hubbs in Long Valley, Nevada produced 20 WF points, 56 unfluted concave-based points, over 300 WST points, and 130 crescents (Hutchinson 1988). However, after re-analysis Rondeau (2006a) counted only 18 as meeting the criteria for true fluting. A large collection of fluted and unfluted projectile points from Mud Lake, southern Nevada, was analyzed by Rondeau and Coffman (2007) and Coffman and Noyes (2008). These points come from the Noyes collection and were found in several sites surrounding the pluvial lake.

China Lake, located in Indian Wells Valley, California, was extensively surveyed in 1969-74 by Emma Lou Davis (Basgall 2007a); her collections were reassessed in 2007, producing counts of 37 Great Basin Concave Base points, 44 Western Stemmed, and 41 crescents. Another 11 Great Basin Concave Base points (not distinguished as true fluted or basally thinned) were found at China Lake by Basgall (2007b). Willig (1991) reports 20 WF from China Lake. Fort Irwin in the Mojave Desert has yielded 17 WF points, five of which are classified as isolates, and 12 as coming from site contexts (Basgall and Hall 1991). WST points from Fort Irwin number 259, with only four coming from isolated contexts. These observations, along with raw material preference and number of points per site, led Basgall and Hall (1991) to conclude that different cultural systems were responsible for their manufacture and discard.

The Hell‘n Moriah Clovis site is one of the few single-component fluted-point sites in the eastern Great Basin (Davis et al. 1996). Consisting of two compete (though reworked) and five broken fluted points, this site appears to represent a retooling station located near the margin of a shrinking lake in Tule Valley formed after Lake Bonneville’s regression isolated it (Davis et al. 1996).

Outside the Great Basin proper, but still in the Far West, 49 WF projectile points and fragments were picked up by collectors along the south shore of Tulare Lake in the San Joaquin Valley, California (Wallace and Riddell 1988). WST points, crescents, Pinto points, and other Archaic forms were also found in the same area. Information regarding lithic analysis or spatial separation is minimal as the collectors did not keep detailed records. Borax Lake in California, also outside the Great Basin, has produced 20 WF points (Willig 1991).

It is believed that Paleoindians were highly mobile hunter-gatherers (Kelly and Todd 1988), and thus they would have needed a technology that would be useful for them as they made their seasonal rounds. During parts of their seasonal rounds, they probably expected to be in areas of unknown or poor quality toolstone. Because of this, Paleoindians would likely need a toolkit based on a highly flexible technology that could be transported easily, curated, and maintained using the minimal amount of raw material. Bifacial technology is the answer to this problem (Kelly and Todd 1988). According to Kelly (1988:719), bifaces can be manufactured for a number of roles within a cultural group: (1) as cores; (2) as long use-life tools which can be resharpened and reused if broken; and (3) as by-products of the shaping process, generally to fit a pre-existing haft.

Paleoindian tool assemblages appear to fit the all the roles described by Kelly (1988). A biface can be used as is or can provide reusable material in the form of flakes; both useable and flakeable types can carry a sharp and durable edge when manufactured from high quality raw material, which is known to be a main characteristic of Paleoindian assemblages (Kelly and Todd 1988). Toolstone sources utilized by Paleoindians have been documented more than 1,500 km from the location of the utilized tool (Tankersley 2004), but are generally within 100-300 km (Kelly and Todd 1988). Fluted points often show a high percentage of resharpening as do associated end scrapers suggesting the long use-life of tools possibly when toolstone is not abundant (Kelly and Todd 1988). All of these factors suggest that Paleoindians were highly mobile hunter-gatherers who needed a dependable and transportable stone tool technology. The near universal use of high quality raw material by Paleoindians suggests a functional need for durable and sharp tools. This is reflected in the long distances traveled to acquire suitable toolstone.

Fluted point sites in the Great Basin show the same characteristics in lithic selection and technology. High quality crypto-crystalline silicates and obsidians are the primary toolstone utilized in the manufacture of fluted points (Taylor 2002). In the east-central Great Basin, obsidian is very rare, which would have primarily restricted its use to formal tools and the debitage created by rejuvenation of such tools, which may show use-wear. The local toolstone in the region consists of various qualities of crypto-crystalline silicates (CCS) and a high amount of fine grained volcanic rock (FGV) which is also referred to as basalt, dacite, andesite, and rhyolite (Jones et al. 2003; Page 2007). These materials would logically form the majority of the informal tools found at Paleoindian sites, with bifaces and flake tools made of lower quality local materials. A relatively high proportion of bifaces should be found at these sites along with bifacial reduction flakes made on higher quality non-local toolstone. In contrast, in the northwest Great Basin where obsidian is of high quality and abundant, tool assemblages should contain both formal and informal tools made from the high quality toolstone. Non-local tools would likely be discarded near the quarries and replaced with the local higher quality raw material.

As stated above, Great Basin fluted points tend to be located around the margins of Pleistocene pluvial lakes, generally on ancient beach ridges and shoreline features. The general lack of fluted points found in caves and rockshelters in the Great Basin and elsewhere in North America may suggest that fluted point makers did not spend enough time in any one place long enough to become acquainted with unique local geological features (Kelly and Todd 1988).

Paleoindian sites in Jakes Valley tend to occur around the presumed Jakes Lake Pleistocene shoreline of 1,925-1,929 m, and rarely above it. At least one WST site (26Wp3808) has been found at an upper elevation around 2,040 m asl in the Egan Range, over 120 m above the playa. It can thus be argued that stemmed point makers utilized a larger range of environments than did fluted point makers, which are generally found only near the lakeshores (Grayson 1993). This may mean that stemmed point makers lived during a time when conditions were better suited for high elevation exploitation, such as the Early Holocene, rather than the Terminal Pleistocene when only the lake margins would have been productive (Grayson 1993).

Early Archaic. Following the Paleoindian period is the Archaic period, which has been subdivided here into Early, Middle, and Late sub-periods, and is associated with the Middle Holocene (8,000-5,000 B.P.), a very arid time in the Great Basin. The Early Archaic dates from 8,000-5,000 B.P. and is viewed as an adaptation to drying and warming conditions in the Great Basin and increased sedentism (Kelly 1997; Zeier 1981). Common projectile points associated with the Early Archaic include Large Side-notched (Northern Side-notched) and the Pinto series. These points are generally thought to be associated with the introduction of the atlatl around 8,500 B.P. and were used to tip darts, which were similar to, but larger than, arrows (Flenniken and Wilke 1989). Groundstone also occurs at a much higher frequency than in the Paleoindian period (Simms 2008). This is seen as an increased reliance on processing plant foods creating a more “broad spectrum” diet (Simms 2008).

Middle Archaic. The Middle Archaic dates to 5,000-1,300 B.P. (the Late Holocene) and is characterized by a general cooling with increased moisture in the Great

Basin and a return of populations after the drier Middle Holocene (Kelly 1997). This allows prehistoric people to exploit all major areas of the landscape (Simms 2008). It is during this period when diagnostic projectile points like Elko Corner-notched, Elko Eared, Gatecliff Split-stem, and Humboldt Concave-base types appear, also used as tips for atlatl darts. It has been noted that Elko points in the eastern Great Basin (from Danger and Hogup caves) may date to as early as 7,000 B.P. (Thomas 1981). If this is true, Elko points in this area overlap considerably with the Early Archaic period, and may have slowly diffused west into other areas of the Great Basin. Again, groundstone is common at Middle Archaic sites suggesting some reliance on processing plant foods, with increasing pinyon nut exploitation (Simms 2008).

Late Archaic. Corresponding to the Fremont period in some subregions, the Late Archaic (1,300-700 B.P.) is characterized by horticultural groups subsisting on maize and other plant foods in the eastern Great Basin (Kelly 1997; Simms 2008; Zeier 1981) and continued hunting and gathering elsewhere (Simms 2008), such as in the vicinity of the Jakes Valley study area (Beck and Jones 2008; Madsen and Simms 1998). Population growth in the eastern Great Basin lead to increasingly sedentary populations aggregated in lowland villages (Simms 2008). Late Archaic material culture contains two types of diagnostic points, Rose Spring Corner-notched and Eastgate points (which are basally notched). These point types are believed to represent the shift to bow and arrow technology, based on the decreased hafting width (Thomas 1981). Thomas (1981) notes that these two point types may represent a single tradition, called Rosegate. However, in this thesis I separate them as two different styles that date to the same period. Distinctive Grayware pottery is also a common characteristic of Fremont sites (Simms 2008) but was not used to a high degree within most areas of the Great Basin (Grayson 1993). No pottery was found during the project described in this thesis.

Late Prehistoric. The Late Prehistoric or Proto-Historic period in the Central Great Basin dates from 700 B.P. to European contact (Grayson 1993). Referred to as the time of Numic language expansion (Beck and Jones 2008a; Bettinger and Baumhoff 1982), it is thought that pre-existing Archaic and Fremont groups were either displaced, replaced, or assimilated within a short period of time by incoming peoples (Kelly 1997). Numic groups placed high importance on gathering and storing pinyon pine nuts, with less emphasis on hunting (Simms 2008; Zeier 1981). Characterized by Desert Side-notched and Cottonwood Triangular points (Simms 2008), the Proto-Historic period in Jakes Valley is not well represented.

Ethnographic Record

The ethnographic record in Jakes Valley is very slim. It was probably not a very hospitable place to live after Jakes Lake disappeared; Illipah Creek was the main source of water, with several other smaller ephemeral streams in the valley. Steward (1938: 147) noted that little is known of Jakes Valley, and mentions that it likely contained few inhabitants, although at least two chiefs are mentioned as living in the surrounding areas. White Pine County was inhabited mostly by the Central Numic, or Shoshonean speakers (Zeier 1981). Hunting of large and small game was less important to these groups than gathering of plant resources (Thomas et al. 1986; Zeier 1981). Pinyon pine nuts were very important during the fall and winter months, often stored near the locations of procurement, which were marked by circular rock cairns (Steward 1938; Zeier 1981).

Historical Record

Like the ethnographic record, the historical background of Jakes Valley is also poorly known. The valley is named after Jake Medzgar ('Dutch Jake') who was one of the earliest white inhabitants (Frederick 2003; Polk 1982). He settled a ranch in the northwestern portion of the valley, south of what is now Highway 50. This ranch was later bought by former Confederate Army Captain William C. Moorman, for whom Moorman Ridge in the White Pine Range is named (Carlson 1974), towards the end of the 1800's and made into a successful operation. This ranch diverts Illipah Creek (from the Shoshone "illa" [rock] and "pah" [water] [Frederick 2003]) using it for irrigation and to fill cattle stock ponds in the center of Jakes Valley. A post office was established on the ranch in 1898 by Moorman's wife, Pearl, but closed 15 years later in 1913 (Frederick 2003). The current foreman is Richard Crossley, and the ranch is now called Dickinson Ranch (Polk 1982). In the southern end of Jakes Valley is another ranch owned by the Gardiners who herd their cattle into the valley to graze (Polk 1982).

Previous Research

A review of Ely District Bureau of Land Management (BLM) site files and survey parcels in the area revealed that numerous pipe line and seismic test line surveys have been conducted in Jakes Valley, with relatively few large-scale block surveys. In general, it seems that few sites have been recorded, most of which are small temporary camps or isolates.

Roughly 1,360 acres were surveyed in Jakes Valley as part of the MX-Missile System survey that tested 22 Nevada valleys (Busby and Kobori 1980). Twenty-four sites (including isolates) were recorded during the project, 21 of which are located near (but not within) my project area (including an isolated find consisting of a WF point fragment [26Wp1097i] and an isolate that may be a stemmed point base [26Wp2004i] but cannot be substantiated). The survey results indicated that 65% of sites were located within 100 m of intermittent streams, while no sites were found near permanent water sources. In addition, the results also suggest an increased use of land as distance from the center of the valley increases, with the highest concentration of sites in the pinyon-juniper and pinyon-juniper/desert shrub vegetation zones and the lowest in the desert shrub vegetation zone. Busby and Kobori (1980) concluded, based on the present environment, that intermittent and areal resources (water, vegetation, and FGV) are responsible for the site distribution pattern. They found no indication of long term occupation within the valley, suggesting that the lack of permanent water limited the extent of occupation possible. However, the large number of sites found in my project on and adjacent to the valley floor in the sagebrush zone, and the large extent of the Jakes Depression site (CRNV-046-7721), seem to contradict Busby and Kobori's (1980) conclusions.

Intermountain Research conducted survey in Jakes and five other valleys as part of a siting location project for a coal burning power plant for White Pine County (Zeier 1981; James and Zeier 1981). They sampled 12.1% of the siting location area, on and adjacent to the northern section of the playa in Jakes Valley. Fifteen prehistoric sites were located; three of them contain Pre-Archaic (Paleoindian) components (26Wp1167, 1177 and 1178) including stemmed points, and three others (26Wp1168, 1179, 1180) appear to be Archaic in age; the remaining nine sites are non-diagnostic lithic scatters or isolates (James and Zeier 1981). Intermountain Research identified three site types: base camps, field camps, and task sites, implying a diversified and full use of the general area throughout the prehistory of the Valley (James and Zeier 1981). Site locations increased in frequency and age further from the valley floor. James and Zeier (1981) suggest that this may be due to differential use of the valley, a change in ecological setting, or to the greater amount of Holocene deposition possibly burying older sites. Five sites recorded during this project are within my project's boundaries (26Wp1173, 1174, 1175, 1177 and 1181). They were re-visited and re-recorded during my project.

Four-hundred-seventeen acres were surveyed as part of a seismic line project conducted in Jakes Valley in 1982 (Polk 1982). A 30 m-wide corridor was surveyed using a single transect, with special attention paid to unusual landforms such as edges of washes, gravel ridges, and prominences. Seven prehistoric sites (one small lithic scatter, two moderate-sized lithic scatters, and four isolated finds) and several historic water canals were located during the line survey. The largest documented site (26Wp1605 or CRNV-046-1844) was a Pre-Archaic (Paleoindian) processing site composed of stemmed points and fragments, a fluted point, cores, knives, other tools and small amounts of debitage. Many of the tools were collected and are now housed at the Nevada State Museum. According to the original site placements, 26Wp1605 appears just to the southeast of the Jakes Depression site (CRNV-046-7721) (Polk 1982; Vierra and McQueen 2000).

A similar seismic line project was conducted in Jakes Valley in 1986 covering about 40 linear km in a 30 m-wide zig-zag transect (Price 1986a). The project located seven archaeological sites (two isolated prehistoric finds, three small lithic scatters, one isolated historic can, and one segment of a historic water canal). None of the newly recorded sites were determined eligible for the National Register of Historic Places. Two previously recorded sites were revisited during this project, including the Pre-Archaic (Paleoindian) site CRNV-046-1844 (26Wp1605).

A two week-long field school sponsored by the Sundance Archaeological Research Fund (SARF) at the University of Nevada, Reno was conducted in Jakes Valley during the summer of 2003 under the direction of Ted Goebel and Kelly Graf. Goals of the field school included test trenching the Jakes Depression site, surveying areas around the assumed lake level at the time of Paleoindian occupation for archaeological sites dating to the Pleistocene-Holocene Transition, and to map and collect any such located sites. The field school intensively surveyed 879 acres using non-probabilistic block survey and recorded 22 new archaeological sites and 27 isolated finds, and re-recorded two archaeological sites (encompassing three previously recorded sites) (Estes and Goebel 2007). Of the 24 archaeological sites recorded in 2003, seven were single-component Paleoindian sites and three were multi-component sites with diagnostic Paleoindian artifacts (Estes and Goebel 2007). These sites were included in this study.

In addition to the five sites re-recorded from the Intermountain Research project, another three sites from a separate project (CRR-04-740 [P]) were re-recorded (BLM temporary site numbers CRNV-046-3872, 3873, and 3875; 26Wp4547, 4548, and 4549). These eight previously recorded sites were revisited and re-recorded during this project, and are now combined into six SARF recorded sites (there were two instances where two previous sites were combined [26Wp1173 and 26Wp4549 are now combined; as are 26Wp1174 and 26Wp4547]). Exact locations of the previously recorded sites are not well known. All eight sites were recorded during the early to mid 1980's, when GPS technology and UTM's were not relied upon for accurate site recordation. Site mapping consisted of placing dots on 15' topographic maps at approximated locations. Often, these locations disagree with the Legal Descriptions of the sites location on the field site form. These, in turn, disagree with the UTM's provided on the field site form. And, again, these three locations do not match the records found at the Ely District BLM Field Office, which uses 7.5' quadrangle maps to document site locations and survey parcels translated from the original maps provided in the project report (often 15' maps).

With all the aforementioned discrepancies in site locations, identifying the "correct" site location seems impossible. To maintain consistency, the original site placement on the original 15' quad maps provided with each original field site form were used as the most accurate or "correct" location. These locations were then transferred to an identical 15' topographic map (Reipetown, NV [1959] or Illipah, NV [1951]) with accurate NAD27 UTM lines. The NAD27 UTM's were then identified and recorded using a 1:62,500 meter scale. The site locations, now recorded in NAD27 UTM's, were then plotted on 7.5' quad maps along with the new archaeological sites recorded by SARF in 2003 and 2006 as part of the current project.

Once this method was applied, eight previously recorded archaeological sites overlapped with six new SARF documented sites. Three other previously recorded sites (BLM temporary site numbers CRNV-046-1846, 1847, and 1848 from Polk [1982] CRR-04-513[P]) appeared to be located within two other SARF recorded sites using the original site descriptions and Ely BLM maps; however, after use of the method outlined above, they were found to be located some distance away. I believe this to be accurate in this particular instance since the SARF recorded sites in which these three previously recorded sites (isolated finds of a scraper, and biface fragment, and flake) would have been located is a very dense lithic scatter with numerous diagnostic tools, and found on hard desert pavement, which affords reasonably good visibility. It seems unlikely that this very large and densely populated archaeological site would have gone unnoticed (save for three artifacts) if it were traversed.

Chapter 3

Methodology

A brief discussion of procedures followed is warranted at this point. In this chapter I outline the steps followed before, during, and after fieldwork was conducted in Jakes Valley. Prior to fieldwork, a records search was completed at the Ely District BLM Field Office in Ely, NV. Subsequent visits were made after fieldwork to compare and update survey maps and site forms and obtain a more complete records search. I also describe field strategies and methods for collecting. Finally, I define the methods and analyses used on the collected materials.

Records Search

Prior to any fieldwork conducted in the United States, a records search should be completed. This vital step helps the researcher understand what areas have previously been surveyed, where previously discovered archaeological sites are located, and conditions to expect during fieldwork. In this case, it also provided a chance to meet and greet the Ely BLM archaeologists and pick their brains about the immediate area. Jakes Valley was also inspected during this time to identify potential areas to conduct survey and to get acquainted with the road system throughout the valley. Three nights were spent camping within and near Jakes Valley. Portions of the White Pine and Egan mountain ranges were inspected along with dry washes in an attempt to identify potential raw material sources. However, this exercise ended unsuccessfully. Following this failed attempt, it was determined that a better use of this limited time would be spent on the valley floor and adjacent alluvial fans and beach ridges identifying likely locations of Paleoindian camps.

Ely BLM survey maps were reviewed in the office and parcels were copied onto field maps that were to be used during the current project. Known sites were also drawn in their approximate locations to be cognizant of when conducting survey in adjacent areas. Copies of site forms were made and carried with the crew during survey for review if questions arose about the location of materials found at previously located sites.

Field Strategies

Fieldwork was conducted in Jakes Valley June 19-28, 2006, and again July 31-August 9, 2006. Small campsites were set up on BLM land to furnish the field crew with a place to eat and sleep. During the evenings I planned and coordinated the following day's field strategies and objectives.

Non-probabilistic pedestrian survey was conducted at 30-m intervals following either an east-west or north-south bearing using a compass and hand-held GPS units set to the NAD27 datum. The majority of fieldwork took place between 1926 and 1929 m (6,320 and 6,330 feet) in elevation, the assumed Pleistocene margin of Jakes Lake. Fieldwork also concentrated on distributaries of major streams that would have flowed into the pluvial lake during the Pleistocene-Holocene Transition. These distributaries include Illipah Creek in the north and Circle Wash in the south. In addition, two sets of beach ridge formations and alluvial fans noted by Garcia and Stokes (2006) were surveyed in an attempt to discern whether early cultural materials would be observed.

In total, ten parcels were subjected to non-probabilistic pedestrian block survey (see Figure 3.1).

Limestone Peak Parcel 1 is located on the southwest edge of the playa and adjacent alluvium in Jakes Valley. Block survey was conducted on an east-west bearing covering 137 acres.

Limestone Peak Parcel 2 is located further south of Limestone Peak Parcel 1 and is slightly higher on the alluvium surrounding the playa. Block survey was conducted on a north-south bearing covering 137 acres.

Railroad Crossing Dam Parcel 1 is located on the southern edge of the playa and adjacent alluvium in Jakes Valley and just north of Railroad Crossing Dam and encompasses the central portion of Circle Wash. Block survey was conducted on an east-west bearing covering 393 acres.

Railroad Crossing Dam Parcel 2 is located about 700 m north of Railroad Crossing Dam Parcel 1 and is situated on the compact floor of the southern portion of the playa and encompasses the northern portions of Circle Wash. Block survey was conducted on an east-west bearing covering 200 acres.

Yamaha Fan Parcel is an alluvial fan located northwest of the Railroad Crossing Dam Parcels just off the southeastern edge of the playa and situated on about six distinct beach ridges, portions of which have been truncated by the Yamaha Fan identified by

Garcia and Stokes (2006). Block survey was conducted on a north-south bearing covering 230 acres.

Lincoln Fan Parcel is an alluvial fan located north of the Yamaha Fan Parcel that consists of about six distinct beach ridges, portions of which have been truncated by the Lincoln Fan identified by Garcia and Stokes (2006). Block survey was conducted on a north-south bearing covering 230 acres.

Illipah Parcel is located in the northwestern edge of the playa and situated primarily on alluvium just west of Waldy Pond and east of Jakes Pond. Block survey was conducted on an east-west and north-south bearing covering 304 acres.

Waldy Pond Parcel is located east of the Illipah Parcel and consists of the areas immediately adjacent to the southwest of Waldy Pond situated on the playa on adjacent alluvium in the northern portion of the playa and encompasses the southern portion of Illipah Creek. Block survey was conducted on an east-west bearing covering 226 acres.

North Illipah Creek Parcel 1 is located about two km north of the Waldy Pond Parcel and encompasses a small portion of Illipah Creek and adjacent areas of alluvium. Block survey was conducted on a north-south bearing covering 302 acres.

North Illipah Creek Parcel 2 is located about one km north of the North Illipah Creek Parcel 1 and covers and encompasses a small portion of Illipah Creek and adjacent areas of alluvium. Block survey was conducted on a north-south bearing covering 302 acres.

Upon identification of any culturally created artifact, field crews would intensively survey the immediate and surrounding area for additional artifacts. Five or more obvious artifacts identified within a discrete area (200 m^2) were labeled a “site”.

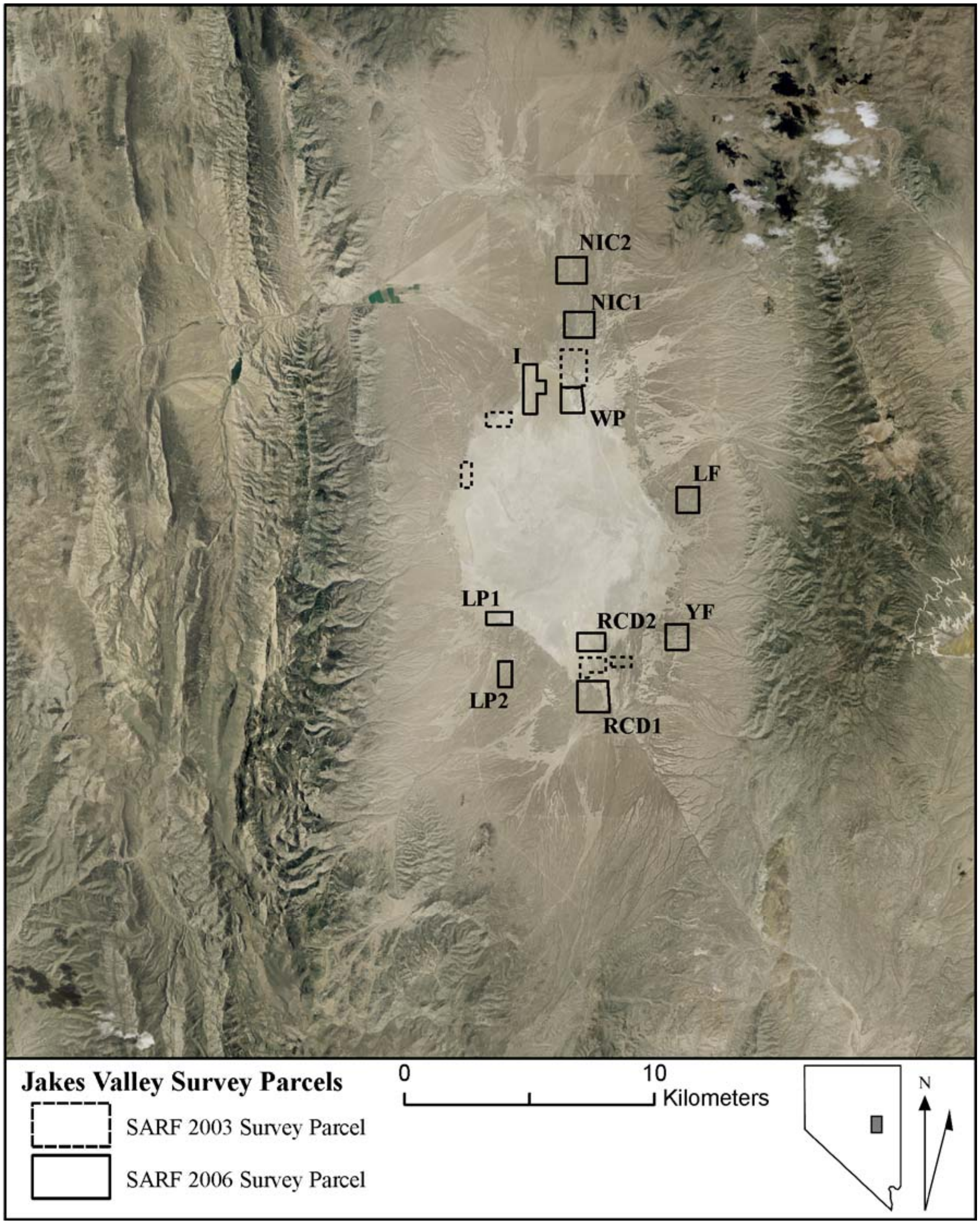


Figure 3.1. Jakes Valley survey parcels, 2003 and 2006. LP=Limestone Peak parcels, RCD=Railroad Crossing Dam parcels, YF=Yamaha Fan parcel, LF=Lincoln Fan parcel, I=Illipah parcel, WP=Waldy Pond parcel, NIC=North Illipah Creek parcels. Adapted from National Agriculture Imagery Program 2006: http://keck.library.unr.edu/data/naips/naips.htm.

Fewer than five artifacts were identified as an "Isolated Find". Once encountered, archaeological sites were recorded using the Intermountain Antiquities Computer System (IMACS) recording forms, mapped with a hand-held GPS unit, photographed with a digital and 35-mm camera, and occasionally interesting or unique artifacts were sketched. Photograph originals are housed at the UNR prehistoric laboratory and will be accessioned with the collections upon completion of this project. Site boundaries, tools, and occasionally flakes were recorded using a Garmin GPS III hand-held unit set to the NAD27 datum.

Paleoindian archaeological sites were identified if they contained diagnostic fluted (Western Fluted) or non-fluted (Black Rock Concave Base) concave-based lanceolate projectile points, Western Stemmed Tradition projectile points, or crescents. These sites were collected either in their entirety, or sampled: tools and a sample of debitage were collected, depending on site size. All single-component Paleoindian sites less than 20,000 m^2 were completely collected. Larger single component sites were sampled: all formal tools were collected with block samples for debitage collection. Multi-component Paleoindian sites were also sampled: identifiable diagnostic Paleoindian tools were collected, while debitage was collected only if clear Paleoindian work areas could be identified. Later Period (Early Archaic thru Protohistoric) or non-diagnostic archaeological sites were recorded using the methods outlined above, but were not collected. Paleoindian Isolated Finds were also collected. No subsurface testing was conducted during this project.

Laboratory Analysis

After fieldwork was completed, collections were brought to the UNR prehistoric laboratory for cleaning and cataloguing. Artifacts were assigned accession numbers then cleaned using sterile water and a soft bristle brush, and left out for drying. The analysis performed includes basic metric measurements (including maximum length, maximum width, and maximum thickness, recorded to the nearest mm using sliding calipers, and weight to the nearest tenth of a gram using a digital scale) and non-metric attributes. Data were recorded into a Microsoft Excel spreadsheet that I designed for use on Paleoindian artifacts. These data were then entered into spreadsheets in SPSS v. 12 for statistical analysis.

Additional variables of morphological, typological, and metric units were applied to various tool classes and debitage. Statistical analyses including inter- and intra-site ratios were applied to the collections to compare occurrences of tool classes (e.g., formal vs. informal tools) and identify organization of technology. Flaked stone tools were categorized using a key for Great Basin Paleoindian tool types developed for SARF investigations. These categories are described below.

Lithic Raw Material

Each artifact was first categorized by lithic raw material. The materials consist of: (1) crypto-crystalline silicates (CCS), a widely encompassing category that includes chert, flint, agate, chalcedony, and jasper, among others; (2) obsidian, volcanic glass that can vary in opacity and color; (3) fine grained volcanics (FGV), another encompassing category that includes basalt, andesite, rhyolite, and dacite; and (4) quartzite, a coarse-grained material that often appears “sugary” in texture. Samples of obsidian and FGV were analyzed using X-ray fluorescence (XRF), a geochemical technique, to further identify their individual sources of origin.

Debitage Analysis

Debitage is here defined as all unmodified pieces of lithic material detached during the reduction process, and which includes spall, flakes, retouch chips, biface thinning flakes, and angular shatter among others. The methods used to analyze debitage follow largely from Andrefsky (2005) and a debitage key developed for SARF investigations. The following descriptions outline the attributes recorded for each flake and the typology used to identify debitage.

Maximum Length. The straight line distance from the proximal to the most remote distal point on the piece of debitage, measured using sliding calipers to the nearest millimeter (mm).

Maximum Width. The widest straight line distance perpendicular to the maximum length line, measured using sliding calipers to the nearest millimeter (mm).

Maximum Thickness. The thickest location measured from dorsal to ventral face perpendicular to the maximum length line, measured using sliding calipers to the nearest millimeter (mm).

Weight. The weight of the piece of debitage to the nearest tenth of a gram (g) using a digital scale. Specimens with weights appearing as 0.0 g on the digital scale (the lowest possible measurement is 0.1 g) were given a weight of 0.1 g for analytical purposes and statistical comparisons.

Size Value. The relative size of a piece of debitage using a scale with four concentric circle size categories: (1) very small (≤ 1 cm^2); (2) small (>1 and <3 cm^2); (3) medium (>3 and <5 cm^2); and (4) large (≥ 5 cm^2).

Striking Platform Preparation. The specific type of platform noted on each piece of debitage using four categories: (1) unidentifiable/broken, no striking platform is observable; (2) cortical, a striking platform with an unmodified cortical surface; (3) smooth, a striking platform with a flat surface; and (4) complex, a striking platform with a surface possessing multiple flake scars

Amount of Cortex. The approximate percent of cortex on the dorsal face of the piece of debitage scored using three categories: (1) 0%; (2) less than 50%; and (3) more than 50%.

After scoring the morphological and metric variables for each of the above attributes, debitage was then placed into one of the following typological categories:

Primary Cortical Spall. A piece of debitage that exhibits greater than 50% cortex on the dorsal face.

Secondary Cortical Spall. A piece of debitage that exhibits cortex on its dorsal face, but less than 50%.

Cortical Spall Fragment. A piece of debitage with no striking platform that exhibits any amount of cortex on its dorsal face.

Flake. A piece of debitage that has an intact smooth (single-faceted) striking platform, no cortex, and is >1 cm^2.

Flake Fragment. A piece of debitage that is missing the striking platform and often the bulb of percussion, with no cortex, that is >1 cm^2.

Retouch Chip. A very small piece of debitage (≤1 cm^2) that exhibits a smooth platform and no cortex.

Retouch Chip Fragment. A very small piece of debitage (≤1 cm^2) that is missing the striking platform and exhibits no cortex.

Biface Thinning Flake. A piece of debitage of variable size that exhibits a complex (multi-faceted) striking platform that is often "lipped" and exhibits no cortex.

Overshot Flake. A piece of debitage that traveled across one face of a biface/core and possesses both lateral edge margins.

Angular Shatter. An angular piece of debitage that exhibits no properties that could distinguish it as flake, such as obvious dorsal or ventral faces, a platform, bulb of percussion, ripple marks, or cortex.

Core Analysis

Cores have been defined as "…objective pieces which are primarily used as sources of raw material" (Andrefsky 2005:144). The following discussion lists the metric and non-metric attributes and variables measured for each core recovered from Jakes Valley.

Maximum Linear Dimension. The longest dimension (cm) measured on the core using sliding calipers.

Weight. The weight of the core (g) measured on a digital scale.

Size Value. The value obtained by multiplying the maximum linear dimension by the core weight. This value is used to compare cores of varying shapes and sizes by reducing inter-observer error when measuring dimensions like thickness, length, and width of cores (Andrefsky 2005).

Number of Detachment Scars. The number of negative flake removal scars on the core.

Surface Platform Preparation. The specific type of platform noted on each detachment scar using five categories: (1) unidentifiable/broken, no striking platform is observable; (2) cortical, a striking platform with an unmodified cortical surface; (3) smooth, a striking platform with a flat surface; (4) complex, a striking platform with a surface possessing multiple flake scars; and (5) abraded, a striking platform surface that exhibits intentional scratching or other signs of abrasion.

Number of Fronts. The number of faces on the core that have had flakes removed from them.

Amount of Cortex. The approximate percent of cortex on the core, scored using three categories: (1) 0%; (2) less than 50%; and (3) greater than 50%.

After scoring the above metric and non-metric attributes the core was given a typological classification. The definitions of each core type are as follows.

Indeterminate Core Fragment. A core fragment of such small proportions that identification of typological classification is impossible.

Unidirectional. A core with flakes removed from a single platform and traveling in the same direction.

Multidirectional. A core with multiple platforms and flake removals traveling in at least two directions.

Blocky. A blocky core consists of a thick chunk of raw material that is roughly cubed in shape.

Bipolar. A core smashed apart using a hammer and anvil technique and showing two platforms on opposite edges with reduced bulbs of percussion.

Tested Cobble. A core that generally has only a few flake removals, likely the result of testing its quality and suitability for knapping.

Split Cobble. A cobble that was likely broken open to test its quality and suitability for knapping. Split cobbles do not exhibit any properties other than the initial testing break.

Chipped Stone Tool Analysis

Jakes Valley tool assemblages were characterized using a tool typology developed for use on Great Basin Paleoindian artifacts for SARF investigations. Metric and non-metric attributes were scored for each specimen. Bifaces are here defined as pieces with two faces that have been flaked and meet to form a single edge around the entire artifact (Andrefsky 2005) and were grouped into two classes: hafted and unhafted, depending on the presence or absence of a hafting element. Unifaces are here defined as tools with flaking on a single face, and were grouped into a variety of tool classes based on their morphological and metric attributes. The classes used in this typology are defined below along with the types that fit within each class.

Hafted Biface. Hafted bifaces are described as any biface or biface fragment that possesses a hafting element (stem, notches, edge-grinding, shoulders, etc.) and a blade. The hafting element would have been attached to a shaft and the blade used as a cutting or piercing tool. Hafted bifaces are often referred to as “projectile points” as researchers assume they would likely have been used to hunt prey as a hand thrown spear, thrown with an atlatl, or with the use of a bow (Musil 1988; Hughes 1998; Flenniken and Wilke 1989; Thomas 1978, 1981).

Unhafted Biface. Unhafted bifaces are described as any biface or biface fragment that does not possess a hafting element.

Side Scraper. A side scraper is generally a unifacial tool with steep, invasive retouch along at least one lateral margin. Side scrapers are generally manufactured on flakes.

End Scraper. An end scraper is generally a unifacial tool with steep, invasive retouch along the distal margin. End scrapers are generally manufactured on flakes.

Graver. Gravers are described as unifacial or bifacial tools with one or more intentionally manufactured spurs.

Backed Knife. A backed knife is a tool that exhibits steep retouch, dulling, edge-grinding, or cortex to “back” one lateral edge, while the opposing edge will show use-wear or retouch creating a sharp edge used for cutting.

Notch. A notch is a unifacial or bifacial tool that has at least one intentionally flaked concavity.

Denticulate. A denticulate is a unifacial or bifacial tool with intentionally manufactured saw-like teeth on at least one margin.

Burin. A burin is an intentionally manufactured chisel-like tool with two flakes removed at right angles to create a sharp and durable edge.

Retouched Flake. Retouched flakes (also called utilized flakes) are complete or fragmented flakes intentionally modified through use or retouch on one or more edges.

Combination Tool. A combination tool is any tool that exhibits two or more characteristics of the previously defined tool classes on a single specimen.

The Jakes Valley hafted bifaces were further typed into recognized Paleoindian (a.k.a. Paleoarchaic and Pre-Archaic) period projectile point types when sufficient information could be gathered from the specimen. These point types include the previously defined Western Fluted, Black Rock Concave Base, Cougar Mountain, Parman, Haskett, Silver Lake, Lake Mohave, and Windust (Amsden 1937; Butler 1965; Clewlow 1968; Layton 1970, 1972a, 1979; Leonardy and Rice 1970; Tuohy 1974a;). Crescents are also included in the hafted biface section. Following Smith (2006) the original definitions have been slightly modified to avoid inconsistencies when typing certain stemmed projectile points. Younger projectile point types were classified following Thomas' (1981) criteria. Hafted biface definitions are provided below.

Western Fluted Projectile Point. While many researchers simply refer to these points as Great Basin fluted points (Beck and Jones 1997), Western Fluted is used in this thesis. Western Fluted points are "Clovis-like" fluted lanceolate-shaped projectile points found in the Great Basin and other Far Western states. They are highly variable in morphological characteristics, although they all show true fluting (as opposed to basal thinning) as defined by Warren and Phagan (1988). The variability in shape and form is often attributed to resharpening and continued use (Beck and Jones 1997). Similar to the originally defined Clovis points from the Southwest, Western Fluted points are also made on high quality crypto-crystalline silicates and obsidians. They are characterized by having slight to pronounced basal concavities, and edge-grinding on the lower lateral margins of the point and occasionally on the base.

Black Rock Concave Base Projectile Point. These points were originally defined by Clewlow (1968) as unfluted lanceolate-shaped projectile points that resemble Plainview points, similar in shape to Clovis, except unfluted. Clewlow (1968) prefers the term Black Rock Concave Base (BRCB) for two reasons. First, although several examples of Plainview points are thick enough to have been fluted, the BRCB points are too thin to flute. Second, Clovis, Plainview, and Folsom points have been found associated with extinct Pleistocene mammals—BRCB were all surface finds without faunal associations. These points exhibit pronounced basal concavities, have very light edge-grinding on the lower lateral margins of the point, and have thin cross sections and broad, shallow, and parallel flaking that meets in the midline of the point.

Cougar Mountain Stemmed Projectile Point. Originally defined by Layton (1972a, 1979), Cougar Mountain points are lanceolate-shaped with prominent sloping shoulders and a long, straight-sided stem with convex base. The stem is heavily edge-ground, but the base is generally not. The flaking patterns on the blade are generally broad, flat, and invasive, forming a medial ridge and oval to diamond-shaped cross-section, with fine and steep secondary flaking found only along the edges of the stem forming a lenticular cross-section. Layton (1979) suggests a range of 10-13 cm for the maximum length. However, this range will be extended from 8-13 cm to fill the gap between Cougar Mountain and Parman stemmed points, following Smith (2006).

Parman Stemmed Projectile Point. Parman points were defined by Layton (1970, 1972b) using the specimens recovered from around the margins of pluvial Lake Parman and excavated from Hanging Rock Shelter. Parman points are shorter than Cougar Mountain points and exhibit a more varied or irregular flaking pattern, with broad blades and squared to sloping shoulders. Some specimens have only a single shoulder. Stems are proportionately shorter than blades, are generally less edge-ground than Cougar Mountain points, and can exhibit either rounded (Style 1) or square (Style 2) bases, which here are collapsed into a single Parman type. Layton (1979) describes Parman points as ranging from 3 to 7 cm in maximum length. Again, following Smith (2006) I increase that measurement from 3 cm to less than 8 cm to separate Cougar Mountain points and fill in a gap between type dimensions.

Haskett Stemmed Projectile Point. Butler (1965) defines two types of Haskett points recovered from the Haskett type site (10Pr37). Haskett points generally have a long tapering stem that accounts for approximately 60% of the total length of the point, with the widest point near the tip, and minimal sloping shoulders on the complete specimens. The stem is often edge-ground and the base is relatively thin and somewhat rounded. Haskett points are characterized by a broad and shallow parallel and collateral flaking pattern creating a lenticular cross-section.

Silver Lake Stemmed Projectile Point. Defined by Amsden (1937), the Silver Lake point has a non-tapering rounded base that usually comprises about one-third of the point but never more than one-half, and more distinct shouldering than Lake Mohave points (see below). These points may exhibit fine pressure retouch on better pieces, or percussion on cruder examples.

Lake Mohave Stemmed Projectile Point. Also defined by Amsden (1937), Lake Mohave (also spelled Mojave) stemmed points are distinct from Silver Lake points, though both were found around Lake Mohave. The Lake Mohave type is characterized as having a long tapering stem, very slight shoulders placed just below the centerline resulting in a diamond shape with more shoulder than blade, though these features are not highly standardized.

Windust Stemmed Projectile Point. Defined by Leonardy and Rice (1970) this point type is characterized by relatively short blades, square to sloping shoulders, and very short and squat parallel sided stems with a square to slightly concave base. Beck and Jones (1997) do not consider the Windust point part of the Western Stemmed Tradition because of its relatively short and broad stem, suggesting a different hafting technique than the longer stemmed types.

Crescent. Crescents are unifacial or (more often) bifacial flaked stone tools that have a distinct crescentic shape. Three types have been identified by Tadlock (1966): (1) Quarter Moon, (2) Half Moon, and (3) Butterfly. These items typically have sharp wing tips often with some edge-grinding or dulling along the lateral body edges, possibly for hafting (Tadlock 1966; Clewlow 1968). Like fluted and stemmed points in the Far West, crescents are generally found near lake margins and rivers in fluted and stemmed point assemblages (Beck and Jones 1997). Their use is currently unknown.

Post-Paleoindian Projectile Points. Various projectile point styles from the Early, Middle, and Late Archaic, Late Prehistoric, and Proto-Historic time periods were also encountered during the initial survey projects. These projectile point types include: Pinto (Vaughan and Warren 1987); Large Side-notched (Thomas 1981); Humboldt Concave-base (Thomas 1981); Gatecliff Contracting and Split-stem (Thomas 1981); Elko Corner-notched and Eared (Thomas 1981); Rose Spring Corner-notched (Thomas 1981); and Desert Side-notched and Cottonwood Triangular projectile points from the Desert Series (Thomas 1981). Because these points are post-Paleoindian in age I do not elaborate, but definitions and criteria for their evaluation, as well temporal assignments, can be found in the references listed for each.

Non-diagnostic Projectile Point Fragment. This class includes fragments of projectile points that have insufficient observable traits to classify it further (i.e. shoulders, notches, base, etc).

Non-diagnostic Stemmed Point Fragment. This class includes incomplete fragments of stemmed projectile points that do not contain sufficient information (shoulder, base, etc) to classify them further. These consist generally of basal fragments that have edge-grinding.

Non-hafted bifaces were analyzed and placed into nominal categories based on stages of workmanship following Andrefsky (2005).

Early Stage Biface. These tend to have few flake scars on either face with none reaching the mid-line. They are thick pieces (width/thickness ratio between 2.0 and 4.0 and edge angle of 50° to 80°) that generally have some cortex and small chips removed from the edges. Not all edges are necessarily worked.

Middle Stage Biface. These have less cortex and some have flake scars that reach the mid-line. These bifaces are thinner than early stage bifaces with a width/thickness ratio between 3.0 and 4.0 and edge angle of 40° to 50°.

Late Stage Biface. Late stage bifaces have no cortex, and have large flat flake scars across their faces. They have a width/thickness ratio greater than 4.0 and edge angle of 25° to 45°.

Finished but Unhafted Biface. These bifaces exhibit refined trimming of the edges but do not have a haft element. Like late stage bifaces, they have a width/thickness ratio of greater than 4.0 and edge angles between 25° and 45°.

The side scrapers recovered from Jakes Valley were analyzed and placed in typological categories based on observed traits using a key created for use in the Great Basin for SARF investigations. Side scrapers are tools that have been reworked on one or more lateral edges of flakes or other tools. The reworked edge tends to have very steep and invasive flaking. These tools may have been used on a variety of materials including, but not limited to, animal hides, wood, meat, or other material. The types of side scrapers include the following.

Unilateral Side Scraper. A flake/tool that has steep, invasive retouch on a single lateral edge.

Bilateral Side Scraper. A flake/tool that that has steep, invasive retouch on two lateral edges.

Convergent Side Scraper: A flake/tool that has steep, invasive retouch on two lateral margins that meet or converge to a point on the distal end.

Three Sided Scraper. A flake/tool that has steep invasive retouch on three sides.

Bifacially Retouched Side Scraper. A flake/tool that has steep invasive retouch on one face and retouch on the opposite face of the same edge.

Alternatively Retouched Side Scraper. A flake/tool that has steep invasive retouch on two opposing edges on opposite faces.

Limace. A flake/tool that has steep invasive retouch on both lateral margins that meet at the mid-line forming a “slug-shaped” scraper.

Side Scraper Fragment. A side scraper fragment that can not be further typed.

The end scrapers recovered from Jakes Valley were analyzed and placed in typological categories based on observed traits using a key created for use in the Great Basin for SARF investigations. End scrapers are tools that have been reworked on the distal end of a flake or other tool. The reworked edge tends to have very steep and invasive flaking. These tools may have been used on a variety of materials including, but not limited to, animal hides, wood, meat, and other materials. The types of end scrapers include the following.

End Scraper on a Flake. A flake that exhibits steep invasive retouch on its distal end.

End Scraper on a Blade. A blade or blade-like flake that exhibits steep invasive retouch on its distal end.

Round End Scraper. An end scraper that has been reworked to have steep invasive retouch on all sides.

Pan-Shaped End Scraper. An end scraper that has a distinctive pizza slice shape.

Steeply Keeled End Scraper. An end scraper triangular in cross section that has steep invasive retouch on its distal end.

Spurred End Scraper. An end scraper that has one or more unintentionally created spur(s) on its edge(s). Spurred end scrapers may have been retouched while hafted, forming the distinctive spur(s).

End Scraper Fragment. A fragment that cannot be further typed.

The gravers recovered from Jakes Valley were analyzed and placed in typological categories based on observed traits using a key created for use in the Great Basin for SARF investigations. Gravers are unifacial or bifacial tools with intentionally created distinctive spurs. The types of gravers include the following.

Single Spurred Graver. A graver with a single intentionally created spur.

Multiple Spurred Graver. A graver with two or more intentionally created spurs.

Graver Fragment. A fragment that can not be further typed.

The burins recovered from Jakes Valley were analyzed and placed in typological categories based on observed traits using a key created for use in the Great Basin for SARF investigations. Burins are an intentionally manufactured chisel-like tool with two flakes removed at right angles to create a sharp and durable edge. The types of burins include the following.

Burin on Flake. A burin manufactured on a flake.

Burin on Biface. A burin manufactured on a biface.

Burin Fragment. A burin that can not be further typed.

In addition to the typological classifications outlined above, a series of morphological and metric attributes were recorded for each tool. The results of these analyses are presented in the following chapters. The attributes are as follows.

Maximum Length. The straight line distance from the proximal to the most remote distal point on the tool, measured using sliding calipers to the nearest mm.

Maximum Width. The widest straight line distance perpendicular to the maximum length line, measured using sliding calipers to the nearest mm.

Maximum Thickness. The thickest location measured from dorsal to ventral face perpendicular to the maximum length line, measured using sliding calipers to the nearest mm.

Weight. The weight of the tool to the nearest tenth of a g using a digital scale.

Tool Blank Type. The type of blank from which the tool was originally manufactured. Categories include: (1) cortical spall; (2) blade-like flakes; (3) flakes with simple platforms; (4) flakes with complex platforms (biface thinning flakes); and (5) indeterminate.

Recycling. The presence of any type of recycling was noted. This may include evidence of a reworked broken edge.

Presence/Absence of Cortex. The presence or absence of cortex was recorded for each tool.

Presence/Absence of Haft Element. The presence or absence of a haft element was recorded for each unifacial and bifacial tool.

Additional attributes were recorded for bifaces.

Biface Fragment Type. Hafted and unhafted biface fragments were additionally classified by the section of the biface that remains. The categories for this attribute include: (1) complete, containing all or nearly all of the tool; (2) proximal fragment, containing only the proximal portion of the tool; (3) distal fragment, containing the distal portion of the tool; (4) medial fragment, containing neither the distal nor proximal portion of the tool; (5) lateral fragment, containing only a single lateral edge of the tool; (6) indeterminable, an indeterminate portion of a biface.

Haft Element Length. The maximum distance from the proximal end of the haft element to the neck/shoulder of the biface.

Basal Width. The width of the base measured 10 mm from the proximal end.

Blade Length. The maximum distance from the shoulder of the biface to the distal end.

Presence/Absence of Basal Grinding. The presence or absence of grinding on the basal margin of the haft element was recorded.

Presence/Absence of Edge Grinding. The presence or absence of grinding on the lateral margins of the haft element was recorded.

Base Shape. The shape of the base was recorded on hafted bifaces using the following categories: (1) convex; (2) concave; (3) straight; and (4) broken.

Flaking Pattern. The flaking pattern employed to manufacture the biface was recorded using the following categories: (1) regular; (2) irregular; (3) collateral; (4) parallel oblique; and (5) indeterminate.

Edge Angle. The angle measured (in degrees) of each lateral edge of hafted and unhafted bifaces using a goniometer.

Proximal Shoulder Angle. The proximal shoulder angle of all hafted bifaces was measured to the nearest 5°. In cases where the two shoulder angles differed, the lesser measurement was used, following Thomas (1981).

Specific attributes recorded for unifaces include the following.

Edge Angle. Edge angles were measured to the nearest 5° using a goniometer at the most invasive flake scar.

Invasiveness. The invasiveness of a unifacial tool is defined as the length (in mm) of the most invasive flake scar.

Number of Retouched Edges. The total number of edges (out of four) that were modified through intentional retouch or use (Figure 3.2).

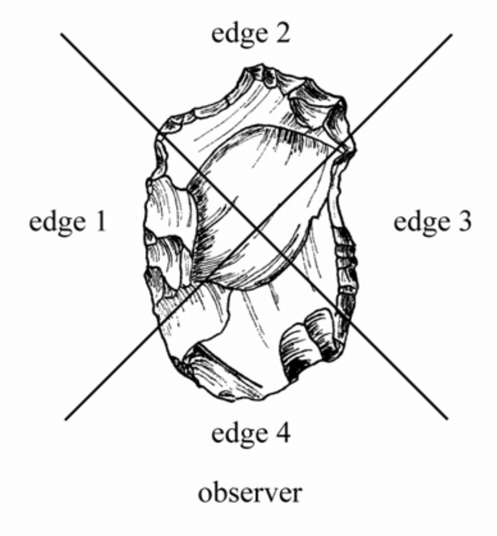


Figure 3.2. Location of edges on flake tools, with proximal end toward the bottom of page.

Location of Retouch. The location of retouch for each modified edge was recorded using the following designations: (1) dorsal; (2) ventral; (3) bifacial; and (4) alternating.

Edge Morphology. The edge morphology of each retouched edge of a unifacial tool was described using the following categories: (1) concave; (2) convex; (3) straight; (4) irregular; and (5) pointed.

Percentage of Edge Worked. The percentage of the worked edges on a unifacial tool. Percentages were broken into the following amounts: (1) 0-25%; (2) 26-50%; (3) 51-75%; and (4) 76-100%.

Integrative Analyses

Integrative analyses that included statistical analyses, ratios, indices, X-ray fluorescence, and obsidian hydration were applied to the data from Jakes Valley lithic assemblages to understand the organization of technology by Western Fluted and Western Stemmed Tradition peoples. Technological organization has been used recently to identify mobility patterns and settlement patterns, and to help understand how raw material distribution varied across the landscape (Kelly 1988, 1992; Andrefsky 1994; Bamforth 1986; Binford 1979, 1980). By comparing the technology employed by WF and WST point makers, I sought patterns that may separate these two groups. The results of the statistical analyses, ratios, and indices are given in the following chapters. Descriptions of the analyses are provided below.

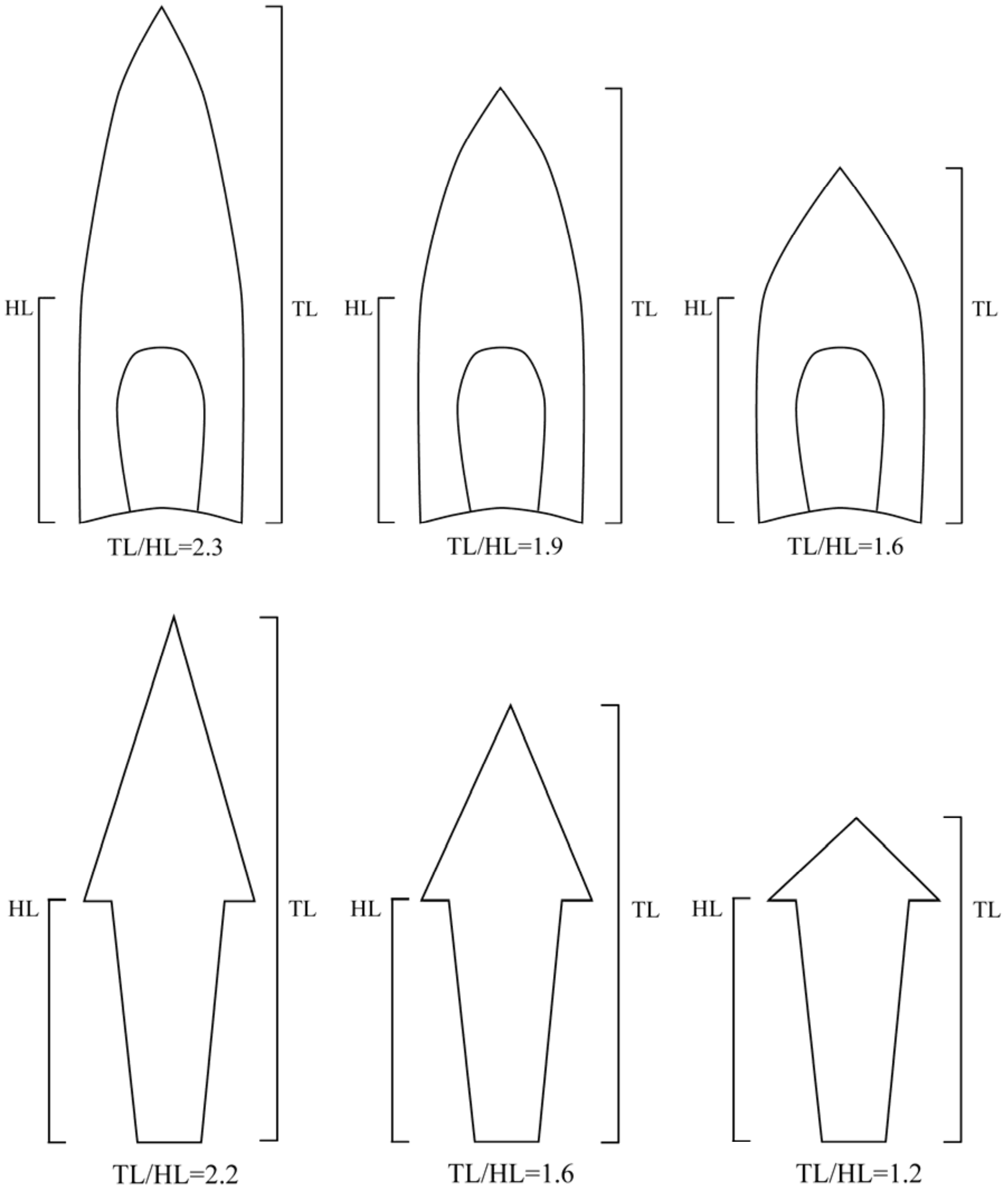
Ratios and Indices

Biface-to-Core Ratio. Paleoindians are assumed to have been highly mobile hunter-gatherers. Kelly (1988) and Kelly and Todd (1988) noted that an unrestrictive technology is required for this lifestyle, hence the use of biface technology in which bifaces function as cores as well as tools. A high Biface-to-Core ratio implies the use of bifaces as cores with low creation of formal cores. Bifacial cores are more flexible, providing useable flakes while already providing sharp and durable edges that can double as tools or be reduced to formal tools such as projectile points. In general, the higher the Biface-to-Core ratio, the greater the mobility a group is thought to have (Parry and Kelly 1987).

Formal-to-Informal Tool Ratio. Similar to the Biface-to-Core ratio, the Formal-to-Informal tool ratio is a measure of mobility that is affected by the quality and quantity of raw material (Andrefsky 1994; Bamforth 1986; Kelly 1988). In general, groups with high mobility tend to create more formalized tools (bifaces, projectile points, scrapers, combination tools, etc.) in anticipation of use and that can perform a variety of tasks, whereas informal tools (retouched flakes, gravers, notches, burins on flakes, backed knives, and denticulates) are created in response to need and are generally used for a single purpose before discard.

Total Length/Haft Length Ratio. The Total Length/Haft Length Ratio (TL/HLR) for hafted bifaces is used to determine the relative amount of resharpening a hafted biface has undergone (Shott 1986). Highly resharpened hafted bifaces result in lower TL/HLR values (Figure 3.3). Therefore, low TL/HLR values are produced by resharpened projectile points that were still hafted before being discarded. Higher numbers reflect a relatively small proportion of resharpening and thus more intact projectile points. For this ratio, if/when a single hafted biface has two different haft lengths the larger value is used.

Biface Reduction Ratio. The biface reduction ratio is defined as the maximum thickness (T) divided by the maximum width (W) of a biface and was taken only on the



TL/HL=2.3 TL/HL=1.9 TL/HL=1.6

TL/HL=2.2 TL/HL=1.6 TL/HL=1.2

Figure 3.3. Total Length/Haft Length Ratio measures amount of resharpening on hafted bifaces. TL=Total Length, HL=Hafted Length.

blades of hafted bifaces, as they are the only element likely to be resharpened. As the blade of a hafted biface is resharpened it loses width while generally maintaining its maximum thickness, creating a higher ratio (closer to 1.0) (Figure 3.4). Lower biface reduction ratios (closer to zero) indicate that the hafted biface has undergone little to no resharpening.

Uniface Reduction Index: The uniface reduction index is useful in determining tool use-life and amount of stone tool reduction through resharpening (Kuhn 1990). The value is obtained by dividing the thickness of the retouched edge (t) by the maximum thickness of the tool (T) (Kuhn 1990). However, Kuhn (1990) notes the problems in measuring t consistently and offers a more reliable method. Instead, the sine is taken of the angle of the retouched edge (a) and multiplied by the extension of retouch scars (D) then divided by T (see Figures 3.5 and 3.6). Eren and Sampson (2009) note that while Kuhn's method does not reliably measure the percentage of flake mass lost, it does measure edge exhaustion efficiently, which is important in this study.

Additional Comparative Analyses

X-Ray Fluorescence. X-ray fluorescence (XRF) is a non-destructive method used to identify the trace elements of rocks through the use of irradiated X-rays to excite electrons into emitting energy, which is then recorded (Odell 2003). In general, different obsidian sources have unique trace element compositions, allowing for specific sources to be identified geochemically and the ability to trace artifacts to their geographic origin (Hughes and Bennyhoff 1986). Less research has been conducted in identifying fine

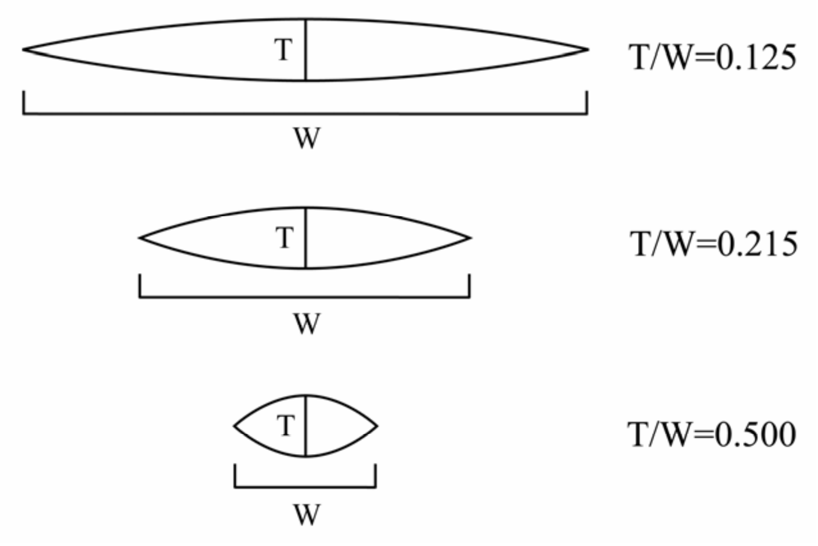


Figure 3.4. Biface Reduction Ratio measures the intensification of biface resharpening. T=Thickness, W=Width. After Graf (2001).

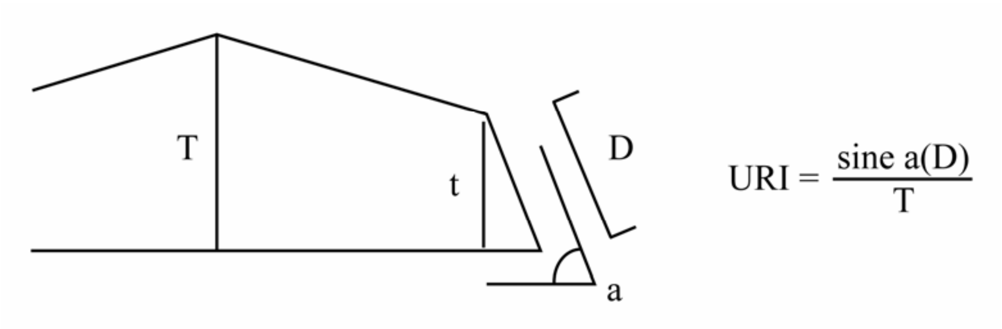


Figure 3.5. The Uniface Reduction Index measures the reduction intensity of unifacial tools. After Kuhn (1990).

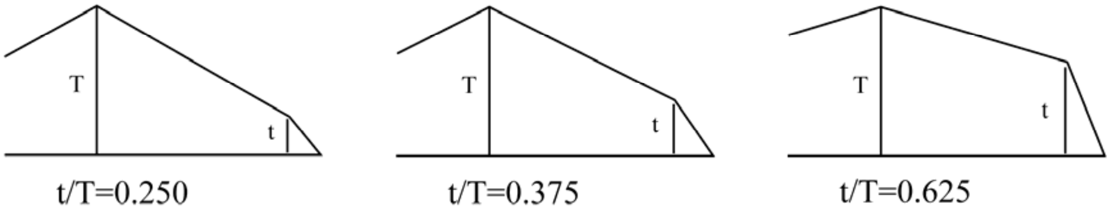


Figure 3.6. Illustration of progressive changes in the Unifacial Reduction Index. After Kuhn (1990).

grained volcanic (FGV) sources in the Great Basin, often resulting in a higher proportion of unknown sources in a sample.

Geochemical sourcing of volcanic artifacts provides a rough indication of distance traveled, or conveyance zones utilized by Paleoindians (under the assumption that raw materials were directly procured) (Jones et al. 2003). Due to the relative paucity of obsidian in the central Great Basin, a high percentage of the obsidian artifacts found during the Jakes Valley project were submitted for XRF analysis (all samples were submitted to Northwest Research Obsidian Studies Laboratory). In addition, many FGV artifacts were submitted for XRF analysis in the hopes of identifying their sources, despite reduced research into the sources of these materials.

Obsidian Hydration. Obsidian hydration (OHD) has been applied to volcanic glass artifacts since its creation as a relative dating method nearly 40 years ago (Friedman and Smith 1960). It is used primarily in volcanic rich areas of the world, including the Great Basin, where numerous studies of volcanic sources have been carried out and the sources have been mapped. Obsidian begins collecting water vapor (or hydrating) on freshly broken surfaces, and the extent of this process can be measured under high powered microscopy (Friedman and Smith 1960). Obsidian hydration is a technique that measures the hydration band or rim by cutting a small section into the glass and measuring the thickness of that rim (Solomon 2000). Different obsidians hydrate at different rates, which can also vary according to environmental factors such as effective moisture, depth buried, and fire effects (Solomon 2000). Hydration rims must be correlated with precise dating techniques (e.g., radiocarbon) to identify the hydration rate of each specific obsidian source. Hydration measurements on diagnostic artifacts (e.g., projectile points) can also help identify ranges for periods of use. Once obsidian source hydration rates have been discovered, the specific environment in which the artifact was found must be factored in. Some researchers then use the hydration rate and environmental factors to obtain a direct date for the time that that piece of obsidian was last flaked. This method has many flaws (Anovitz et al. 1999; Ridings 1996) but many researchers believe that OHD can be used as a relative dating technique (Hull 2001). Obsidian specimens in my study were submitted to Northwest Research Obsidian Studies Laboratory and to Archaeometrics for obsidian hydration analysis on Paleoindian artifacts to identify the relative timing of WF and WST artifacts in Jakes Valley.

Richness. In archaeological lithic assemblages, richness refers to the number of tool classes present (Rhode 1988; Jones et al. 1989). This measure is used to identify the functions of a given assemblage based on what types of tools occur in it. It is used when comparing the diversity of two or more assemblages. For this thesis, I used six classes of artifacts: (1) Projectile Point; (2) Unhafted Biface; (3) Crescent; (4) Core; (5) Formal Flake Tool; and (6) Informal Flake Tool. These six categories were used in conjunction with diversity and equitability indices to identify whether WF and WST sites have different functions, and to identify whether large Paleoindian sites (those containing hundreds of tools, e.g., Jakes Depression) differ from small Paleoindian sites (those containing fewer than 30 tools, most other sites).

Diversity. A measure of the number of present tool classes (richness) within a sample and their relative abundance. In this thesis, it is measured using the Shannon-Weaver (a.k.a., Shannon-Wiener) diversity index, shown below. High diversity values result when samples contain a more even distribution of tool abundance between tool classes, while samples with highly uneven distributions across the same number of tool classes results in lower diversity values.

Equitability. The relative abundance of tools within each tool class (Reitz and Wing 1999; Rhode 1988). This measure informs on the degree to which tool classes are equally abundant and evenness of which they are used (Reitz and Wing 1999). High equitability values (closer to 1.0) indicate a more even distribution of tools across tool classes, whereas low values identify the importance of one or a few tool classes.

The Shannon-Weaver H and Equitability V statistics are shown below:

Shannon-Weaver: $\mathbf{H' = \sum_{i=1}^{s} (p_i)(Log\ p_i)}$

where:

H' = information content of the sample.

p_i = the relative abundance of the i^{th} taxon within the sample.

Log p_i = the logarithm of p_i. This can be to the base of 2, e (natural log), or 10.

s = the number of taxonomic categories (Richness) in the assemblage.

Equitability: $\mathbf{V' = H'/Log\ S}$

where:

H' = the Shannon-Weaver function.

S = the number of taxonomic categories (Richness) in the assemblage.

Statistical Analyses. Data were analyzed using the statistical software SPSS v. 12 on a personal computer. Because a main goal of this thesis seeks to identify any differences between the two Paleoindian traditions in Jakes Valley, use of several comparative statistical tests was warranted. These tests were used to determine if the two (or more) assemblages came from the same population of artifacts. The variables from WF and WST assemblages used in this statistical comparison include: (1) raw material of all artifacts; (2) raw material of debitage; (3) debitage class; (4) debitage platform preparation; (5) debitage size categories; (6) debitage weight categories; (7) amount of cortex on debitage; (8) obsidian hydration mean values; (9) raw material of tool assemblage; (10) tool class; (11) biface reduction ratio; (12) total length/haft length ratio; (13) uniface reduction index; and (14) percent of edge worked on unifacial tools. The statistical tests employed in this thesis include: Chi-Square, Student's T-Test, Mann-Whitney U, Kruskal-Wallis H, and Kolmogorov-Smirnov Z.

Chapter 4

Materials

The data in this thesis were collected from Jakes Valley, NV, during the 2002, 2003, and 2006 field seasons by archaeologists working for the Sundance Archaeological Research Fund (SARF) at the University of Nevada, Reno. These projects were conducted in Jakes Valley with permission of the Ely District BLM Field Office. Project goals were to conduct survey surrounding pluvial Jakes Lake to identify, delineate, record, and collect Paleoindian archaeological sites.

Analysis of lithic assemblages and their locations in Jakes Valley provides an opportunity to describe Paleoindian technological organization, mobility, settlement organization, and lithic conveyance zones for a relatively small basin in the east-central Great Basin.

This chapter briefly describes the lithic assemblages, environments, and settlement locales of Paleoindian sites located during the three field seasons of work in Jakes Valley. In addition, other known Paleoindian sites are briefly described. This introduction to the valley and its known Paleoindian occupation sets the context for the remainder of this thesis.

Jakes Valley Paleoindian Sites

2002 Field Season

Jakes Depression. The Jakes Depression site (CRNV-04-7721) was first recorded during the Seismic Survey for Philips Petroleum project (Vierra and McQueen 2000). Jakes Depression is located in south-central Jakes Valley in an open and relatively flat area southwest of the playa. Vegetation consists primarily of sagebrush (*Artemisia tridentata*) and sparse grasses, with winterfat (*Eurotia lanata*) occurring as you move closer to the playa. The surface sediment consists of a dry, loose, and very fine silty-loam with abundant small gravels and a cracked-earth surface. The site record notes the presence of 65 bifaces, two utilized flakes, two point fragments, a side-notched point, a crescent, two stemmed points, and over 400 flakes. The two stemmed points and the crescent were collected. National Register Status was suggested under Criterion (D) as significant due to the site's excellent integrity of location and design, despite the two-track road that passes through the site, and its potential to yield information important to prehistory. The presence of stemmed points, a crescent, and other diagnostic indicators suggested an integrity of association, with these forms being related to the Western Pluvial Lakes Tradition in Great Basin prehistory.

In 2002, then SARF Director and Associate Professor of Anthropology at UNR Dr. Ted Goebel, along with Pat Bruce, Gene Griego, Kurt Perkins, and Amanda Taylor, went to Jakes Valley to map and collect the Jakes Depression site as Mark Henderson (then of the Ely BLM) believed the site was in danger of illegal collection. The crew

Table 4.1. 2002 Field Season UNR Collection at Jakes Depression.

Tool Type	Total
Hafted Bifaces	
Western Fluted Points	**5**
Black Rock Concave Base Points	**2**
Cougar Mountain Stemmed Points	**17**
Haskett Stemmed Points	**5**
Parman Stemmed Points	**14**
Windust Stemmed Points	**1**
Reworked/Recycled Stemmed Points	**3**
Stemmed Point Fragments	**41**
Unidentifiable Point Fragments	**1**
Crescents	**14**
Unhafted Bifaces	
Early Stage Bifaces	**12**
Middle Stage Bifaces	**32**
Late Stage Bifaces	**39**
Finished/Unhafted Bifaces	**27**
Core	
Unidirectional Cores	**1**
Multi-Directional Cores	**7**
Scrapers	
End/Side Scrapers	**7**
End Scrapers on Blade	**2**
End Scrapers on Flake	**14**
Spurred End Scrapers	**1**
Round End Scrapers	**1**
End Scraper Fragments	**14**
3-Sided Scrapers	**1**
Angle Scrapers	**1**
Bifacially Retouched Scrapers	**2**
Unilateral Side Scrapers	**10**
Bilateral Side Scrapers	**3**
Convergent Side Scrapers	**2**
Transverse Side Scrapers	**1**
Alternatively Retouched Scrapers	**1**
Side Scraper Fragments	**9**
Gravers	
Single-Spurred Gravers	**7**
Multi-Spurred Gravers	**1**
Retouched Flakes	
On Flakes	**36**
Fragments	**47**
Combination Tools	
Notch/Graver	**1**
Retouched Flake/Scraper	**6**
Scraper/Burin	**1**
Scraper/Graver	**3**
Retouched Flake/Graver	**1**
Scraper/Notch	**2**
Other Tools	
Notches	**1**
Backed Knives	**3**
Mano/Pestles	**1**
Total	**400**

surveyed the site using 5 meter-wide transects, flagging every artifact. A total-station theodolite was set up over the BLM datum and employed to accurately record the exact provenience and elevation of every collected artifact. In addition, two-track roads were recorded, along with elevation and vegetation changes. Five hundred fifty-eight artifacts were mapped with the transit. During recordation, Goebel noticed two debitage concentrations separated in space and elevation: one associated with two Western Fluted points (6,327 ft asl [1,928 m]), and the other with 21 Western Stemmed Tradition points (6,329 ft asl [1,929 m]). Four hundred lithic tools were collected from Jakes Depression (see Table 4.1). The chipped stone assemblage consists primarily of unhafted bifaces, WST points (including Cougar Mountain, Parman, and Haskett types), WF points, BRCB points, end and side scrapers, gravers, knives, combination tools, notches, retouched flakes, and cores (Figures 4.1-4.4). Raw materials used to manufacture these chipped stone tools consist of 42.11% crypto-crystalline silicates (n=168), 41.4% fine grained volcanics (n=165), 15.3% obsidian (n=61), 1.0% quartzite (n=4), and 0.3% rhyolite (n=1). Only 159 pieces of debitage were recovered from Jakes Depression, consisting of 5.7% cortical flakes (n=9), 62.3% flake or flake fragments (n=99), and 32.1% biface thinning flakes (n=51). Debitage raw materials consist of 30.8% crypto-crystalline silicate (n=49), 55.4% fine grained volcanics (n=88), and 13.8% obsidian (n=22). In addition, a single mano/pestle was recovered as part of the tool assemblage despite the fact that it was located ~80 m from the next nearest artifact and was found in a small drainage. This groundstone implement is very finely shaped, with three faceted faces, and the ends battered to flat faces; it also appears to have red ochre on one face. Groundstone artifacts are absent or rare from virtually all Paleoindian sites in North

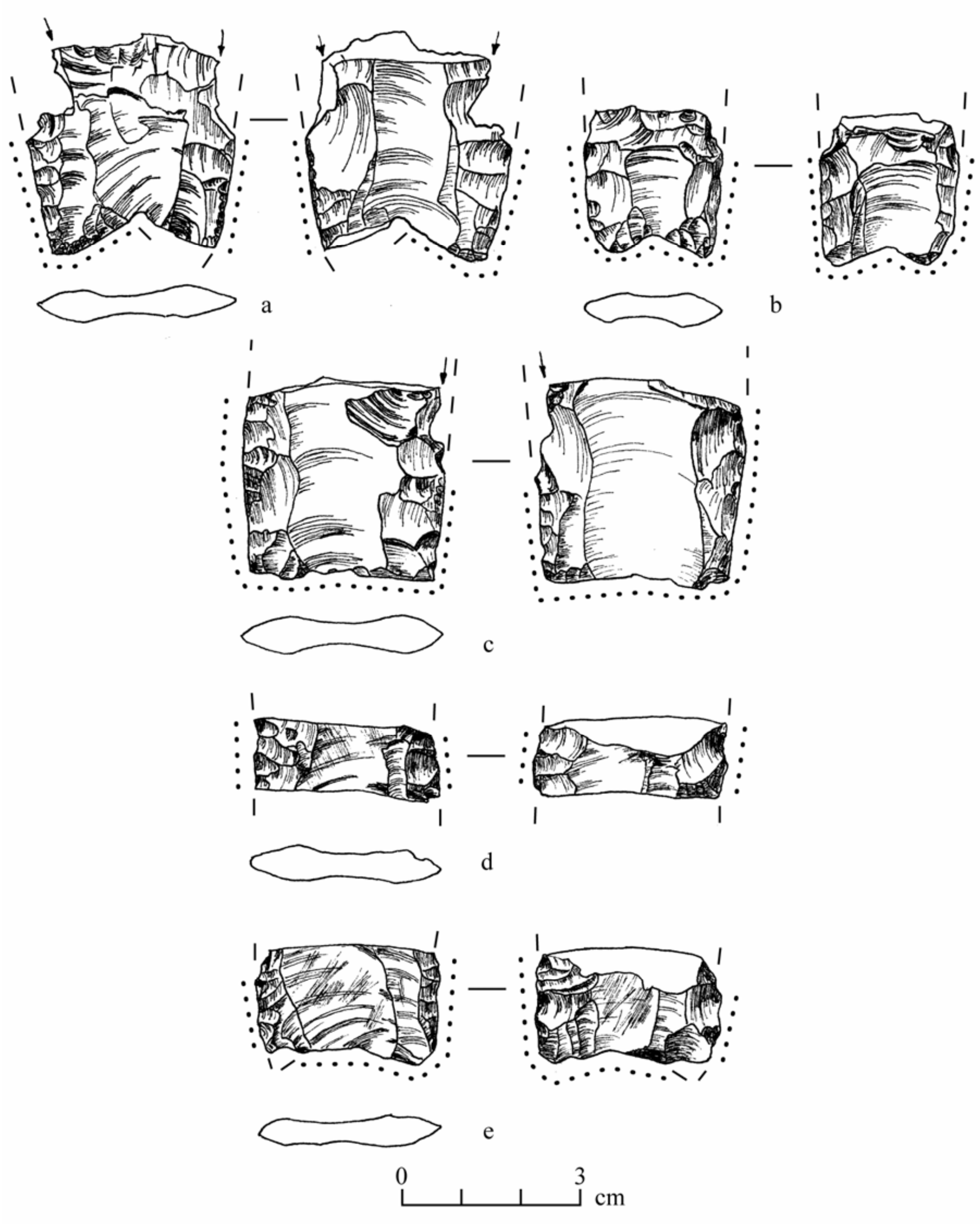


Figure 4.1. Fluted projectile points recovered from the Jakes Depression site: specimens (a-c) manufactured on CCS; specimens (d-e) on obsidian. Illustrations by author.

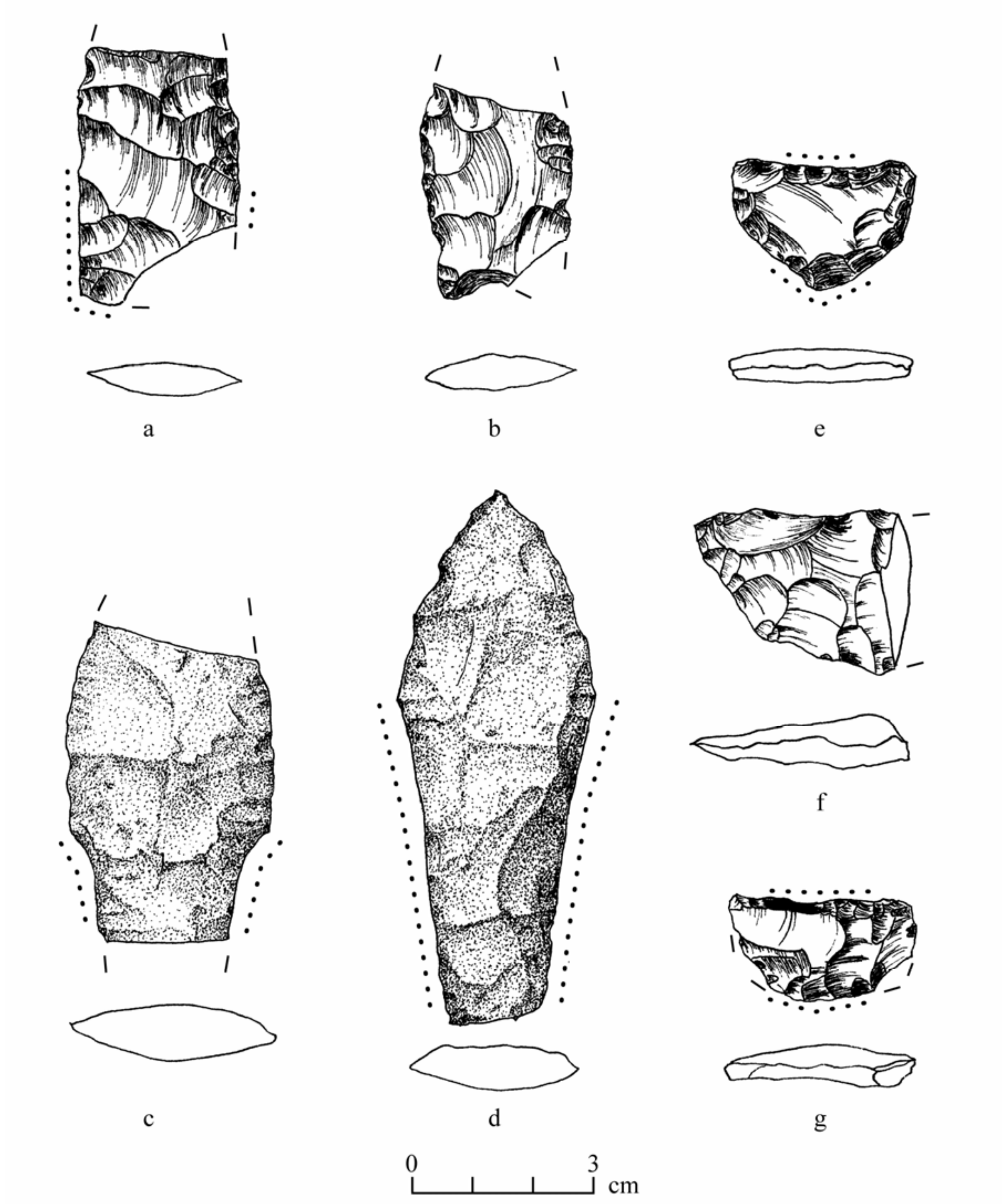


Figure 4.2. Paleoindian artifacts from the Jakes Depression site: specimens (a-b) are Black Rock Concave Base; (c) is a Parman Stemmed; (d) is a Cougar Mountain Stemmed; e-g are crescents. All specimens are made of CCS, except (c-d) which are manufactured on FGV. Illustrations by author.

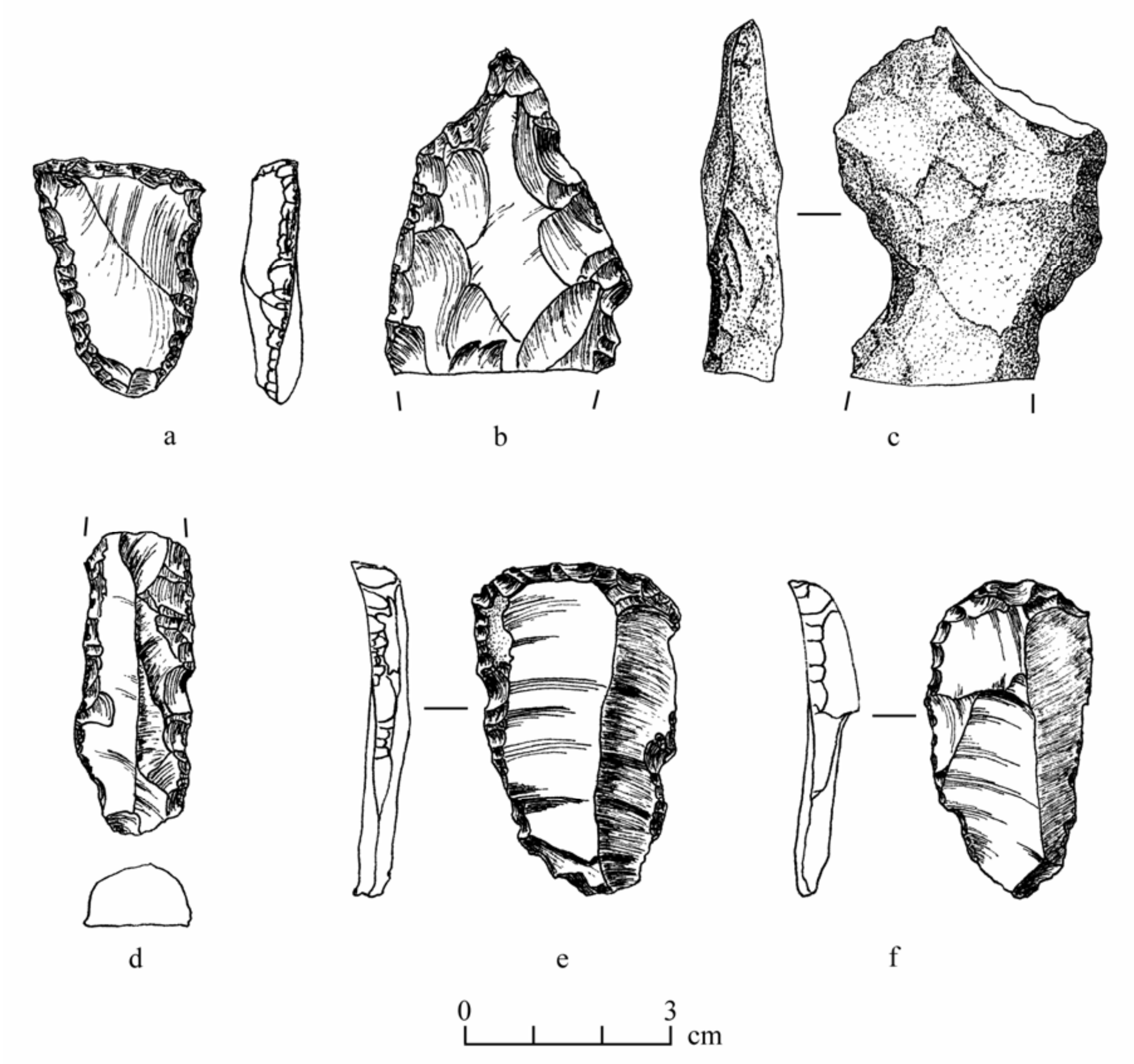


Figure 4.3. Unifacial tools recovered from Jakes Depression: (a) three-sided scraper; (b) convergent scraper; (c) notch; (d) bilateral side scraper; (e-f) end scrapers. All specimens made on CCS except (b) made on obsidian, and (c) made on FGV. Illustrations by author.

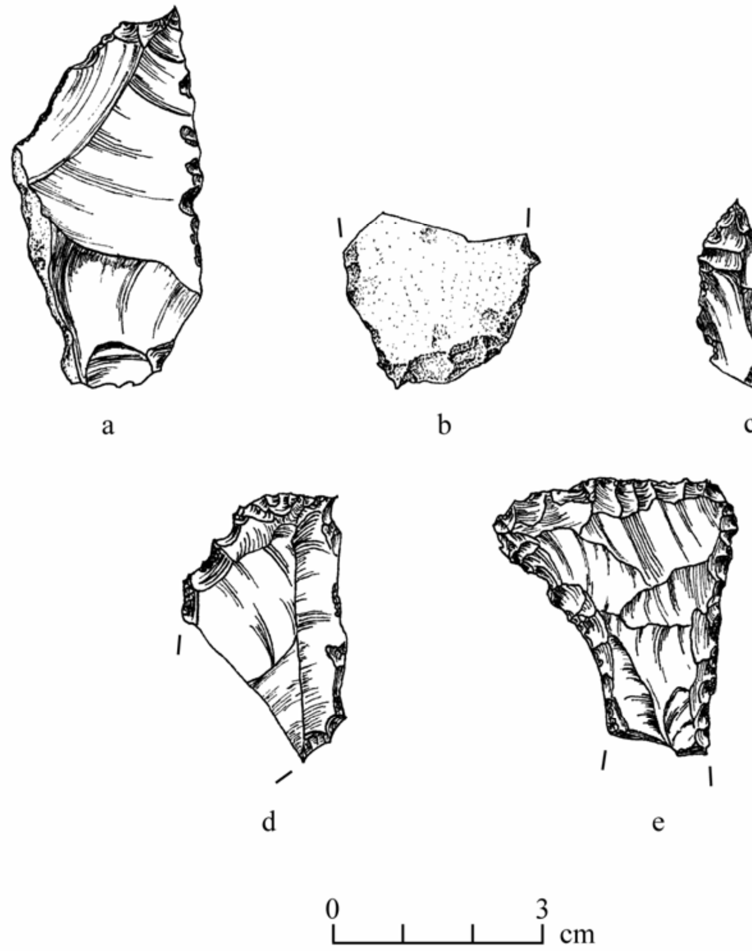


Figure 4.4. Additional unifacial tools from Jakes Depression: (a and c) single-spurred gravers; (b) multi-spurred graver; (d) combination scraper/graver tool; (e) combination notch/scraper tool. All specimens made on CCS, except (b) which is made on FGV. Illustrations by author.

America, although occasionally they appear in the Great Basin (Simms 2008). Three factors suggest this particular piece is not Paleoindian-produced: (1) as noted, it was ~80 m from the next nearest artifact at the Jakes Depression site and would therefore not warrant inclusion into the site following Nevada BLM standards; (2) it was located in a wash and may have been redeposited from upstream; and (3) the fine workmanship indicates much time was spent shaping this piece for grinding plant seeds, which Elston and Zeanah (2002) argue is not typical of Pre-Archaic (a.k.a. Paleoindian) technology.

2003 Field Season

In 2003, SARF at UNR returned to Jakes Valley with a field school led by Dr. Ted Goebel and then UNR doctoral candidate Kelly Graf. Goals of the field school included geomorphologic trenching and profiling of the Jakes Depression site, survey of geologic features surrounding Jakes Valley at similar elevations as the Jakes Depression site (1,926 – 1,932 m), including three intermittent streams that flow into the Jakes Valley playa (Illipah Creek, Jakes Wash, and Circle Wash), and collection of any archaeological sites that date to the Paleoindian period based on diagnostic Western Fluted or Western Stemmed Tradition points. Twenty-two new archaeological sites were recorded during this field school, two archaeological sites were revisited and re-recorded, and 27 isolates were recorded (Estes and Goebel 2007). Ten of these sites contain Paleoindian components (six are single-component WST sites; one contains WF and WST points; one contains WF, WST, and later Archaic points; and two contain WST and later Archaic points), and two isolates are stemmed points (IF-6 was mistaken as a Gatecliff contracting stem point in Estes and Goebel [2007], and re-classified for this thesis as a Parman Stemmed point).

Table 4.2. 2003 Field Season UNR Collection within Jakes Valley.

Tool Types	26Wp 1173	26Wp 1177	26Wp 7316	26Wp 7317	26Wp 7318	26Wp 7321	26Wp 7323	26Wp 7334	26Wp 7335	26Wp 7336	Total
Hafted Bifaces											
Western Fluted Points	1	1	-	-	-	-	-	-	-	-	**2**
Cougar Mountain Stemmed Points	-	-	1	-	-	1	-	-	-	-	**2**
Haskett Stemmed Points	-	-	-	1	-	-	-	-	-	-	**1**
Parman Stemmed Points	-	-	1	-	-	-	-	2	-	1	**4**
Silver Lake Stemmed Points	1	-	-	-	-	-	-	-	-	-	**1**
Windust Stemmed Points	1	3	-	-	-	-	-	-	1	3	**8**
Stemmed Point Fragments	1	2	1	-	1	1	2	1	-	1	**10**
Pinto Points	6	-	-	1	1	-	-	-	-	-	**8**
Gatecliff Points	-	-	-	2	-	-	-	-	-	-	**2**
Elko Corner-notched Points	1	-	-	-	1	-	-	-	-	-	**2**
Elko Eared Points	1	-	-	-	-	-	-	-	-	-	**1**
Unidentified Notched Points	1	-	-	-	-	-	-	-	-	-	**1**
Unhafted Bifaces											
Early Stage Bifaces	-	3	-	-	-	-	-	-	-	-	**3**
Middle Stage Bifaces	4	1	-	-	-	-	-	-	-	-	**5**
Late Stage Bifaces	5	3	1	-	2	1	2	-	-	1	**15**
Finished/Unhafted Bifaces	-	-	-	-	-	2	-	-	-	-	**2**
Cores											
Multi-directional	1	1	2	1	-	2	-	-	-	-	**7**
Scrapers											
End/Side Scrapers	-	-	-	1	-	-	-	-	-	-	**1**
End Scrapers on Flake	-	-	-	-	-	-	-	-	-	1	**1**
End Scraper Fragments	1	-	-	1	-	-	1	-	1	1	**5**
Unilateral Side Scrapers	3	1	-	-	1	-	-	-	1	-	**6**
Bilateral Side Scrapers	1	-	-	-	-	-	-	-	-	-	**1**
Transverse Side Scrapers	-	-	-	-	1	-	-	-	-	-	**1**
Side Scraper Fragments	1	-	1	-	-	-	1	-	1	3	**7**
Graver											
Single-Spurred Gravers	2	-	-	-	-	-	-	-	-	-	**2**
Multi-Spurred Gravers	1	-	1	-	-	-	1	-	-	-	**3**
Retouched Flakes											
On Flakes	5	-	3	2	1	2	-	-	1	-	**14**
Fragments	-	6	1	-	-	2	-	-	3	-	**12**
Combination Tools											
Biface/Side Scraper	-	-	-	-	-	-	-	-	1	-	**1**
Retouched Flake/Scraper	-	-	-	-	-	-	-	-	-	1	**1**
Scraper/Graver	-	1	-	-	-	-	-	-	-	1	**2**
Wedge/Scraper	-	-	-	1	-	-	-	-	-	-	**1**
Other Tools											
Notch	-	-	-	-	-	-	-	-	-	1	**1**
Total	**37**	**22**	**12**	**10**	**8**	**11**	**7**	**3**	**9**	**14**	**133**

Site 26Wp1173. Originally recorded as two separate sites (26Wp1173 and 26Wp1973), thorough investigation of the area in 2003 revealed that they are connected (Estes and Goebel 2007). This discrete site spans the Paleoindian through Middle Archaic periods (11,000-1,300 B.P.). It is located north of the playa in Jakes Valley, west of Illipah Creek, primarily within a sagebrush (*Artemisia tridentata*) flat on loose and friable silty-loam. The projectile point assemblage consists of a white CCS Western Fluted point base, one Windust stemmed point, one Silver Lake stemmed point, three stemmed point fragments, six Pinto points, two Elko series points, and one unidentified notched point (Figure 4.5).

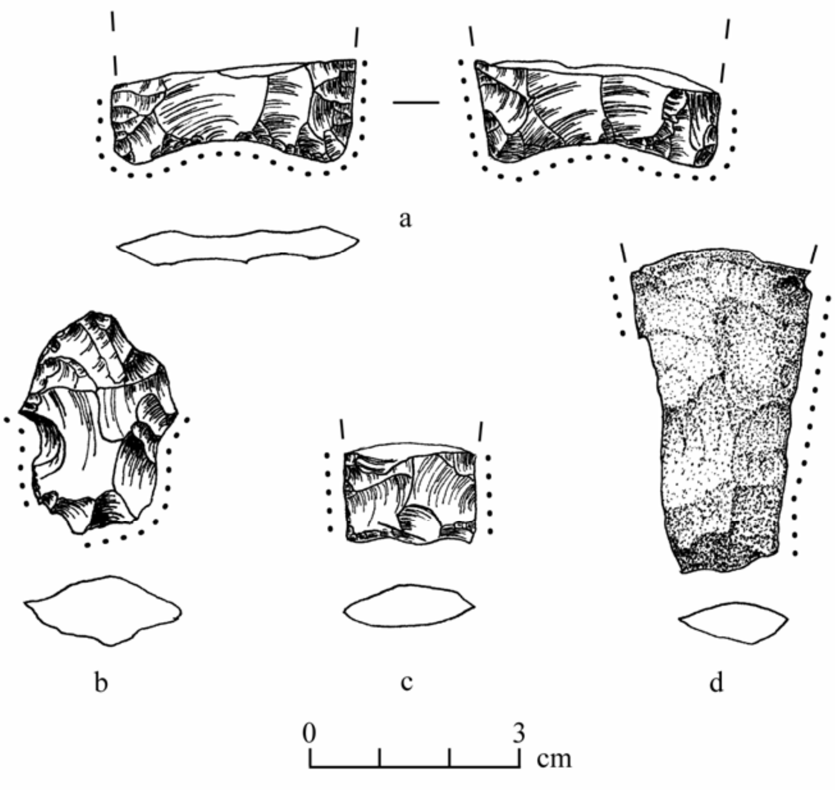


Figure 4.5 Paleoindian artifacts from 26Wp1173: specimen (a) Fluted point; specimen (b-d) Western Stemmed points; (a) manufactured on CCS; (b-c) on obsidian; (d) on FGV. Illustrations by author.

Other tools found at this site include nine bifaces, one core, six scrapers, three gravers, and five retouched flakes (see Table 4.2). It should be noted that the Western Fluted point was separated from all other tools at the site and was lower in elevation compared to the Western Stemmed points (Estes and Goebel 2007: 26Wp1173 Site Sketch). This lithic assemblage consists of 45.9% CCS (n=17), 29.7% FGV (n=11), 21.6% obsidian (n=8), and 2.7% rhyolite (n=1). Two hundred forty pieces of debitage were collected from a 10x10 m collection block. Of those, 11.7% were cortical spalls (n=28), 48.3% flakes (n=116), 38.3% retouch chips (n=92), and 1.7% angular shatter (n=4). Debitage raw material frequencies are 30% CCS (n=72), 59.2% FGV (n=142), and 10.8% obsidian (n=26).

Site 26Wp1177. Originally recorded as a concentration of small thinning flakes of CCS, basalt, and obsidian with three obsidian Stemmed point bases (James and Zeier 1981) this site was revisited in 2003 by a SARF crew that documented a large, densely concentrated lithic scatter located on floodplain deposits in Jakes Valley. Illipah Creek is located to the west. Vegetation is dominated by tall sagebrush (*Artemisia tridentata*) and local grasses. Twenty-two tools were observed on site (see Table 4.2). The lithic assemblage includes three Windust stemmed points, two broken stemmed point fragments, and one Western Fluted lateral fragment (Figure 4.6). Additional tools include seven bifaces, one core, one scraper, one combination scraper/graver tool, and six retouched flakes. This tool assemblage is composed of 45.5% CCS (n=10), 27.3% FGV (n=6), and 27.3% obsidian (n=6). Debitage was collected from a 10x10 m area. Debitage classes consist of 25.2% cortical spalls (n=29), 47.8% flakes (n=55), 24.3% retouch chips (n=28), and 2.6% angular shatter (n=3). The debitage consists primarily of basalt (57.9%, n=66), and CCS (33.3%, n=38), with a smaller amount of obsidian (8.8%, n=10).

Site 26Wp7316. This site (newly recorded in 2003) is a sparse lithic scatter situated on the western edge of the playa in Jakes Valley, just below several beach ridge features, and northeast of Cottonwood Pond. The site is in sagebrush (*Artemisia tridentata*) and shadscale (*Atriplex confertifolia).* Twelve tools were observed and collected (Table 4.2). The lithic tool assemblage includes one Cougar Mountain stemmed point, one Parman stemmed point, and one unidentifiable stemmed point fragment, as well as one biface, two cores, one scraper, one multiple-spurred graver, and four retouched flakes. Raw materials used to manufacture these tools consist of 50% CCS (n=6), 33.3% FGV (n=4), and 16.7% obsidian (n=2). Debitage was collected in a 10x10 m area from the site. The classes of debitage at this site are 3.6% cortical spalls (n=1), 71.4% flakes (n=20), and 25.0% retouch chips (n=7). Debitage raw material consists of 57.1% CCS (n=16), 32.1% FGV (n=9), and 10.7% obsidian (n=3).

Site 26Wp7317. This multi-component site is a lithic scatter located several km north of Railroad Crossing Dam and just west of an ephemeral wash on a deltaic floodplain south of the Jakes Valley playa. Ten lithic tools were found and collected (Table 4.2), including a Haskett stemmed point (Figure 4.6), a Pinto point, and two Gatecliff Contracting-stem points, along with two scrapers, two retouched flakes, a core, and a combination wedge/scraper tool. The occurrence of these various time-sensitive artifacts indicates reuse of the site area spanning the Paleoindian through the Middle Archaic periods (11,000-1,300 B.P.). This tool assemblage is composed of 50% CCS, (n=5), 40% FGV (n=4), and 10% obsidian (n=1). No debitage was collected from this site, but 285 flakes were analyzed in the field, consisting of 62.8% FGV (n=179), 17.9% CCS (n=51), and 1.8% obsidian (n=5). Debitage classes include 11.9% cortical spalls (n=34), 46.0% flakes (n=131), and 24.6% retouch chips (n=70).

Site 26Wp7318. This is a multi-component lithic scatter located south of the Jakes Valley playa on a deltaic floodplain just west of Circle Wash and north of Railroad Crossing Dam. Evidence of cattle grazing and erosion is apparent. Eight tools were observed on site and collected for analysis (Table 4.2), including an untyped stemmed point fragment, a Pinto point, and an Elko Corner-notch point, along with two bifaces, two scrapers, and a retouched flake. The occurrence of these three time-sensitive artifacts indicates reuse of the site area spanning the Paleoindian through Middle Archaic periods (11,000-1,300 B.P.). Raw material consists of 62.5% FVG (n=5), 25% CCS (n=2), and 12.5% obsidian (n=1). A grab sample of debitage was collected from the site. The debitage classes break into 8.6% cortical spalls (n=26), 46.7% flakes (n=141), 43.7% retouch chips (n=132), and 1.0% angular shatter (n=3). Debitage raw materials consist almost entirely of FGV 92.1% (n=278), with only 6.0% CCS (n=18) and 2.0% obsidian (n=6).

Site 26Wp7321. This is a single-component lithic scatter located south of the Jakes Valley playa on the Circle Wash deltaic floodplain. Cattle grazing and erosion is evident on site. Eleven lithic tools were encountered and collected (Table 4.2). This assemblage includes a complete Cougar Mountain stemmed point made from Tempiute obsidian (Figure 4.6), one unidentified stemmed point fragment, three bifaces, two cores, and four retouched flakes. Raw materials of this tool assemblage consist of 45.5% CCS (n=5), 45.5% FGV (n=5), and 9.1% obsidian (n=1). Eighty-two pieces of debitage were

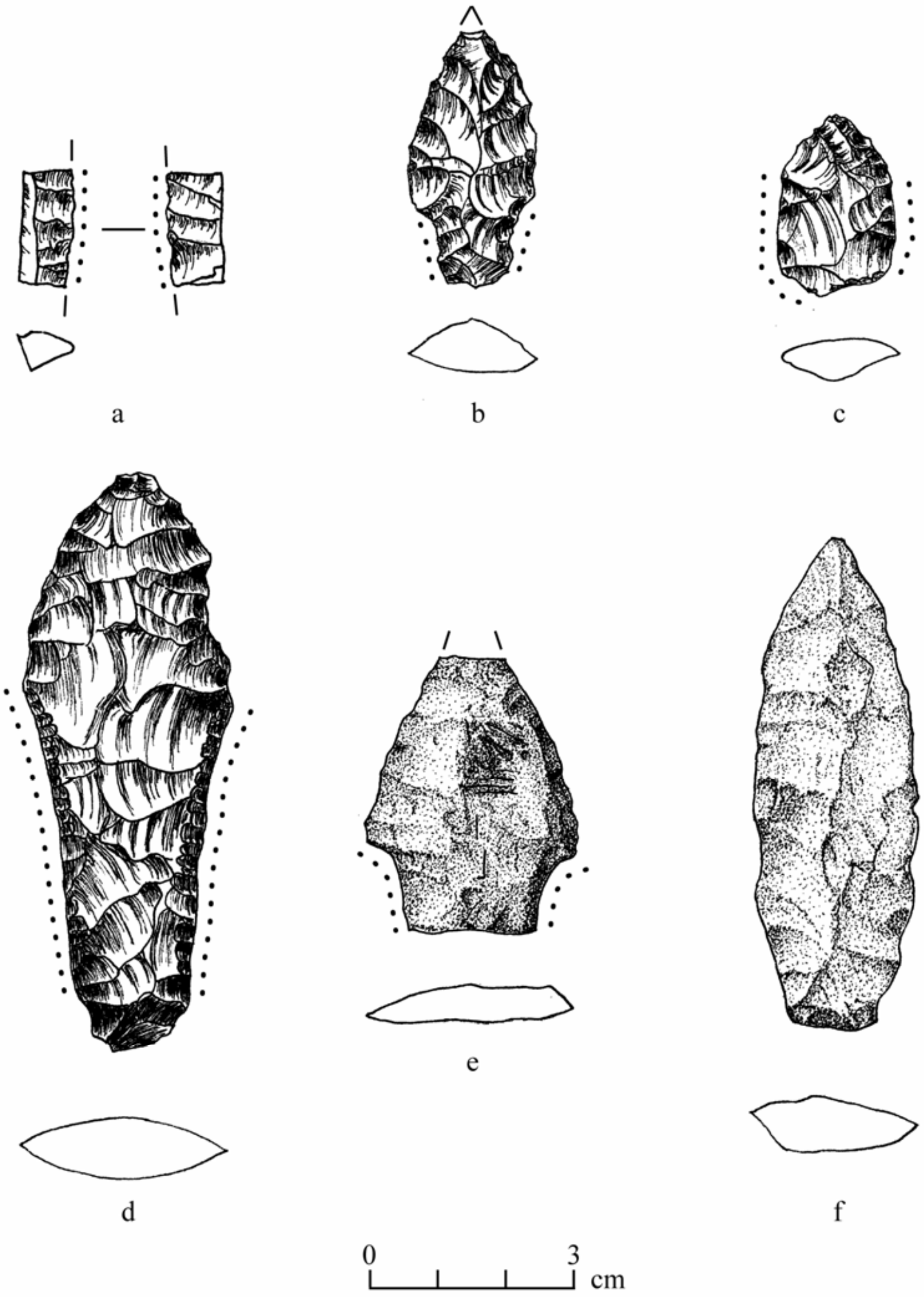


Figure 4.6. Paleoindian artifacts recovered from several sites during the 2003 field season: (a) Fluted point fragment from 26Wp1177; (b) Isolate 6 Parman stemmed; (c) highly reworked Windust from 26Wp7335; (d) Cougar Mountain stemmed from 26Wp7321; (e) Parman stemmed from 26Wp7334; (f) Haskett stemmed from 26Wp7317. Artifacts (a-d) made on obsidian, (e-f) made on FGV. Illustrations by author.

collected with 20.7% cortical spalls (n=17), 41.5% flakes (n=34), 32.9% retouch chips (n=27), and 4.9% angular shatter (n=4). The raw materials utlized to manufacture these chips is composed of 51.2% FGV (n=42), 40.2% CCS (n=33), 4.9% rhyolite (n=4), 2.4 % sandstone (n=2), an 1.2% obsidian (n=1).

Site 26Wp7323. This is a single-component lithic scatter located south of the Jakes Valley playa on the Circle Wash deltaic floodplain. The site is in a zone of tall sagebrush (*Artemisia tridentata*) that shows evidence of periodic flooding and animal trampling activity. Lithic artifacts were found on the cracked clay surface and open areas between the tall brush. Seven tools were collected (Table 4.2), consisting of two unidentified stemmed point fragments, two bifaces, two scrapers, and a multiple-spurred graver. Raw materials of this tool assemblage consist entirely of FGV. The debitage collected from this site includes 7.4% cortical spalls (n=18), 67.6% flakes (n=165), 23.8% retouch chips (n=58), and a meager 1.2% angular shatter (n=3). The raw materials of the debitage reflect the tool assemblage, consisting almost entirely of FGV (92.6%, n=226), with the remaining 7.4% of CCS (n=18).

Site 26Wp7334. This is a very small single-component lithic scatter located north of the Jakes Valley playa, just east of Illipah Creek. Vegetation consists primarily of tall sagebrush (*Artemisia tridentata*). Three lithic tools were observed and collected: two Parman stemmed points and an untyped stemmed point fragment (Table 4.2). One Parman and the untyped stemmed point were made of obsidian (66.7%); the other Parman is of FGV (33.3%) (Figure 4.6). Seven pieces of debitage were noted (but not collected), consisting of 57.1% FGV (n=4), 28.6% CCS (n=2), and 14.3% obsidian (n=1).

Debitage classes include 14.3% cortical spalls (n=1), 71.4% flakes (n=4), and 14.3% retouch chips (n=1).

Site 26Wp7335. This site is a single-component lithic scatter located north of the Jakes Valley playa in an alluvial drainage on the east side of Illipah Creek. The on-site vegetation consists mainly of tall sagebrush (*Artemisia tridentata*) and winterfat (*Eurotia lanata*). Nine lithic tools were found and collected for analysis (Table 4.2). This assemblage includes a Windust stemmed point (Figure 4.6), three scrapers, four retouched flakes, and one biface/scraper combination tool. Raw materials used for the tool assemblage consist primarily of FGV (77.8%, n=7), with one made on CCS (11.10%), and one obsidian tool (11.1%). Debitage from a 10x10 m area was collected and analyzed. The debitage classes are composed of 28.9% cortical spalls (n=24), 50.6% flakes (n=42), 18.1% retouch chips (n=15), and 2.4% angular shatter (n=2).

Site 26Wp7336. This is a lightly concentrated single-component lithic scatter located north of the Jakes Valley playa on the floodplain east of Illipah Creek. There is some evidence of cattle grazing and trampling on site. Vegetation consists of tall sagebrush (*Artemisia tridentata*) and various grasses. Fourteen tools were noted and collected for analysis (Table 4.2). This tool assemblage consists of three Windust stemmed points, one Parman stemmed point, one untyped stemmed point fragment, one biface, five scrapers, one retouched/scraper and one scraper/graver combination tools, and one notch tool (Figure 4.7). Tools are divided between raw materials with 42.9% CCS (n=6), 35.7% FGV (n=5), and 21.4% obsidian (n=3). Debitage noted on-site consists of 57.1% FGV (n=88), 26.0% obsidian (n=40), 16.3% CCS (n=25), and 0.6% unknown material (n=1). However, only the obsidian debitage (n=39, 97.4%) and one

FGV flake (2.6%) were collected from this site. These collected flakes consist of 59.0% flakes (n=23) and 41.0% retouch chips, with no cortical spalls or angular shatter.

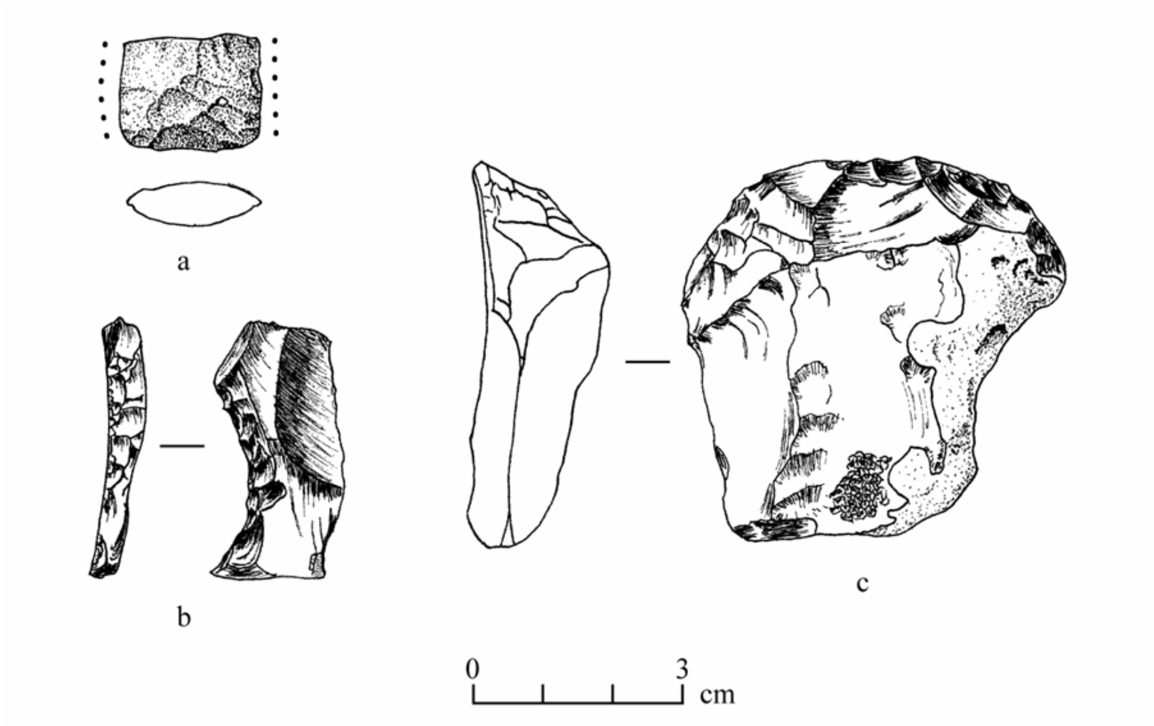


Figure 4.7. Paleoindian artifacts from 26Wp7336: (a) Western Stemmed point fragment made on FGV; (b) notch tool made on CCS; (c) large end scraper made on CCS. Illustrations by author.

Isolated Artifact 6. This isolated artifact, found north of the Jakes Valley playa, is a complete obsidian Parman stemmed point (Figure 4.6). The obsidian is fairly opaque black with obvious banding. It was not sourced using XRF but is similar to Wild Horse Canyon, UT, obsidian in appearance. This isolate was originally labeled a Gatecliff Contracting Stem in Estes and Goebel (2007), but reclassified as a Parman stemmed point upon further inspection.

Isolated Artifact 12. This isolated artifact was also found north of the Jakes Valley playa. It is a long tapering stem of a stemmed point with a flat base and is broken below the shoulders. It is made of a purple/white quartzite and has ground margins. It is either a Haskett or Cougar Mountain stemmed point based on its stem characteristics.

2006 Field Season

A small crew of archaeologists sponsored by SARF at UNR returned to Jakes Valley in summer 2006 to continue studying the Paleoindian occupation. Twenty days were spent surveying in Jakes Valley. Crews intensively surveyed areas immediately surrounding the playa, two areas of shore lines identified by Garcia and Stokes (2006) (Lincoln and Yamaha fans), as well as further areas along Illipah Creek, Circle Wash, and Hayden Wash.

Thirty-three archaeological sites were located and recorded during the 2006 field season, of which four were revisits to previously recorded sites, and 29 were newly recorded (Estes and Goebel 2007). Eight of those 33 sites contain Paleoindian components. Of those eight, two are single-component Western Fluted, two are single-component Western Stemmed Tradition, and three are multi-component containing Western Stemmed points and later Archaic components, and one is multi-component with a Black Rock Concave Base point and later Archaic components. One isolated obsidian WST point base was collected (IF-34). Paleoindian artifacts from multi-component sites were the only collected pieces, unless clear and obvious debitage concentrations were noted; no later Archaic materials from multi-component sites were collected.

Table 4.3. 2006 Field Season UNR Collection within Jakes Valley.

Tool Types	26Wp 1174	26Wp 1175	26Wp 7729	26Wp 7735	26Wp 7738	26Wp 7739	26Wp 7746	26Wp 7748	Total
Hafted Bifaces									
Western Fluted Points	-	-	2	1	-	-	-	-	**3**
Black Rock Concave Base Points	1	-	-	-	-	-	-	-	**1**
Cougar Mountain Stemmed Points	-	-	-	-	1	1	1	-	**3**
Haskett Stemmed Points	-	-	-	-	-	1	2	-	**3**
Parman Stemmed Points	-	1	-	-	-	-	2	-	**3**
Silver Lake Stemmed Points	-	-	-	-	-	1	-	-	**1**
Stemmed Point Fragments	-	-	-	-	-	-	4	1	**5**
Crescents	-	-	1	-	-	-	-	-	**1**
Unhafted Bifaces									
Middle Stage Bifaces	-	-	-	-	1	1	-	-	**2**
Late Stage Bifaces	-	-	2	1	-	-	-	-	**3**
Finished/Unhafted Bifaces	-	-	1	1	-	-	3	2	**7**
Core									
Multi-Directional Cores	-	-	1	-	-	-	-	-	**1**
Tested Cobble	-	-	1	-	-	-	-	-	**1**
Scrapers									
Unilateral Side Scrapers	-	-	2	-	-	-	-	-	**2**
Convergent Side Scrapers	-	-	1	-	-	-	-	-	**1**
Side Scraper Fragments	-	-	1	-	1	-	2	-	**4**
Gravers									
Multi-Spurred Gravers	-	-	1	-	-	-	-	-	**1**
Retouched Flakes									
On Flakes	-	-	-	1	-	-	-	-	**1**
Fragments	-	-	3	-	-	-	2	1	**6**
Combination Tools									
Biface/End Scraper	-	-	-	1	-	-	-	-	**1**
Scraper/Notch	-	-	-	-	1	-	-	-	**1**
Other Tools									
Backed Knives	-	-	-	1	1	-	-	-	**2**
Total	**1**	**1**	**16**	**6**	**5**	**4**	**16**	**4**	**53**

Site 26Wp1174. Originally recorded as two separate sites in 1981 and 1985 (26Wp1174 and 26Wp4547, respectively) the 2006 SARF archaeological crew found enough artifacts to combine them into a single site. Previous finds at 26Wp1174 consisted of 30-40 light brown CCS flakes, mostly tertiary with a few secondary, and two CCS core chunks (James and Zeier 1981). Previous finds at 26Wp4547 consisted of three red/yellow CCS secondary flakes and a CCS core (Price 1985). The combined site is located on loose silts of aeolian or alluvial origin in a patchy winterfat-dominated (*Eurotia lanata*) area northwest of the Jakes Valley playa. It is bisected by a dirt road that runs east-west towards Waldy Pond and Illipah Creek. The lithic assemblage includes seven diagnostic projectile points with some groundstone. The northwestern portion of the site contained numerous (n>200) pink-white pieces of debitage with many tools noted around the northwestern perimeter of the site. Diagnostic points include one Black Rock Concave Base, a Pinto, a Large Side-notch, a Humboldt, and three Elko series points. Other tools at this site include 13 bifaces, four metate fragments, two cores, four scrapers and two retouched flakes. Only the Black Rock Concave Base point (made on FGV) was collected (Table 4.3 and Figure 4.8).

Site 26Wp1175. Originally recorded in 1981, this site consisted of a single white CCS biface tip fragment, one basalt flake, one brown CCS core, and several CCS flakes (James and Zeier 1981). In 2006, a SARF archaeological crew revisited and documented this site as a large multi-component surface lithic scatter located north of the Jakes Valley playa on alluvial sediments. Artifacts were found among several patches of sagebrush (*Artemisia tridentata*) and between them in the open areas. The lithic assemblage from this site includes a Parman stemmed point mid-section, an Elko series point, five bifaces, four scrapers, two cores, and a drill. The site has a low density scatter of debitage (n=35). Only the Parman stemmed point (made on FGV) was collected (Table 4.3 and Figure 4.8).

Site 26Wp7729. This newly recorded single-component site is a large lithic scatter situated on very friable alluvial sediments, north of the playa in Jakes Valley. Vegetation

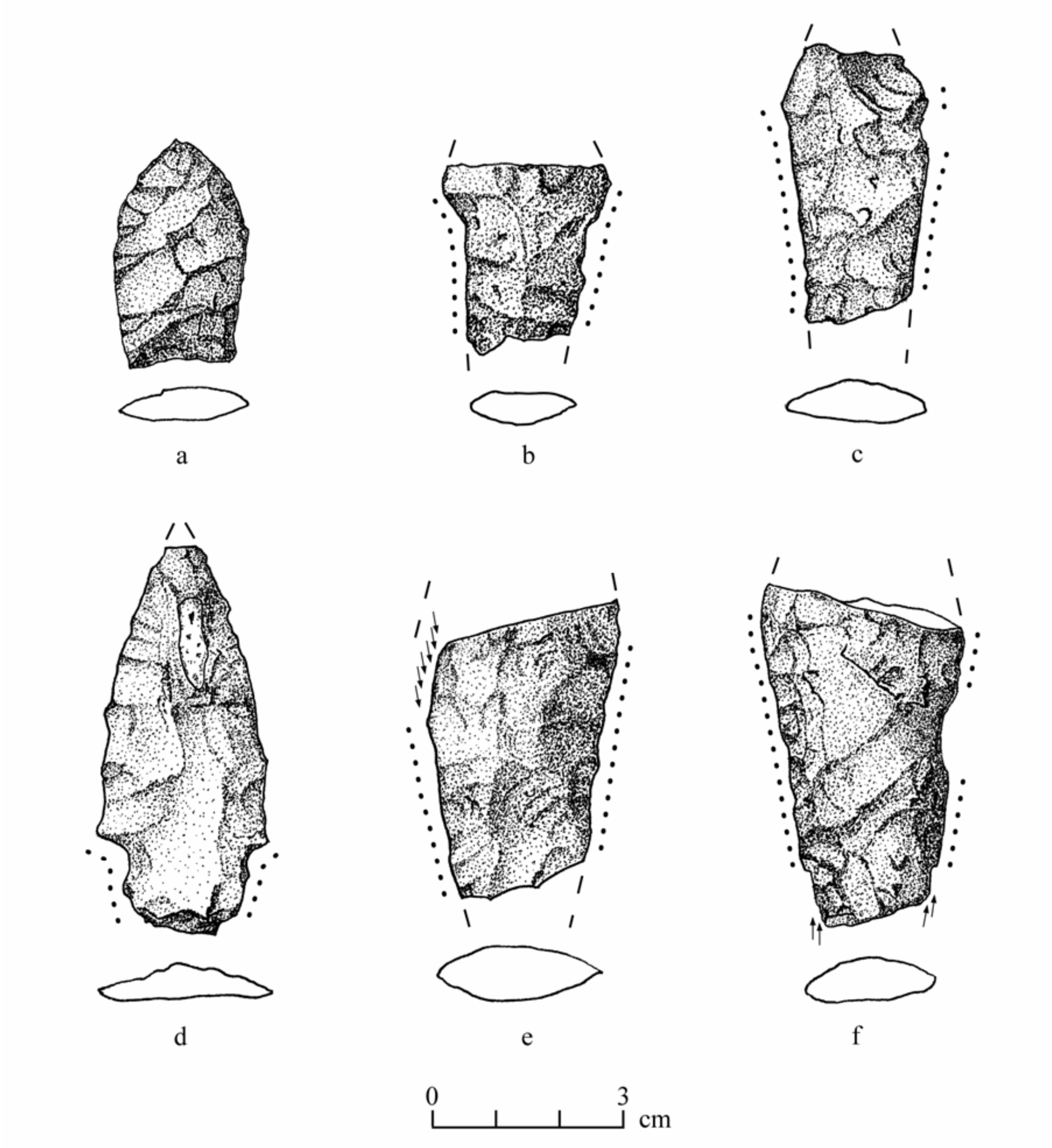


Figure 4.8. Various Paleoindian points recovered in 2006: (a) Black Rock Concave Base point from 26Wp1174; (b) Parman Stemmed from 26Wp1175; (c-e) Haskett, Silver Lake, and Cougar Mountain Stemmed from 26Wp7739; (f) Cougar Mountain Stemmed from 26Wp7738. All specimens manufactured on FGV. Illustrations by author.

consists almost entirely of winterfat (*Eurotia lanata*), with sagebrush (*Artemisia tridentata*) around the eastern and northern boundary. A dirt road that runs east-west towards Waldy Pond bisects this site. The lithic assemblage collected from the site includes two Western Fluted points (one complete, one fragment), a crescent, three bifaces, two scrapers, two cores, a multiple-spurred graver, and three retouched flakes (Table 4.3 and Figures 4.9 and 4.10). The tools are made primarily (93.8%) of CCS (n=15), with only 1 obsidian tool (6.3%). Debitage consists of 246 pieces of CCS and obsidian. However, only 135 pieces were collected for analysis. The debitage consists of 8.1% cortical spalls (n=11), 48.1% flakes (n=65), 38.5% retouch chips (n=52), and 5.2% angular shatter (n=7). The raw material used to manufacture the debitage closely mirrors the tool assemblage with 97.0% CCS (n=131) and only 3.0% obsidian (n=4). The artifacts occur in three dense concentrations (southern, central, and northern), with fewer artifacts occurring between those concentrations. All tools and a sample of debitage (from three 10x10 m and one 20x20 m collection blocks) were collected from the site.

Site 26Wp7735. This is a small single-component lithic scatter located northwest of the Jakes Valley playa on friable alluvial sediments, vegetated primarily by winterfat (*Eurotia lanata*). The lithic tool assemblage consists of one Western Fluted point fragment, two bifaces, a retouched flake, a backed knife, and a combination biface/end scraper tool (see Table 4.3 and Figure 4.11). The entire tool assemblage is made from CCS. The debitage assemblage (n=46) is similarly composed entirely of CCS. The debitage classes from this assemblage include 2.2% cortical spalls (n=1), 45.7% flakes (n=21), and 52.2% retouch chips (n=24).

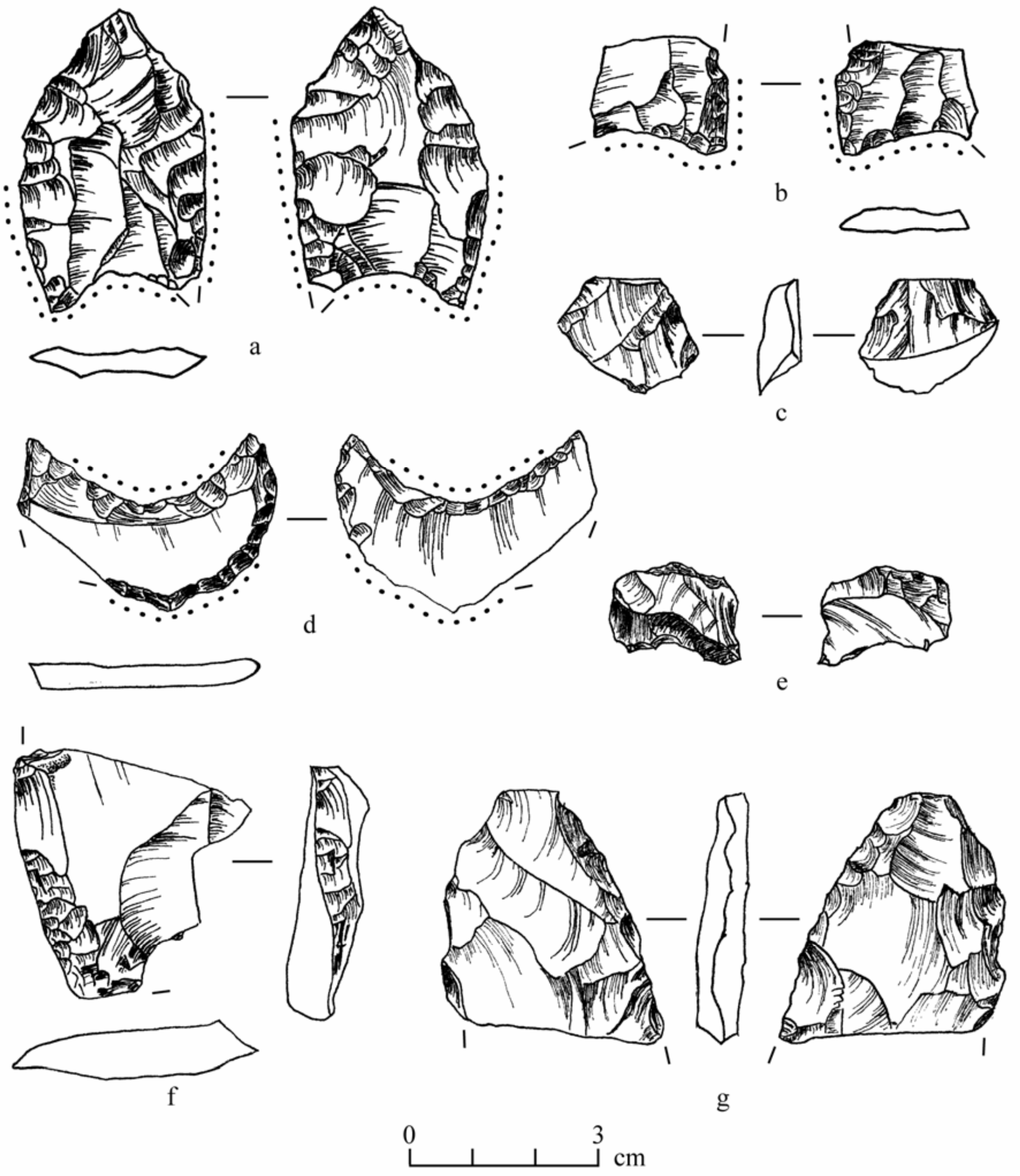


Figure 4.9. Artifacts recovered from site 26Wp7729: (a-b) fluted projectile points; (c and g) unhafted bifaces; (d) crescent; (e) multiple-spurred graver; (f) side scraper. All specimens manufactured on CCS, except (c) which is obsidian. Illustrations by author.

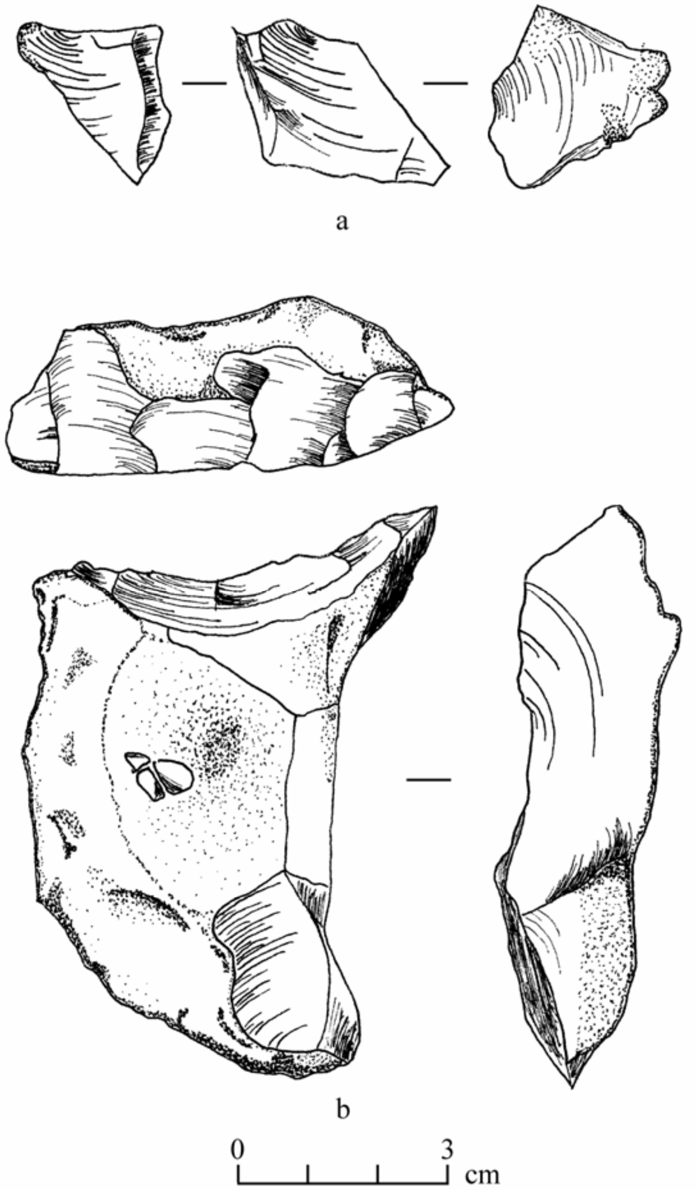


Figure 4.10. Cores recovered from 26Wp7729: (a) expended multi-directional core; (b) tested cobble. All specimens manufactured on CCS. Illustrations by author.

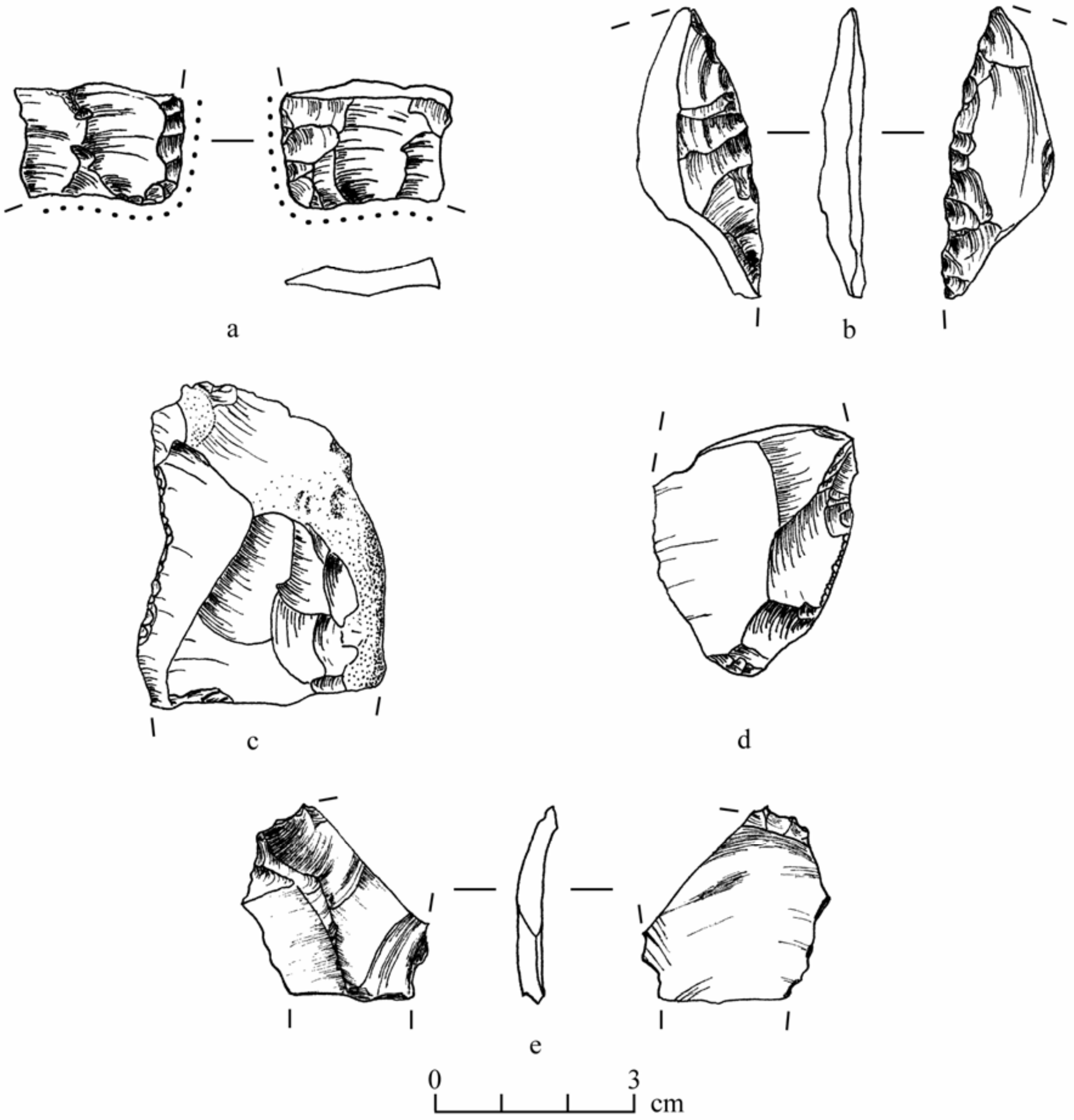


Figure 4.11. Artifacts recovered from 27Wp7735: (a) Fluted projectile point fragment; (b) unhafted biface; (c) backed knife; (d) retouched flake; (e) distal end of an overshot flake. All specimens manufactured on CCS. Illustrations by author.

Site 26Wp7738. This single-component site is a low-density lithic scatter located north of the Jakes Valley playa on desert pavement sediments. Abundant gravels in the pavement made it difficult to distinguish between naturally fractured CCS cobbles and those that were culturally modified. A Cougar Mountain stemmed point fragment was found along with a biface, scraper, backed knife, and combination scraper/notch tool (Table 4.3 and Figure 4.8). The tools are 60.0% made of CCS (n=3) and 40.0% of FGV (n=2). Debitage consists entirely of CCS (n=10) and is 50.0% cortical spalls, 40.0% flakes, and 10.0% retouch chips (n=1).

Site 26Wp7739. This multi-component site is a very large, medium-density lithic scatter located north of the Jakes Valley playa. It is situated on hard, sun-baked floodplain and alluvial deposits originating in the White Pine Range to the west. The site straddles a small unnamed drainage channel that runs roughly north-south, although the majority of artifacts are located on the eastern side. Artifacts were observed dispersed among the sagebrush (*Artemisia tridentata*) patches found on site. The lithic tool assembage includes numerous diagnostic artifacts such as three Western Stemmed points (Cougar Mountain, Haskett, and Silver Lake), two Humboldt points, two Large Side-notch points, and four Elko series points. Due to the multi-component nature of this site, only the three WST points were collected, along with a biface that was originally thought to be a stemmed point (Table 4.3 and Figure 4.8). Later analysis classified it as a middle stage biface. All four collected tools are made on FGV. No debitage was collected from this site.

Site 26Wp7746. This single-component Western Stemmed Tradition site is a large, medium-density lithic scatter located far north of the Jakes Valley playa, and is situated on alluvial sediments in a sagebrush flat located ~200 m east of Illipah Creek. The lithic tool assemblage contains several different types of WST points (n=9), along with bifaces, scrapers, and retouched flakes (Table 4.3 and Figure 4.12). The proportions of raw materials used to manufacture these tools are 37.5% CCS (n=6), 6.3% obsidian (n=1), and 56.3% FGV (n=9). The debitage assemblage contains 13.6% cortical spalls (n=20), 61.2% flakes (n=90), 21.8% retouch chips (n=32), and 3.4% angular shatter (n=5). Debitage consists primarily of CCS (77.6%, n=114), with 20.4% FGV (n=30), and 2.0% obsidian (n=3). It should also be noted that two of the CCS stemmed point fragments are made from the same material and refit (Figure 4.12a).

Site 26Wp7748. This multi-component site is a small, medium-to-low-density lithic scatter located far north of the Jakes Valley playa on alluvial sediments in a sagebrush (*Artemisia tridentata*) flat roughly 600 m east of Illipah Creek. There are two distinct concentrations of lithic artifacts at the site. Concentration A is located on the eastern edge of the site and appears to be associated with a Paleoindian occupation. Concentration B is located on the western half of the site and has a much higher density and frequency of lithic materials. A broken Humboldt basal fragment was observed in this concentration along with two scrapers, which suggests a Middle Archaic age (5,000-1,300 B.P.). Nothing was collected from Concentration B. Concentration A was collected in its entirety. The lithic tool assemblage from Concentration A includes a stemmed point fragment, two bifaces, and a retouched flake (Table 4.3). These four tools are divided between 50.0% CCS and 50.0% obsidian. The debitage from this concentration contains 4.0% cortical spalls (n=1), 64.0% flakes (n=16), and 32.0%

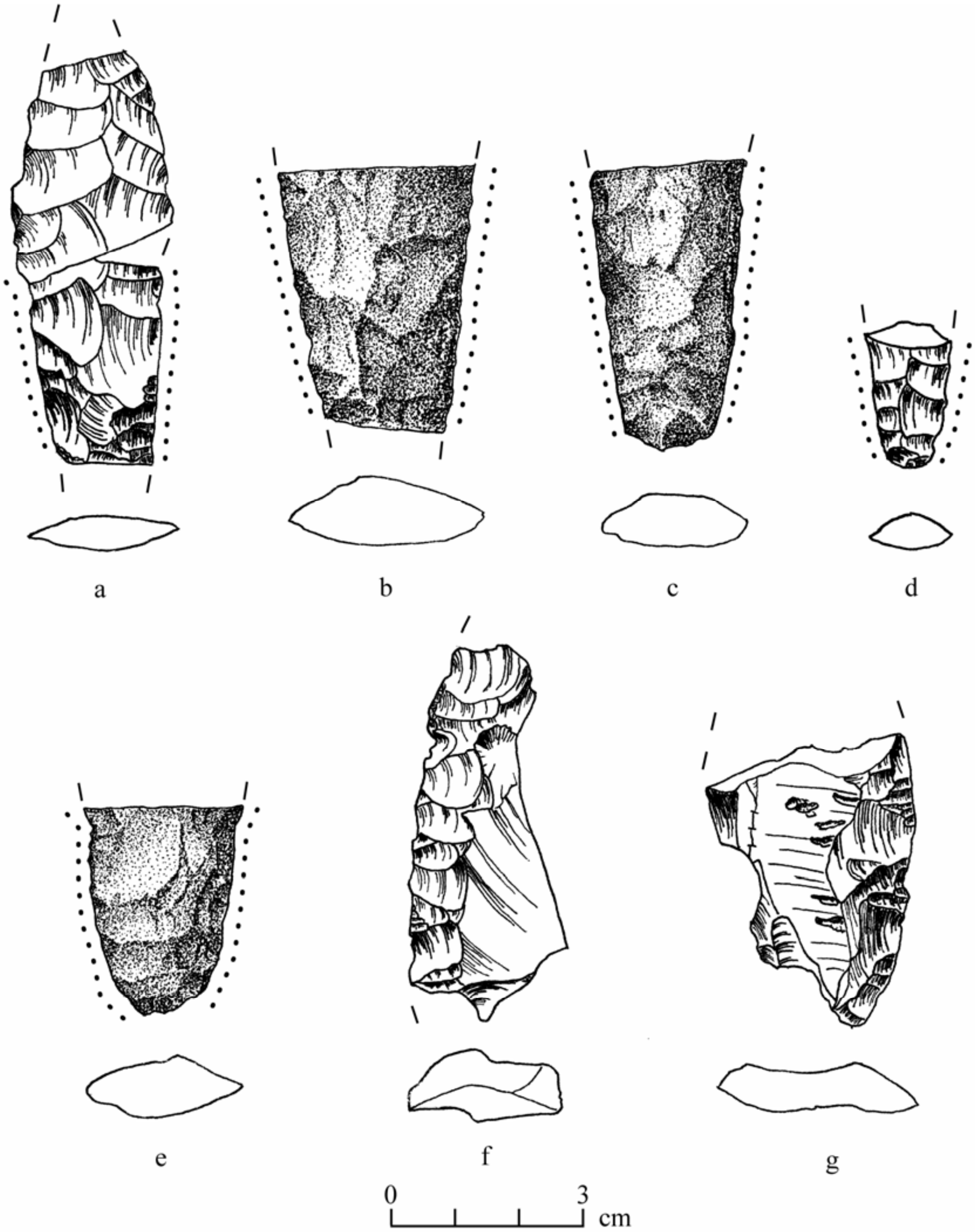


Figure 4.12. Artifacts from 26Wp7746: (a) Haskett Stemmed; (b and d) Untyped Stemmed; (c) Cougar Mountain Stemmed; (e) Parman Stemmed; (f-g) side scrapers. Specimens (a, d, and f) manufactured on CCS; (b-c, and e) manufactured on FGV; (g) manufactured on obsidian. Illustrations by author.

retouch chips (n=8). Debitage consists of 52.0% CCS (n=13), 40.0% obsidian (n=10), and 8.0% FGV (n=2).

Isolated Artifact 34. This isolated artifact was found in a rut of a two-track road south of the Jakes Valley playa. It consists of an obsidian Western Stemmed Tradition point base. The base is broken below the shoulders but is very long and tapering, with well ground margins. This point is likely a Cougar Mountain point but may be a Haskett. It was geochemically sourced to Wild Horse Canyon, UT.

Other Known Paleoindian Finds in Jakes Valley

The sites and isolates in this next section are described according to their original site records; I did not analyze the assemblages. My projectile point classifications were based on visual characteristics in pictures or artifact sketches included in the original site record. The purpose of this section is to identify *where* other Paleoindian sites are located within Jakes Valley to determine settlement patterns based on elevation and geographic positioning and situation within the valley, and to identify their associated artifact assemblages.

Site 26Wp4927 (CRNV-046-1844). Recorded by Polk (1982), this Paleoindian site is located southwest of the Jakes Valley playa, and is located southeast of the Jakes Depression site (CRNV-046-7721). The site is situated on the lower edge of a bajada which rises to the west and south. The soil consists of clay loam with angular and rounded siliceous gravel, with patchy sagebrush (*Artemisia tridentata*) on site transitioning to winterfat (*Eurotia lanata*) closer towards the playa to the northeast. The lithic assemblage Polk located included lanceolate point fragments, scrapers, knives, scraper-knives, cores, and a small number of flakes and debris. Twelve artifacts were collected (stored at the Nevada State Museum), consisting of a lanceolate point tip made of FGV; a lanceolate mid-section with one shoulder made of FGV; three long tapering stemmed point bases with edge grinding, two of FGV, one CCS; a CCS knife fragment; a small biface fragment of FGV; three possible Lake Mohave stemmed points, two made of CCS, and one of FGV; a single shouldered stemmed point made of CCS; and a triangular point with concave base, fluted on one side that extends 1/3 the length, made on CCS. After looking at the artifact sketches, I suggest that the single-shouldered point and two of the possible Lake Mohave points could be classified as Parman stemmed points, using my criteria. The third possible Lake Mohave stemmed point may be a Cougar Mountain. Two of the stemmed point bases may be Cougar Mountain or Haskett types.

This site was revisited by Jones et al. (2003) and labeled Long Peak Locality 1 (LPL-1). A total of 213 diagnostic projectile points are listed as coming from this site (Jones et al. 2003:14), the clear majority (n=211) being WST points; one is Early Holocene (Either Pinto or Windust) and one is Archaic (Gatecliff, Large Side-notched, Elko, Rosegate, or Desert series). Raw materials represented at this site include 55.1% FGV (n=3,822), 37.1% CCS (n=2,572), 7.7% obsidian (n=532), and 0.1% other materials (n=6). One hundred forty-two obsidian samples were geochemically sourced to 13 distinct sources. Best represented are Browns Bench (35.9%) and Panaca Summit (aka Modena) at 33.8%, Unknown Source B (12.7%), and Wild Horse Canyon (5.6%) (Jones et al. 2003:16-17).

Site 26Wp1167 (CRNV-046-1867). Originally recorded by James, Tobey, Pizzo, and Elston in 1981, this site is a Paleoindian lithic scatter located northwest of the Jakes Valley playa (James and Zeier 1981). It is situated in a sagebrush community with rabbitbrush and various grasses. The lithic assemblage consists of two stemmed point bases (both long tapering stems with convex bases) made of FGV (one was collected), three CCS cores, a CCS biface, and 12 flakes of CCS and three of FGV.

Site 26Wp1178 (CRNV-046-1878). This site was also recorded in 1981 by James, Tobey, Pizzo, and Elston, and consists of a Paleoindian lithic scatter northeast of the Jakes Valley playa (James and Zeier 1981). It is situated on a hard-packed silty soil within an open winterfat area. The lithic assemblage includes two stemmed points (one base, one tip—both collected) made on FGV, a CCS biface, and a FGV scraper, and several FGV and CCS flakes.

Site 26Wp3316 (CRNV-046-3794). This upland site consists of a multi-component flake scatter located in the very southern portion of Jakes Valley, on the edge of a hill at 1,951 m asl (6,400 ft) overlooking Jakes Wash (Murray 1985). The site rests on soft sandy silt and is within juniper woodland with sagebrush in the wash below. The lithic assemblage includes one stemmed point midsection that appears to be a Cougar Mountain, made on FGV, three Desert Side-notched points, one Elko Corner-notched point, numerous bifaces, a chopper, core, and two hammerstones accompanied by over 500 pieces of debitage, and some fire cracked rock. The site is eroding down the hill, but no blackened soil was observed, suggesting the hearth feature may have been very ephemeral.

Site 26Wp3808 (CRNV-046-4113. This is another upland Paleoindian site in the southeastern portion of Jakes Valley, above Jakes Wash. It was recorded by Brian C. Amme and John Zancanella of the Ely District BLM Field Office. The site is situated at 2,042 m asl (6,700 ft) on a prominent ridge of the Egan Range foothills on the north side of a saddle. Vegetation on site consists of sagebrush, pinyon, and juniper. This single-component Paleoindian site contains at least six Western Stemmed Tradition points (two of which are complete—a Cougar Mountain, and Haskett), scrapers, beaked gravers, bifaces, choppers, multi-directional cores, as well as more than 500 large flakes of FGV and CCS with some rhyolite and obsidian, including blade flakes, side-struck flakes, and bi-polar cobble reduction flakes.

Site 26Wp3809 (CRNV-046-4149. This multi-component site is also in the uplands of the southeastern portion of Jakes Valley in the Egan Range. It is situated on a bedrock ridge covered with sand, overlooking Jakes Wash within a sparse pinyon-juniper woodland. A petroglyph panel is located within 150 m of this site. The lithic assemblage includes a stemmed point base made of FGV and an Elko series point made on purple CCS, as well as gravers, knives, and 50-100 flakes of FGV and CCS.

Site 26Wp3469 (CRNV-046-4747). This site is a very large, multi-component scatter located in a small valley north of Antelope Summit on the east slope of the White Pine Range and west of the Butte Mountains (Price 1986b). This area is technically the pass between Jakes and Long Valley (Price and Johnston 1988). The site is within a sagebrush zone with juniper towards the southern boundary. Sixteen distinct lithic concentrations were observed by Price in 1986. The vast tool assemblage includes two WST points (one of which has two parallel basal thinning scars on one face that resemble flutes), a Humboldt point, three Elko series points, a Rose Spring point, and a Desert Side-notched point. Other tools include numerous bifaces, cores, drills, knives, scrapers, ground stone fragments (including a trough metate fragment), a few pieces of ceramics, and three areas of fire cracked rock. Debitage (n>500) on site consists primarily of CCS (99%), with only a few pieces of obsidian, FGV, and other materials. The two WST points occurred in a concentration separate from the others near the southern boundary at a higher elevation.

Site 26Wp209 (CRNV-046-4782). Very little information is available about this site recorded by Tuohy in 1971. The site record notes that it is situated within a pinyon-juniper woodland north of the Jakes Valley playa on the eastern slope of the Butte Mountains at an elevation of 6,620 ft. (~2,019 m). The site consists of a single flake and a "Clovis-like" base (however, no sketch or photograph was supplied with the site record). No further information is noted on the site record, and it is unknown if the point base was collected. The preliminary findings from an archaeological survey of a proposed ~300 mile long, 230 kilovolt electric transmission line that passes through Jakes Valley were reported in the Nevada Archaeologist (Tuohy 1974b). According to the Nevada Cultural Resources Information System (NVCRIS), this site was within that survey. Tuohy (1974b) notes that no "Early Man" tools were analyzed from this project; line sketches (p. 20) show a single concave-base projectile point fragment that seems to match the description of "Clovis-like." If this illustration represents the artifact from site 26Wp209, I would not classify it as a Western Fluted point. More likely, it represents a Black Rock Concave Base point, as it lacks true fluting. If this sketch does not represent the artifact from 26Wp209, I still must remove this site from its status as a Western

Fluted site because I could not validate its claim. Therefore, due to insufficient reporting, this site is removed from consideration.

Isolated Artifact 26Wp1097i (CRNV-046-2003i). This isolated Western Fluted point was located in the center of the Jakes Valley playa. The vegetation is dominated by winterfat, with some foxtail (genus *Setaria*) and bunchgrass. It was located by Bob Harmon, Melissa Kennard, Paul Keyser, and Steve Roche working for the MX-Missile System Project (Busby and Kobori 1980). Based on the artifact sketch and cross section, this point was fluted on both sides and is missing its tip and one basal corner. It is made of a dark brown CCS, has a concave base and is near parallel-sided with regular edge trimming. Edge grinding is not indicated on the sketch.

Discussion

Jakes Valley provides a unique opportunity to explore the Paleoindian occupation of a high elevation valley in the Great Basin. The high density of Western Fluted and especially Western Stemmed Tradition sites in Jakes Valley allows not only for the comparison of lithic technological organization, lithic conveyance zones, and mobility, but also landscape use as well as settlement systems. The temporal relationship between WF and WST occupations within the Great Basin is hotly debated, with many researchers assuming the traditional model of "Clovis First" (Willig and Aikens 1988), while others speculate the opposite (Beck and Jones 2008b; Bryan 1988). Because the temporal relationship of these two traditions is unclear, further discussion is appropriate.

Temporal Placement of Jakes Valley Assemblages

This thesis deals with a number of known archaeological sites within Jakes Valley, mostly of Paleoindian age; but some contain a mixture of Paleoindian and later Archaic materials. This is a constant problem within the Great Basin that boasts primarily a surface record. Mixing of later materials with old is a fact that must be dealt with. Because the sites are all surface assemblages, no direct absolute dating is possible. I rely on temporal sequences defined in Chapter 2 and based almost entirely on projectile point typology. Types have been reliably dated in various caves and rockshelters in the Great Basin, and have been shown to be easily identifiable and reliable, although somewhat coarse-grained, temporal markers or index fossils (Thomas 1981). When multi-component sites were analyzed, I used only the undiagnostic debitage if and when clear Paleoindian work areas were identified at the site. Work areas were identified as concentrated areas of debitage in association with diagnostic Paleoindian tools and a lack of later Archaic points. However, I think all sites with any Paleoindian diagnostics can still contribute to a study of landscape use within Jakes Valley.

All of the sites described above contain diagnostic Paleoindian artifacts, defined here as Western Fluted points, Black Rock Concave Base points, or points of the Western Stemmed Tradition (Cougar Mountain, Parman, Haskett, Silver Lake, Lake Mohave, or Windust). Other point types found at some of these sites contain Early Archaic (Early Holocene) points, such as Pinto and Large Side-notched points. Middle Archaic points include Humboldt, Gatecliff, and Elko series points. Late Archaic points include Rose

Spring, Eastgate, and Desert Series points. The temporal span at each site was defined based on the occurrence of these diagnostic points.

Dating Techniques

In 1960 archaeologists working with obsidian identified the characteristic trait of water vapor absorption on freshly broken or exposed faces (Friedman and Smith 1960). Over time the moisture accumulates forming a 'hydration band' visible and measurable under 200-300x magnification (Solomon 2000). The absorption of moisture is dependent upon several factors, including relative humidity, temperature, and chemical composition (indicating that each obsidian hydrates at its own rate); rind thickness can become reduced through such agencies as burning or erosion (Friedman and Smith 1960). Correlations between band thickness and independently dated features (e.g., a radiometrically dated hearth) with which obsidian artifacts are directly associated has been useful in creating hydration curves to correlate absolute dates and band thickness (Friedman and Smith 1960). However, the accuracy of obsidian hydration (OHD) to provide absolute ages is argued (Anovitz et al. 1999; Ridings 1996; but see also Hull 2001). When used as a relative dating technique, comparing band thicknesses of temporally diagnostic artifacts from the same obsidian source, OHD has been shown to work well (Beck 1999; Beck and Jones 1994, 2000; Jones and Beck 1999; Tuohy 1980).

The Paleoindian sites described in this thesis are all surface or near-surface assemblages of material culture. No buried deposits were found that could show stratigraphic separation of Western Fluted and Western Stemmed traditions. Instead, obsidian hydration was employed as a relative dating technique in an attempt to identify the temporal sequence of these traditions in Jakes Valley. Diagnostic WF and WST points and undiagnostic tools and debitage associated with each tradition were cut for hydration to allow analysis. Artifacts from each tradition were chosen for hydration if obsidian sources were shared, thus comparing apples to apples. This allowed for the comparison of three shared obsidian sources: Browns Bench, Modena, and Wild Horse Canyon. Mean hydration readings were then statistically compared using the Student's T-Test.

Settlement Patterns

As can be seen in the site descriptions above, the majority of the Paleoindian sites in Jakes Valley are small, single use camp sites, processing sites, or retooling stations. Only the Jakes Depression and Long Peak Locality 1 sites, located in the southern portion of the valley, are of any great magnitude in size, density, and number of artifacts. These two sites contain hundreds of artifacts, while the rest only contain tens of artifacts. This observation allows for further testing. Are these large sites something different than the small sites? Could they represent 'residential bases' (*sensu* Binford 1980), or prolonged stay areas, or are they just good spots (i.e., Binford's 'locations') around the lake that were repeatedly occupied for short durations? These questions are tackled in this thesis by looking at richness, diversity, and equitability statistics (discussed in Chapter 3) of lithic assemblages at each site, then comparing large to small sites.

If large sites contain a higher richness and diversity than small sites, this would indicate that a more diverse set of activities were performed, possibly representing more permanent occupations. If large and small sites appear similar in richness and diversity, they likely formed through similar processes and the large sites represent repeated short-term occupations at a favored spot around the lake.

The Western Pluvial Lakes Tradition model posits that Paleoindian groups in the Great Basin were specially adapted to pluvial lake environments, suggesting a more permanent occupation of the valley floors near these lakes. If true, we would expect a logistically mobile settlement system where Paleoindian groups created residential base camps near the lake and sent logistic task groups to extract resources from the surrounding environment. Thus, if these "large sites" in Jakes Valley contain higher richness and diversity indices than the small sites, we may assume they represent base camps. If, however, the large sites and small sites have similar richness and diversity, then we may assume that they are similar types of sites (e.g., residential base camps, processing sites, butchering sites, etc.) and do not represent anything different, but are accumulations of numerous small visits by highly mobile populations.

Landscape Use

The sites and isolated finds listed above detail the extent to which Paleoindians utilized this valley during the Pleistocene-Holocene transition. By plotting where Paleoindian sites are located I planned to identify how these early hunter-gatherers settled in the valley, and hope to understand why certain areas were chosen over others. The reported elevation and geographic setting of each site described above are listed in Table 4.4. Twenty-six distinct sites are noted in this table, but for purposes of comparing Western Fluted and Western Stemmed Tradition sites, the Jakes Depression concentrations have been added to each respective phase. Although six sites contain WF points, only two are single-component, and one more contains a WF concentration area, totaling three sites, and one isolate. All of these sites are located on the valley floor and are likely directly associated with wetland patches created near the termination of Illipah Creek near the playa. Averaging the elevations of these sites (excluding the isolate) I find they center around 1,928 m (6,324 ft). Four sites contain both Paleoindian traditions, and their elevations average 1,929 m (6,327 ft).

Twenty Western Stemmed Tradition sites and three isolates are reported within Jakes Valley and the surrounding mountain ranges. All but four of these sites are located on the valley floor. Several of those on the valley floor, however, are likely not associated directly with wetland patches near the playa. 26Wp7746 and 26Wp7748 are situated fairly close to Illipah Creek and are located several kilometers north of the Paleoindian cluster of sites that are believed to represent shore-line occupations. If these four sites can reasonably be assumed to have no direct connection to Pluvial Jakes Lake and be removed from consideration, the remaining 16 site elevations (excluding isolates) average 1,930 m (6,331 ft). Averaging all WST sites results in an elevation of 1,950 m (6,398 ft).

Table 4.4. Elevation and Environment Information for Jakes Valley Paleoindian Sites and Isolates.

Tradition	Other Name	CRNV-046-	Trinomial	Type	Setting	Elev. (ft)	Reference
WF	Jakes Depression	7721	-	B	1	6,327	Goebel et al. (2004)
WF	Waldy Pond 9	-	26Wp7729	A	1	6,319	Estes & Goebel (2007)
WF	Illipah 4	-	26Wp7735	A	1	6,326	Estes & Goebel (2007)
WF	-	2003i	26Wp1097i	C	1	6,300	Busby and Kobori (1980)
WF/WST	Limestone Peak Locality 1	1844	26Wp4927	A	1	6,330	Polk (1982); Jones et al. (2003)
WF/WST	Illipah Creek 1	1873	26Wp1173	A	1	6,322	Estes & Goebel (2007)
WF/WST	Doug 3	1877	26Wp1177	A	1	6,325	Estes & Goebel (2007)
WF/WST	Jakes Depression	7721	-	A	1	6,330	Vierra and McQueen (2000)
WST	-	1867	26Wp1167	A	1	6,360	James and Zeier (1981)
WST	Illipah 11	1875	26Wp1175	A	1	6,340	Estes & Goebel (2007)
WST	-	1878	26Wp1178	A	1	6,330	James and Zeier (1981)
WST	-	3794	26Wp3316	A	3	6,400	Murray (1985)
WST	Jakes Wash Paleo Site	4113	26Wp3808	A	3	6,700	Amme (1989)
WST	-	4149	26Wp3809	A	3	6,370	Amme (1989)
WST	-	4747	26Wp3469	A	3	Avg.=7,185	Price (1986b)
WST	Jakes Depression	7721	-	B	1	6,329	Goebel et al. (2004)
WST	Zandra 3	9604	26Wp7323	A	1	6,330	Estes & Goebel (2007)
WST	Zandra 1	9631	26Wp7321	A	1	6,329	Estes & Goebel (2007)
WST	Megan 1	9632	26Wp7317	A	1	6,324	Estes & Goebel (2007)
WST	Illipah Creek 8	9633	26Wp7335	A	1	6,322	Estes & Goebel (2007)
WST	Travis 1	9635	26Wp7318	A	1	6,326	Estes & Goebel (2007)
WST	Liz 1	9636	26Wp7336	A	1	6,323	Estes & Goebel (2007)
WST	Jakes Pond 3	9641	26Wp7316	A	1	6,320	Estes & Goebel (2007)
WST	Illipah Creek 7	9643	26Wp7334	A	1	6,322	Estes & Goebel (2007)

Table 4.4 (continued). Elevation and Environment Information for Jakes Valley Paleoindian Sites and Isolates.

Tradition	Other Name	CRNV-046-	Trinomial	Type	Setting	Elev. (ft)	Reference
WST	Illipah 8	-	26Wp7738	A	1	6,338	Estes & Goebel (2007)
WST	Illipah 9	-	26Wp7739	A	1	6,342	Estes & Goebel (2007)
WST	North Illipah Creek 1	-	26Wp7746	A	2	6,336	Estes & Goebel (2007)
WST	North Illipah Creek 3	-	26Wp7748	A	2	6,343	Estes & Goebel (2007)
WST	Isolate 6	-	-	C	1	6,326	Estes & Goebel (2007)
WST	Isolate 12	-	-	C	1	6,322	Estes & Goebel (2007)
WST	Isolate 34	-	-	C	1	6,342	Estes & Goebel (2007)

Note: **Tradition:** WF=Western Fluted; WST=Western Stemmed Tradition. **Type:** A=Site; B=Concentration in Site; C=Isolate. **Setting:** 1=Valley Floor; 2=Riverine; 3=Upland

Lithic Conveyance Zones

Jones et al. (2003) describe lithic conveyance zones as the geographic foraging territories that are contained within the areas of extra-local obsidian exploitation. Those areas within the boundary defined by the utilized extra-local obsidian sources make up the hunter-gatherer lithic conveyance zone. Because most researchers believe that Paleoindian groups were small in number and population, raw material procurement would likely have been procured directly, with little or no exchange (Jones et al. 2003; Kelly and Todd 1988). Thus, raw material procurement was likely embedded in Paleoindian mobility patterns and general resource extraction systems (i.e. hunting or gathering episodes). In this thesis I follow Jones et al. (2003) in using these known obsidian sources as the limits of Jakes Valley Paleoindian geographic foraging territories and lithic conveyance zones.

Chapter 5

The Jakes Valley Lithic Assemblages

This chapter describes the results of my analysis of lithic technological organization, mobility, settlement systems, landscape use, and lithic conveyance zones as interpreted from the various Jakes Valley Paleoindian assemblages reported in Chapter 4. The materials from each site described in Chapter 4 are analyzed here in the following categories: raw materials, cores, tools (including bifaces and unifaces), and debitage. Inter-assemblage comparisons are then made between Western Fluted and Western Stemmed Tradition sites. This comparison focuses on raw material, obsidian use and conveyance zones, obsidian hydration, tool classes, biface-to-core ratio, formal-to-informal tool ratio, biface reduction stages, debitage classes, richness, diversity, and landscape use. In this manner I hope to demonstrate how the two traditions, Western Fluted and Western Stemmed, differ in their cultural remains; I then their possible meanings.

CRNV-046-7721 (Jakes Depression)

This site contains 559 lithic artifacts, including 159 pieces of debitage, 8 cores, 213 bifaces, 178 unifaces, and one piece of groundstone, which I have left out of this analysis because of its likely post-Paleoindian age.

Raw Material

Five types of raw material are present at the Jakes Depression site, including CCS, obsidian, FGV, quartzite, and rhyolite. The 558 artifacts (excluding the groundstone) are composed primarily of FGV (n=253, 45.3%), and CCS (n=217, 38.9%), with lesser amounts of obsidian (n=83, 14.9%), and very little quartzite (n=4, 0.7%) and rhyolite (n=1, 0.2%).

Core Analysis

Eight cores were identified at the Jakes Depression site, seven of which are multi-directional and one is uni-directional. Seven cores are made from CCS and one multi-directional core (FS509) is made from Smith Valley FGV, quarried 22 km east of Jakes Valley. Table 5.1 lists the cores and their attributes. The uni-directional core (FS366)

Table 5.1. Jakes Depression Core Attributes.

FS #	Core Type	Raw Material	Max Linear Dimension (cm)	Wt (g)	Size Value (MLD x Wt)	# of Detachment Scars	# of Platforms	# of Fronts (faces)
123	Multi-directional	CCS	5.4	63.2	341	6	4	3
172	Multi-directional	CCS	4.7	20.9	98	6	4	3
202	Multi-directional	CCS	4.7	36.0	169	10	4	3
203	Multi-directional	CCS	3.5	15.3	54	4	2	2
366	Uni-directional	CCS	3.5	11.5	40	6	1	2
451	Multi-directional	CCS	7.7	96.1	740	7	4	3
509	Multi-directional	FGV	9.8	338.9	3321	5	4	3
511	Multi-directional	CCS	4.6	21.2	98	4	4	4

represents the only core found directly associated with either of the two Paleoindian traditions present at Jakes Depression (Figure 5.1). It was found in the Western Stemmed Tradition concentration area within this site.

Tool Analysis

Three hundred ninety-nine tools were collected from the Jakes Depression site (see Table 4.1), including 213 bifaces and 178 unifaces. These tools were made from five raw material types, primarily CCS (n=168, 42.1%) and FGV (n=165, 41.4%), with lesser quantities of obsidian (n=61, 15.3%) and very little quartzite (n=4, 1.0%) and rhyolite (n=1, 0.3%).

Bifaces. Of the 213 bifaces at the Jakes Depression site, 103 have features indicating they were made to be hafted (including three stemmed points reworked into a drill, graver, and an end scraper) and 110 are unhafted. The hafted bifaces are made from FGV (n=58, 56.3%), CCS (n=22, 21.4%), obsidian (n=19, 18.4%), quartzite (n=3, 2.9%), and rhyolite (n=1, 1.0%). The 100 hafted bifaces with no obvious reworking into new tool types are divided into Western Fluted points (n=5, 5.0%), Black Rock Concave Base points (n=2, 2.0%), and various Western Stemmed Tradition point types, including Cougar Mountain (n=17, 17.0%), Parman (n=14, 14.0%), Haskett (n=5, 5.0%), Windust (n=1, 1.0%), broken/unidentifiable stemmed point fragments (n=41, 41.0%), crescents (n=14, 14.0%), and unidentifiable point fragments (n=1, 1.0%). Four of the five fluted points are basal fragments, and one is a midsection near the base as evidenced by flute scars on each side. Three of the fluted points are made from CCS (FS109, 143, and 200), and two are obsidian (FS289 and 523) coming from the Modena and Wild Horse Canyon obsidian quarries, respectively.

The 110 unhafted bifaces are made from FGV (n=66, 60.0%), CCS (n=29, 26.4%), obsidian (n=14, 12.7%), and quartzite (n=1, 0.9%). These unhafted bifaces were categorized into four stages of refinement (see Chapter 3) as early stage (n=12, 10.9%), middle stage (n=32, 29.1%), late stage (n=39, 35.5%), or finished but unhafted (n=27, 24.5%). This includes one fluted biface categorized as middle stage (Figure 5.1).

The Western Fluted work area contains nine bifacial tools, including three hafted bifaces (two Western Fluted points and one crescent), and six unhafted bifaces. FS109 is a Western Fluted point basal fragment made of a tan-colored CCS, and has a lateral snap above the flute scars, with burin scars on each edge of the break (Figure 4.1a). The base is shaped like an inverted V forming pronounced ears at the base, and it appears to have a small notch in the center, probably from the last flute flake removal. One of the ears is burinated which could also be the cause of the apparent “notch.” Side A was fluted twice, each ending in a step fracture below the snap. Side B was fluted once and was truncated by the lateral snap. Both lateral edges and remaining section of the base are edge-ground. FS289 is a medial section of a Western Fluted point, apparently from near the base as evidenced by the visible flute scars on each side (Figure 4.1d). This point is made from obsidian sourced to the Modena quarry. This point has been fluted once per side, and both flake scars are truncated proximally and distally. Scratches are present only on the flute scar of side A. The final remaining hafted biface from this work area is a quarter-moon crescent made from a CCS flake, exhibiting only dorsal edge modification.

The other Western Fluted points were not found in the work area but are described here. FS143 is a small and narrow fluted point fragment consisting of the basal portion and is made on a mottled green-brown-white CCS (Figure 4.1b). The point has a lateral snap above the flute scars on each face. Each side has been fluted once; the flute on side A measures 1.4 cm long and 1.1 cm wide; the flute on side B measures 1.3 cm long and 1.5 cm wide. The lateral margins and base are edge-ground. FS200 is an orange-colored CCS Western Fluted point fragment, consisting of the proximal half (Figure 4.1c). Each face has been fluted once and both were truncated by the lateral snap of the point. The base is straight to slightly concave and exhibits edge and basal grinding. FS523 is a basal fragment of an obsidian Western Fluted point, sourced to the Wild Horse Canyon quarry (Figure 4.1e). This point has been fluted twice on each side, all of which have been truncated by the lateral snap. Both primary flute scars have visible scratches. The point has a concave base and exhibits lateral and basal edge grinding.

The unhafted bifaces from the Western Fluted work area are manufactured from obsidian (n=3, two from Modena, and one Browns Bench), CCS (n=2), and FGV (n=1). The bifacial reduction stages present include early stage (n=1, 16.7%), middle stage (n=1, 16.7%), late stage (n=1, 16.7%), and finished but unhafted (n=3, 50.0%).

The Western Stemmed Tradition work area contains 23 hafted (22 stemmed points and one crescent) and 44 unhafted bifaces. Raw material represented among the hafted bifaces includes FGV (n=20, 87.0%), obsidian (n=2, 8.7%) and CCS (n=1, 4.3%). The stemmed point types represented include six Parman stemmed points, one Haskett stemmed point, one Windust stemmed point, four Cougar Mountain stemmed points, nine stemmed point fragments, and one unidentifiable point fragment. The crescent (FS88) is a wing fragment of a quarter-moon crescent that exhibits no edge-grinding, made on FGV. Both obsidian stemmed points were sourced to Browns Bench. Eight stemmed points made on FGV were sourced to Diamond Mountains (n=1), Smith Valley (n=1), and unknown (n=6).

The unhafted bifaces from the Western Stemmed Tradition work area are manufactured from FGV (n=37, 84.1%), CCS (n=5, 11.4%), and obsidian (n=2, 4.5%). The bifacial reduction stages present include early stage (n=3, 6.8%), middle stage (n=13, 29.5%), late stage (n=19, 43.2%), and finished but unhafted (n=9, 20.5%).

Unifaces. The raw material selection for the 178 unifacial tools breaks down into three categories, including CCS (n=110, 61.8%), FGV (n=40, 22.5%), and obsidian (n=28, 15.7%). Unifacial tools represented at the Jakes Depression site include side scrapers (n=30, 16.9%), end scrapers (n=39, 21.9%), gravers (n=8, 4.5%), backed knives (n=3, 1.7%), notches (n=1, 0.6%), combination tools (n=14, 7.9%), and retouched flakes (n=83, 46.6%). Of great interest is FS497, a channel flake made from an orange/tan colored CCS that exhibits parallel sides, previous flake scars that meet in the center forming a medial ridge, a constricted neck and isolated platform with grinding, and near perfectly flat ventral face (Figure 5.1). This channel flake, after removal from a Western Fluted point, was utilized on both lateral edges and had a single graver spur fashioned onto the distal end. This diagnostic flake indicates Western Fluted point manufacture at the Jakes Depression site or transport of the channel flake as a curated tool.

The Western Fluted work area contains 14 unifacial tools plus the channel flake tool totals 15 tools made from CCS (n=6, 40.0%), obsidian (n=8, 53.3%), and FGV (n=1,

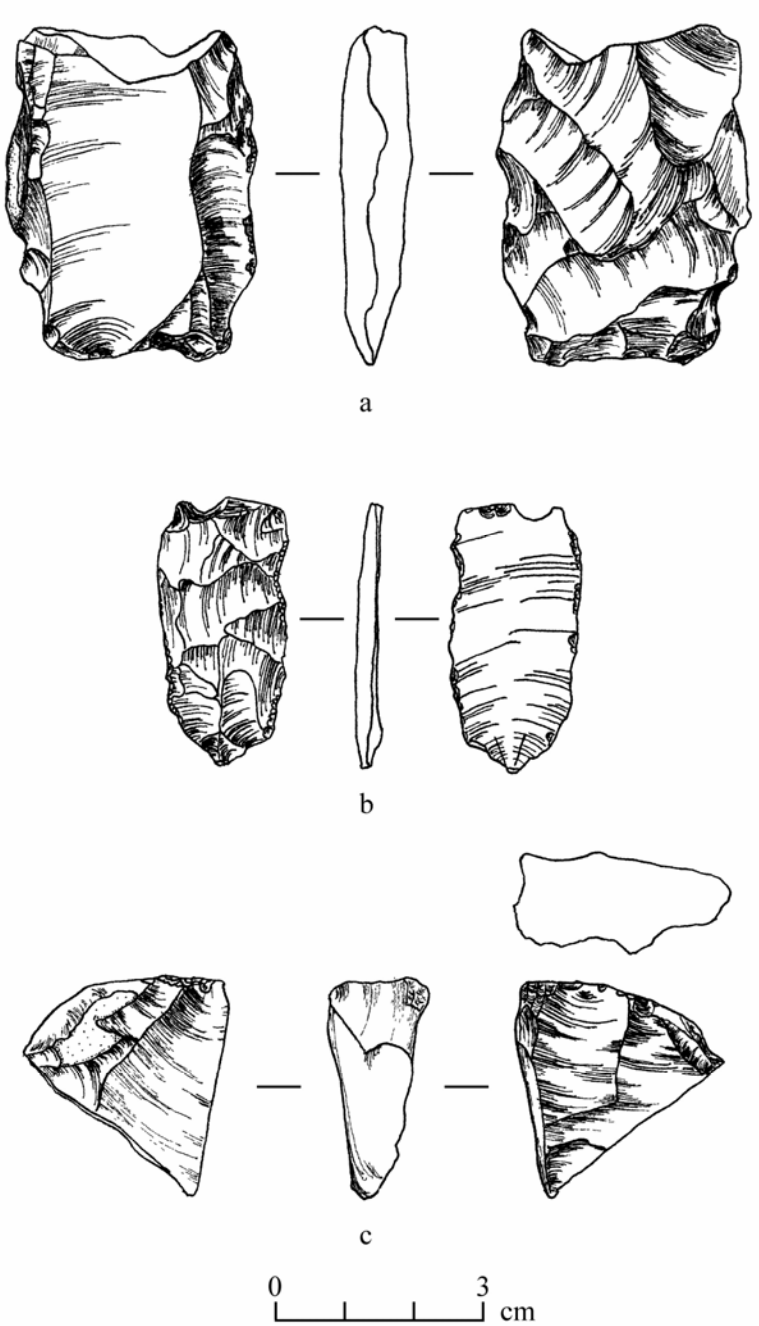


Figure 5.1. Special tools from Jakes Depression noted in text: (a) fluted biface; (b) channel flake; (c) uni-directional core. All specimens manufactured on CCS. Illustrations by author.

6.7%). These tools include 12 retouched flakes (80.0%), one single-spurred graver (6.7%), one combination retouched flake/graver tool (6.7%), and one side scraper (6.7%).

The Western Stemmed Tradition work area contains 38 unifacial tools made from FGV (n=23, 60.5%), CCS (n=13, 34.2%), and obsidian (n=2, 5.3%). These tools include 21 retouched flakes (55.3%), seven end scrapers (18.4%), six side scrapers (15.8%), and one each (2.6% ea.) multiple-spurred graver, backed knife, notch, and combination scraper/graver tool.

Debitage Analysis

Despite the large size and density of tools recovered from the Jakes Depression site, only 159 pieces of debitage were collected. The majority of these were located in either the Western Fluted or Western Stemmed Tradition concentration areas (n=44 and 90, respectively). Raw materials used to manufacture these flakes includes FGV (n=88, 55.3%), CCS (n=49, 30.8%) and obsidian (n=22, 13.8%). Table 5.2 compares the raw material and flake classes between the WF and WST concentrations. Debitage platform types can inform on the pervasive reductive technology used by a group. At the Jakes Depression site, noted platform types include unidentifiable/broken (n=94, 59.1%), cortical (n=4, 2.5%), simple (n=16, 10.1%), and complex (n=45, 28.3%). If we disregard flakes without proximal ends, the distribution become cortical (n=4, 6.2%), simple (n=16, 24.6%), and complex (n=45, 69.2%). Figure 5.2 compares flakes with proximal ends at the WF (n=15) and WST concentrations (n=36). In addition, debitage size values and weights are compared between the WF and WST concentrations (Figures 5.3 and 5.4, respectively).

Table 5.2. Jakes Depression Debitage Classes and Raw Material at the Western Fluted Concentration (WF) and Western Stemmed Tradition Concentration (WST).

Tradition	Class	Raw Material CCS	 FGV	 OBS	Total
WF concentration	CS	4 (9.1%)	-	-	**4**
	F	16 (36.4%)	3 (6.8%)	11 (25.0%)	**30**
	RC	4 (9.1%)	-	6 (13.6)	**10**
	AS	-	-	-	**0**
WST concentration	CS	1 (1.1%)	10 (11.1%)	-	**11**
	F	3 (3.3%)	46 (51.1%)	3 (3.3%)	**52**
	RC	9 (10.0%)	17 (18.9%)	1 (1.1%)	**27**
	AS	-	-	-	**0**
Total		**37**	**76**	**21**	**134**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

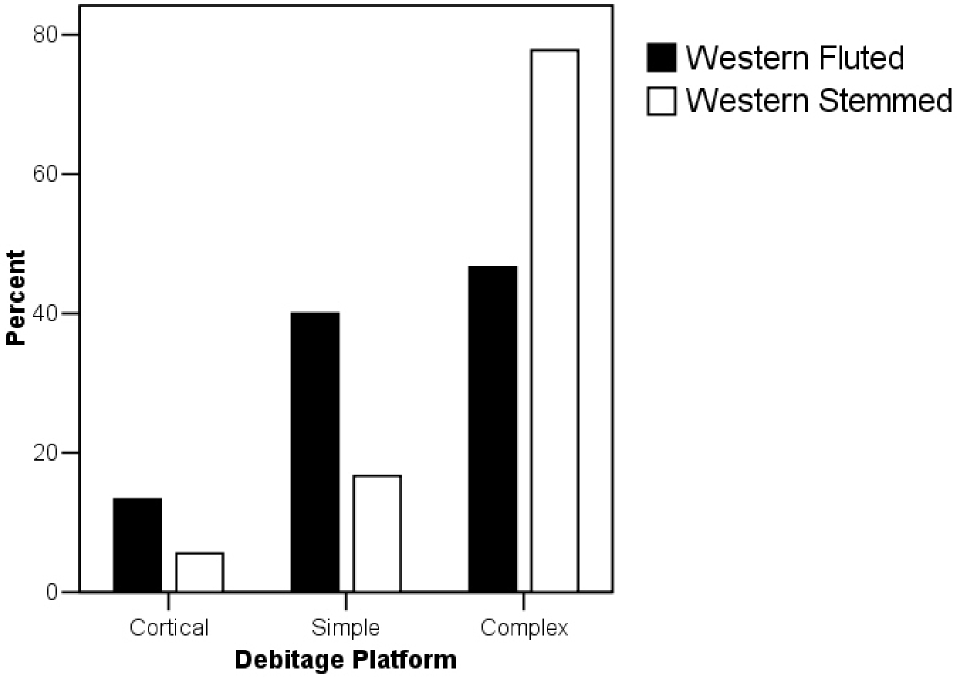


Figure 5.2. Debitage platform types present at the Western Fluted (n=15) and Western Stemmed Tradition concentrations (n=36) at Jakes Depression.

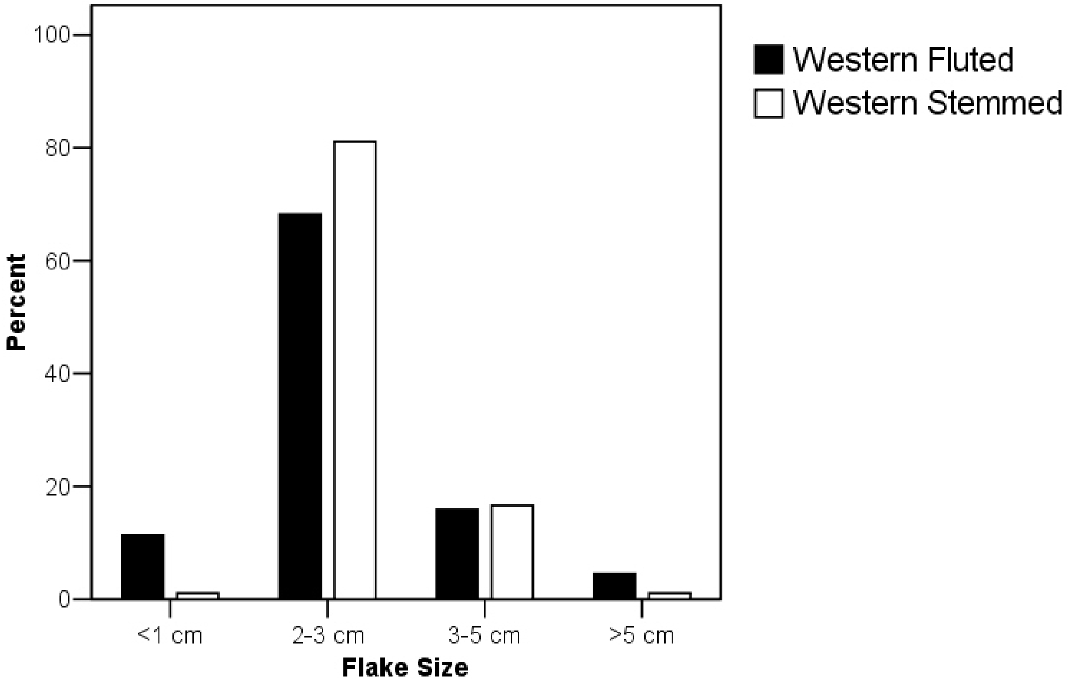


Figure 5.3. Debitage size values present at the Western Fluted (n=44) and Western Stemmed Tradition concentrations (n=90) at Jakes Depression.

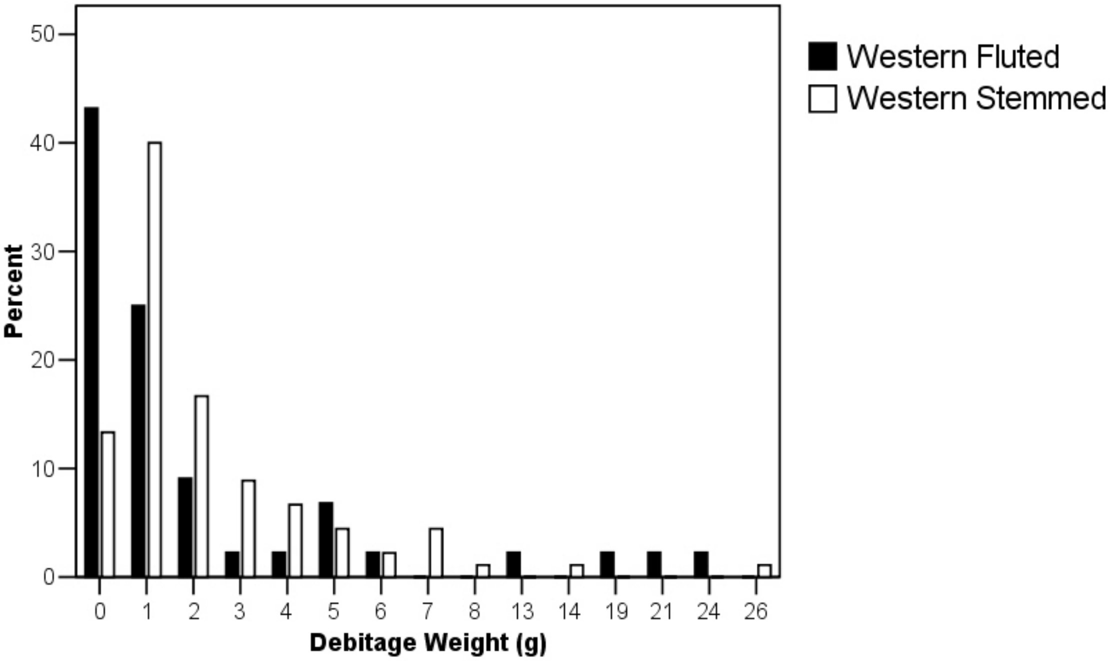


Figure 5.4. Debitage weight (g) at the Western Fluted (n=44) and Western Stemmed Tradition concentrations (n=90) at Jakes Depression.

Site 26Wp1173 (Illipah Creek 1)

This site contains 277 artifacts, including 240 pieces of debitage, one core, 22 bifaces, and 14 unifaces. However, this site is multi-component including both Paleoindian traditions and later Archaic materials. No obvious Paleoindian work areas were identified; only diagnostic WF and WST artifacts are described below.

Tool Analysis

Bifaces. Four diagnostic Paleoindian hafted bifaces were identified at this site, including one WF point base and three WST points (Figure 4.5). The WF point base (FS38) is made on white CCS that fluoresced a deep maroon color under short-wave ultraviolet light, dissimilar from Tosawihi chert that fluoresces green, suggesting this material is not from the Tosawihi quarry (Rondeau 2006b). This fluted point base exhibits lateral and basal grinding, a slightly concave base, two flute scars on each face truncated by the lateral snap of the point, and a bi-concave cross-section (Figure 4.5a). Two of the three WST points are bases broken below the shoulders, and all exhibit lateral edge grinding but no basal grinding. FS34 is made from rhyolite and has a long contracting stem, suggesting it is either a Haskett or Cougar Mountain stemmed point type (Figure 4.5d). FS56 was sourced to an unknown obsidian quarry and exhibits a straight-sided stem with a straight to slightly convex base, suggesting either a Windust or Parman stemmed point type (Figure 4.5c). FS65 is a complete Silver Lake stemmed point made from Tempiute obsidian and has an expanding stem with convex base, expanding shoulders, and exhibits extensive resharpening on the blade (Figure 4.5b).

Site 26Wp1177 (Doug 3)

This site contains 137 artifacts, including 115 pieces of debitage, one core, 13 bifaces, and eight unifaces. It is a mixed Paleoindian site, containing both WF and WST point types. No clear WF or WST work areas were identified, but since this site contains strictly Paleoindian diagnostics, all artifacts are described below.

Raw Material

Three types of raw material were identified at this site: FGV, CCS, and obsidian. The 137 artifacts are made primarily from FGV (n=72, 52.6%), with high quantities of CCS (n=49, 35.8%), and lesser amounts of obsidian (n=16, 11.7%).

Core Analysis

Table 5.3 describes the single multi-directional core (FS17) found at this site.

Table 5.3. Core Attributes from Site 26Wp1177.

FS #	Core Type	Raw Material	Max Linear Dimension (cm)	Wt (g)	Size Value (MLD x Wt)	# of Detachment Scars	# of Platforms	# of Fronts (faces)
17	Multi-directional	CCS	3.6	18.4	66	4	4	3

Tool Analysis

Twenty-one tools were recovered from 26Wp1177, including 13 bifaces and eight unifaces. The raw materials of these 21 tools include CCS (n=10, 47.6%), FGV (n=6, 28.6%), and obsidian (n=5, 23.8%).

Bifaces. Thirteen bifaces were recovered and analyzed, consisting of six hafted and seven unhafted bifaces. The hafted bifaces include one lateral margin of a WF point and five WST point fragments, of which three are typed as Windust and two are base fragments missing shoulders that would allow classification. The WF point fragment is made from Modena obsidian, exhibits a flute scar that truncates at least five parallel flake scars from the lateral edge, and is lightly edge-ground (Figure 4.6a). Two WST points are sourced to the Smith Valley FGV quarry, one is Modena obsidian, one is Black Rock Area obsidian, and one is CCS. All WST points exhibit lateral edge grinding but no basal grinding.

Unhafted bifaces at site 26Wp1177 consist of CCS (n=4, 57.1%) and FGV (n=3, 42.9%). These unhafted bifaces were categorized into four stages of refinement as early stage (n=3, 42.9%), middle stage (n=1, 14.3%), and late stage (n=3, 42.9%).

Unifaces. Eight unifacial tools were analyzed from 26Wp1177, including six retouched flakes, one side scraper, and one combination scraper/graver tool. The raw materials used to create these tools consist of CCS (n=5, 62.5%), obsidian (n=2, 25.0%), and FGV (n=1, 12.5%).

Debitage Analysis

One hundred fifteen pieces of debitage were collected from this site. The raw material distribution consists of FGV (n=66, 57.4%), CCS (n=38, 33.0%), and obsidian (n=11, 9.6%). Flake classes present include cortical spalls (n=29, 25.2%), flakes or flake fragments (n=55, 47.8%), retouch chips (n=28, 24.3%), and angular shatter (n=3, 2.6%). Fifty-two of the 115 flakes contained proximal ends, including cortical (n=5, 9.6%), simple (n=15, 28.8%), and complex (n=32, 61.5%). Only two size values are present at this site, 1-3 cm (n=83, 72.2%) and 3-5 cm (n=32, 27.8%).

Site 26Wp7316 (Jakes Pond 3)

This site consists of 40 collected and analyzed artifacts, including 28 pieces of debitage, two cores, four bifaces, and six unifaces. 26Wp7316 is a single-component WST site, and its artifacts are described below.

Raw Material

The 40 artifacts are represented by three different raw materials at 26Wp7316: CCS, FGV, and obsidian. Crypto-crystalline silicates account for 55.0% of the artifact assemblage (n=22), 32.5% is of FGV (n=13), and 12.5% obsidian (n=5).

Core Analysis

Two cores were analyzed from this site, including one made from CCS (FS6), and one from Modena obsidian (FS13). Core attributes are listed in Table 5.4.

Table 5.4. Core Attributes from Site 26Wp7316.

FS #	Core Type	Material	Max Linear Dimension (cm)	Wt (g)	Size Value (MLD x Wt)	# of Detachment Scars	# of Platforms	# of Fronts (faces)
6	Multi-directional	CCS	6.2	42.0	260	8	6	4
13	Multi-directional	OBS	3.9	13.4	52	18	7	3

Tool Analysis

Ten tools were analyzed from the 26Wp7316 assemblage, including four bifaces and six unifaces. These ten tools are represented by three types of raw material: CCS, obsidian, and FGV. The distribution of raw materials is CCS (n=5, 50.0%), FGV (n=4, 40.0%), and obsidian (n=1, 10.0%).

Bifaces. Four bifaces were collected and analyzed from this site, including three hafted bifaces and one unhafted biface. The three hafted bifaces consist of a Parman stemmed point (FS4) made from Duckwater FGV, a Cougar Mountain stemmed point (FS10) made from Smith Valley FGV, and a long, contracting stemmed point stem (FS1) made from CCS broken below the shoulders hindering further classification, but likely representing either a Haskett or Cougar Mountain stemmed point. The unhafted biface is a late stage biface made from an unknown FGV; it has a long contracting stem and was likely a stemmed point preform.

Unifaces. Six unifacial tools were analyzed from 26Wp7316. The raw materials used to manufacture these tools includes CCS (n=4, 66.7%), FGV (n=1, 16.7%), and obsidian (n=1, 16.7%). Four of the six unifacial tools are retouched flakes, one is a multiple-spurred graver, and one is a side scraper.

Debitage Analysis

Twenty-eight pieces of debitage were analyzed from this site and are represented by three types of raw materials: CCS (n=16, 57.1%), FGV (n=9, 32.1%), and obsidian (n=3, 10.7%). Table 5.5 lists the flake classes by raw material. Most flakes at site 26Wp7316 have broken proximal ends (n=20, 71.4%), the remaining eight flakes have simple (n=2, 7.2%) and complex platform preparation (n=6, 21.4%). Size values of debitage distributes into <1 cm (n=1, 3.6%), 1-3 cm (n=26, 92.9%), and 3-5 cm (n=1, 3.6%).

Table 5.5. Debitage Classes and Raw Material at Site 26Wp7316.

		Raw Material			
Site	**Class**	CCS	FGV	OBS	**Total**
26Wp7316	CS	1 (3.6%)	-	-	**1**
	F	14 (50.0%)	5 (17.9%)	1 (3.6%)	**20**
	RC	1 (3.6%)	4 (14.3%)	2 (7.1%)	**7**
	AS	-	-	-	**0**
Total		**16**	**9**	**3**	**28**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

Site 26Wp7317 (Megan 1)

Ten artifacts were collected from this site, including one core, four bifaces, and five unifaces. No debitage was collected from this site due to its multi-component nature, spanning the Paleoindian through Middle Archaic periods, as evidenced by the presence of a Haskett stemmed point, a Pinto point, and two Gatecliff points. Only the Haskett point is described here.

Tool Analysis

Bifaces. Of the four bifaces recovered from this site, only one is of Paleoindian age. FS8 is a complete Haskett stemmed point made from Smith Valley FGV. This point exhibits collateral flaking and a long, contracting stem that has no edge or basal grinding (Figure 4.6f). This point measures 7.3 cm in length, 2.4 cm in width, 1.0 cm in thickness, and weighs 19.5 g.

Site26Wp7318 (Travis 1)

Three hundred ten artifacts were recovered from this site, including 302 pieces of debitage, five bifaces, and three unifaces. This site is also multi-component, containing a WST point, a Pinto point, and an Elko series point. Two unhafted bifaces may represent stemmed point preforms. No obvious WST work areas were identified, and thus only three artifacts are described here.

Tool Analysis

Bifaces. One biface, and possibly two more, represent WST points. The hafted biface (FS7) is of an unidentifiable stemmed type, as it is broken below the shoulders and above the base. However, it exhibits a long contracting stem with edge grinding and collateral flaking, and likely represents either a Cougar Mountain or Haskett stemmed point. It is made from Buck Mountain/Orchard Canyon FGV. The other two bifaces (FS3 and FS6) are made from Smith Valley FGV and Little Smokey Quarry FGV, respectively. They both appear to have long contracting stems, but neither exhibit edge-grinding. FS6 may be a midsection of a Cougar Mountain stemmed point, as possible shoulders appear to slope gently outwards.

Site 26Wp7321 (Zandra 1)

Ninety-three artifacts were recovered from site 26Wp7321, including 82 pieces of debitage, two cores, five bifaces, and four unifaces. 26Wp7321 is a single-component WST site, and all artifacts are described below.

Raw Materials

Five types of raw materials are represented among the 93 artifacts: CCS, FGV, obsidian, possible sandstone, and rhyolite. The majority of artifacts are made from FGV (n=47, 50.5%) and CCS (n=37, 39.8%), with very few pieces of rhyolite (n=4, 4.3%), obsidian (n=2, 2.2%), and a sandstone-like material (n=2, 2.2%).

Core Analysis

Two cores were analyzed from this site, including one made from FGV (FS1) and one from CCS (FS2). Core attributes are listed in Table 5.6.

Table 5.6. Core Attributes from Site 26Wp7321.

FS #	Core Type	Material	Max Linear Dimension (cm)	Wt (g)	Size Value (MLD x Wt)	# of Detachment Scars	# of Platforms	# of Fronts (faces)
1	Multi-directional	CCS	5.5	39.0	215	6	4	3
2	Multi-directional	OBS	4.7	30.6	144	6	3	4

Tool Analysis

Nine tools were recovered from this site and analyzed, including five bifaces and four unifaces. Three types of raw material were used to manufacture these tools: CCS (n=4, 44.4%), FGV (n=4, 44.4%), and obsidian (n=1, 11.2%).

Bifaces. The biface assemblage includes two hafted and three unhafted bifaces (two of which may be broken blades from stemmed points). The hafted bifaces include a complete Cougar Mountain stemmed point (FS6) made from Tempiute obsidian and an untypeable stemmed point fragment made from Diamond Mountains FGV. The latter exhibits a contracting and edge-ground stem (a possible shoulder may type this point as a Parman stemmed point). The Cougar Mountain point measures 8.5 cm long, 3.1 cm wide at the shoulder, 0.9 cm thick, and weighs 23.2 g. The blade has been reworked, and the lateral stem margins are extensively edge-ground (Figure 4.6d).

The unhafted bifaces are all made from FGV, but were not sourced. Two of these bifaces (FS3 and 4) are finished biface tips that may represent the discarded blades from two broken stemmed points, but neither have shoulders present and are thus labeled as finished but unhafted bifaces. The other unhafted biface (FS12) is a late stage biface edge fragment.

Unifaces. All four unifacial tools analyzed from site 26Wp7321 are retouched flakes made from CCS.

Debitage Analysis

Eighty-two pieces of debitage were collected from site 26Wp7321 and analyzed. Five types of raw material are represented within this assemblage: FGV, CCS, rhyolite, obsidian, and a sandstone-like material. The clear majority of flakes are made from FGV (n=42, 51.2%) and CCS (n=33, 40.2%), with little use of rhyolite (n=4, 4.9%), the

Table 5.7. Debitage Classes and Raw Material at Site 26Wp7321.

		Raw Material					
Site	**Class**	CCS	FGV	OBS	SND	RHY	**Total**
26Wp7321	CS	15 (18.3%)	2 (2.4%)	-	-	-	**17**
	F	10 (12.2%)	20 (24.4%)	-	1 (1.2%)	3 (3.7%)	**34**
	RC	5 (6.1%)	19 (23.2%)	1 (1.2%)	1 (1.2%)	1 (1.2%)	**27**
	AS	3 (3.7%)	1 (1.2%)	-	-	-	**4**
Total		**33**	**42**	**1**	**2**	**4**	**82**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

sandstone-like material (n=2, 2.4%), and obsidian (n=1, 1.2%). Table 5.7 lists the debitage flake classes by raw material. Over half the debitage assemblage (n=48) contains flake fragments with broken proximal ends. The remaining 34 flakes with proximal ends are distributed between cortical (n=1, 2.9%), simple (n=6, 17.6%), and complex platform preparation (n=27, 79.4%). The size values present at this site are distributed thus: <1 cm (n=3, 3.7%), 1-3 cm (n=61, 74.4%), 3-5 cm (n=18, 22.0%).

Site 26Wp7323 (Zandra 3)

The artifact assemblage of the single-component WST site 26Wp7323 consists of 251 artifacts, including 244 pieces of debitage, four bifaces, and three unifaces. Two types of raw material are present at this site: FGV and CCS. The overwhelming majority of artifacts are made from FGV (n=233, 92.8%), with only 7.2% (n=18) made from CCS.

Tool Analysis

Seven tools were collected from 26Wp7323, consisting of four bifaces and three unifaces. All seven tools are made from FGV.

Bifaces. Four bifaces were analyzed, consisting of two hafted and two unhafted bifaces. The hafted bifaces are both representative of the WST, but neither were classified, each consisting of midsections with some shouldering and edge-grinding on the broken stems. These two FGV stemmed points were sourced to the Duckwater and Little Smokey quarries. The unhafted bifaces may represent stemmed point preforms, as neither exhibit edge-grinding, but they appear to be the correct shape and size for either the stem or blade sections of a stemmed point. Both were sourced to the Little Smokey quarry.

Unifaces. Three FGV unifacial tools were analyzed from this site. These tools consist of a side scraper, an end scraper, and a multiple-spurred graver. None of these tools were geochemically characterized, but the end scraper (FS8) and multiple-spurred graver (FS10) appear visually similar to the Little Smokey quarry material (FGV), which has a smooth texture, dark black color, and small light-colored phenocrysts.

Debitage Analysis

Site 26Wp7323 yielded 244 pieces of debitage that were analyzed. These are made predominantly from FGV (n=226, 92.6%), with very little CCS utilized (n=18, 7.4%). Table 5.8 lists the debitage classes present by raw material type. Platform preparation was not analyzed on 155 pieces due to absence of a proximal end on these

Table 5.8. Debitage Classes and Raw Material at Site 26Wp7323.

Site	**Class**	**Raw Material** CCS	 FGV	**Total**
26Wp7323	CS	3 (1.2%)	15 (6.1%)	**18**
	F	14 (5.7%)	151 (61.9%)	**165**
	RC	-	58 (23.8%)	**58**
	AS	1 (0.4%)	2 (0.8%)	**3**
Total		**18**	**226**	**244**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

broken flakes. The remaining 89 flakes exhibit cortical (n=4, 4.5%), simple (n=31, 34.8%), and complex platform preparation (n=54, 60.7%). All size categories are present among the 244 flakes analyzed, with <1 cm (n=5, 2.0%), 1-3 cm (n=79.1%), 3-5 cm (n=41, 16.8%), and >5 cm (n=5, 2.0%).

Site 26Wp7334 (Illipah Creek 7)

This small single-component WST site consists of three collected artifacts, all hafted bifaces. Seven pieces of debitage were noted in the field, but not collected. All three artifacts are described below; the debitage is left out as it was not collected or analyzed.

Tool Analysis

Bifaces. Three hafted bifaces were collected and analyzed from site 26Wp7334. FS1 is a Windust stemmed point made from Modena obsidian. The blade has been highly reworked and only one shoulder remains; the stem is straight-sided, square-shaped and edge-ground, but broken at the very base. FS2 consists of the blade and shoulders of a Parman stemmed point made from Smith Valley FGV (Figure 4.6e). The blade edges are beveled and slightly reworked. The point is broken just below the shoulders, but some light edge grinding is still detectable on the stem. FS3 is a stubby stemmed point, either a Windust or Parman stemmed point made on Browns Bench obsidian, with a short contracting stem with edge-grinding and straight base.

Site 26Wp7335 (Illipah Creek 8)

This site consists of 92 collected and analyzed artifacts, including 83 pieces of debitage, one biface, and eight unifaces. It is a single-component WST site and the artifacts are described below.

Raw Material

Four types of raw materials are present among the 92 artifacts at this site, including CCS, FGV, obsidian, and rhyolite. The majority of the artifacts are made from FGV (n=86, 93.5%), with very little use of CCS (n=3, 3.3%), obsidian (n=2, 2.2%), and rhyolite (n=1, 1.1%).

Tool Analysis

Nine tools were recovered and analyzed from this site, including one biface and eight unifaces. The raw materials present reflect roughly the same percentages as the total artifact percentages, with FGV dominating (n=7, 77.8%), and CCS and obsidian accounting for one artifact each (11.1% ea.)

Bifaces. Only one bifacial tool was found at this site; a Windust stemmed point made from Modena obsidian. It has been extensively reworked and no longer has shoulders. Its stem is square and edge grinding is present on the lateral edges and base (Figure 4.6c).

Unifaces. Eight unifacial tools were collected and analyzed from this site. All but one (FS13, an end scraper made from CCS) are made from FGV. The tool types include two side scrapers, one end scraper, four retouched flakes, and one combination biface/side scraper tool.

Debitage Analysis

Eighty-three pieces of debitage were collected and analyzed from site 26Wp7335. The majority of these flakes are made from FGV (n=79, 95.2%), with few specimens of CCS (n=2, 2.4%), obsidian (n=1, 1.2%), and rhyolite (n=1, 1.2%). Table 5.9 presents the debitage listed by flake class and raw material. Fifty-eight flakes do not contain proximal ends and platforms could not be categorized. The remaining 25 flakes exhibit cortical (n=2, 8.0%), simple (n=5, 20.0%), and complex platforms (n=18, 72.0%). Three

Table 5.9. Debitage Classes and Raw Material at site 26Wp7335.

		Raw Material				
Site	**Class**	CCS	FGV	OBS	RHY	**Total**
26Wp7335	CS	1 (1.2%)	22 (26.5%)	1 (1.2%)	-	**24**
	F	1 (1.2%)	40 (48.2%)	-	1 (1.2%)	**42**
	RC	-	15 (18.1%)	-	-	**15**
	AS	-	2 (2.4%)	-	-	**2**
Total		**2**	**79**	**1**	**1**	**83**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

debitage size value classes are present among the entire assemblage. Flake sizes fit into the following proportions: <1 cm (n=2, 2.4%), 1-3 cm (n=54, 65.1%), 3-5 cm (n=26, 31.3%), and >5 cm (n=1, 1.2%).

Site 26Wp7336 (Liz 1)

The analyzed assemblage from this site consists of 53 artifacts, including 39 pieces of debitage, six bifaces, and eight unifaces. 26Wp7736 is a single-component WST site and the artifacts are described below.

Raw Material

This site may seem somewhat anomalous compared to the others. Like many others, three raw material types are found here, including CCS, FGV, and obsidian. Departing from most other sites is the high frequency of obsidian (n=41, 77.4%), with fewer specimens of CCS (n=6, 11.3%) and FGV (n=6, 11.3%). This unusual frequency, however, is a product of selective collection. As can be seen in Chapter 4, nearly 90 FGV and 25 CCS flakes were observed on-site, but not collected.

Tool Analysis

Fourteen tools were collected and analyzed from this site, consisting of six bifaces and eight unifaces. However, the raw materials of the tools do not reflect the overall raw material picture. Six tools (42.9%) are made from CCS, five tools (35.7%) are made from FGV, and three tools (21.4%) are made from obsidian.

Bifaces. Of the six analyzed bifaces, five are hafted and one is unhafted. All five hafted bifaces are representatives of the WST point type (including three Windust, one Haskett, and one stemmed fragment that could not be classed further). The three Windust stemmed points are all made from an unknown FGV (Figure 4.7a). The Haskett stemmed point is made from Modena obsidian and is broken at the shoulders, leaving only the blade and shoulder; the haft element is broken and missing. The shoulder is edge-ground. The stemmed point fragment is made from Tempiute obsidian. It exhibits a straight-sided stem with a convex base, both of which are edge-ground. The unhafted biface is made from FGV and represents a late stage biface with a cortical platform remaining. It is likely a stemmed point preform.

Unifaces. Six (75.0%) of the eight analyzed bifaces are made from CCS, with one each of FGV (12.5%) and obsidian (12.5%). The tool types represented include three side scrapers, two end scrapers, a notch tool, and two combination tools including a retouched/scraper and a scraper/graver tool with a single graver bit (Figure 4.7b, c).

Debitage Analysis

Thirty-nine pieces of debitage were collected and analyzed. The overwhelming majority are made from obsidian (n=38, 97.4%), with one flake made from FGV (2.6%). Table 5.10 represents the flake classes by raw material. Platform preparation could not be analyzed for 25 of the 39 flakes, as they are broken. The remaining 14 all exhibit a complex platform preparation. Three size categories fit the entire debitage assemblage with <1 cm (n=3, 7.7%), 1-3 cm (n=35, 89.7%), and 3-5 cm (n=1, 2.6%).

Table 5.10. Debitage Classes and Raw Material at Site 26Wp7336.

Site	Class	Raw Material OBS	 FGV	Total
26Wp7336	CS	-	-	**0**
	F	22 (56.4%)	1 (2.6%)	**23**
	RC	16 (41.0%)	-	**16**
	AS	-	-	**0**
Total		**38**	**1**	**39**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

Site 26Wp1174 (Illipah 6)

This site is a multi-component occupation that spans the Paleoindian through Middle Archaic period. During recordation, no discrete Paleoindian work areas were identified, thus only the Paleoindian artifacts were collected. The entire collected assemblage consists of a single Black Rock Concave Base point. It is described below.

Tool Analysis

Bifaces. The only collected artifact was a hafted biface, a Black Rock Concave Base point made from Duckwater FGV (Figure 4.8a). It is complete, though highly reworked. The point is lanceolate in shape with a concave base. Edge-grinding and basal grinding were not observed; the point has an oblique flaking pattern dissimilar to the parallel-oblique pattern observed on Humboldt projectile points. The point measures 3.5 cm long, 2.1 cm wide, 0.5 cm wide, and weighs 4.1 g.

Site 26Wp1175 (Illipah 11)

Site 26Wp1175 is a multi-component occupation that spans the Paleoindian through Middle Archaic period. During recordation no obvious Paleoindian work areas were identified, and thus only the Paleoindian artifacts were collected. The entire collected assemblage consists of a single Parman stemmed point. It is described below.

Tool Analysis

Bifaces. The only collected artifact was a Parman stemmed point that was made from Little Smokey Quarry FGV (Figure 4.7b). This point is a midsection, exhibiting a broken blade and base; however, much of the haft element is present as are the upward expanding shoulders. The haft element is straight to slightly contracting and edge-ground. The flaking pattern is collateral.

Site 26Wp7729 (Waldy Pond 9)

This site is a single-component WF occupation in Jakes Valley. The artifact assemblage consists of all tools and a sample of debitage. One hundred fifty-one artifacts were collected and analyzed, including 135 pieces of debitage, two cores, six bifaces, and eight unifaces. These artifacts are described below.

Raw Material

Two types of raw material are present at this site: CCS, and obsidian. The majority of the 151 collected artifacts are manufactured from CCS (n=146, 96.7%), with only five (3.3%) artifacts made from obsidian.

Core Analysis

Two cores were analyzed from this site, both made from CCS (Figure 4.10). Core attributes are listed in Table 5.11.

Table 5.11. Core Attributes from Site 26Wp7729.

FS #	Core Type	Material	Max Linear Dimension (cm)	Wt (g)	Size Value (MLD x Wt)	# of Detachment Scars	# of Platforms	# of Fronts (faces)
7	Multi-directional	CCS	3.5	12.6	44	3	3	3
25	Tested Cobble	CCS	8.3	96.8	803	6	3	3

Tool Analysis

Fourteen tools were collected represented by two material types, CCS and obsidian. Thirteen (92.9%) of those tools are made from CCS, with only one tool (7.1%) made from obsidian.

Bifaces. Six bifaces were collected and analyzed from this site, consisting of three hafted and three unhafted types. The three hafted bifaces include two WF points and one crescent. All three of these hafted bifaces are made from CCS. FS1 is a complete but highly reworked fluted point (Figure 4.9a). It exhibits a deeply concave base forming distinct eared projections, one of which is broken. The base and lower lateral margins are edge-ground. The point expands distally from the base, up to the area that has undergone extensive reworking. The tip shows impact damage with subsequent resharpening, probably while still in the haft. The point has been fluted twice on side A and once on side B giving it a bi-concave basal cross-section. It measures 4.8 cm long, 3.0 cm wide, 0.9 cm thick, and weighs 12.4 g, with a basal concavity of 0.5 cm. The flute scars on side A measure 2.4 and 1.9 cm long by 1.1 and 1.0 cm wide; the flute scar on side B measures 1.4 cm long and 1.2 cm wide. FS4 is a basal corner fragment of a fluted point, broken both horizontally and vertically (Figure 4.9b). It exhibits a concave base, edge and basal grinding, and has one flute on each side, truncated horizontally and vertically by the two breaks. FS4 is a quarter-moon crescent made from a fairly thick, flat flake (Figure 4.9d). Steep edge modification has shaped this flake into a crescent but it exhibits no flaking into the center of the tool; both the ventral and dorsal surfaces of the original flake are visible and unmodified.

The remaining three bifaces are of the unhafted type. Two are made from CCS and the other is made from Wild Horse Canyon obsidian (Figure 4.9c, g). These bifaces were classified respectively as two late stage and one finished but unhafted biface.

Unifaces. All eight unifacial tools are fashioned from CCS. Four of the tools are side scrapers, three are retouched flakes, and one is a multiple-spurred graver (Figure 4.9e, f).

Debitage Analysis

The debitage assemblage (n=135) collected and analyzed from this site consists primarily of CCS (n=131, 97.0%), with only four pieces of obsidian (3.0%). Table 5.12 lists the debitage by flake class and raw material. Platform preparation was not identifiable on 83 flakes due to breakage. The remaining 52 flakes classify as cortical (n=2, 3.8%), simple (n=21, 40.4%), and complex platform preparation (n=29, 55.8%). Size categories for the entire assemblage include <1 cm (n=41, 30.4%), 1-3 cm (n=91, 67.4%), 3-5 cm (n=2, 1.5%), and >5 cm (n=1, 0.7%).

Table 5.12. Debitage Classes and Raw Material at Site 26Wp7729.

Site	**Class**	**Raw Material** CCS	 OBS	**Total**
26Wp7729	CS	11 (8.2%)	-	**11**
	F	61 (45.2%)	4 (3.0%)	**65**
	RC	52 (38.5%)	-	**52**
	AS	7 (5.1%)	-	**7**
Total		**131**	**4**	**135**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

Site 26Wp7735 (Illipah 4)

The lithic assemblage at this site contains 52 artifacts, including 46 pieces of debitage, three bifaces, and three unifaces. It is a single-component WF site that was entirely collected. The artifacts are described below.

Raw Material

The entire lithic assemblage, except for one flake of a rhyolite-tuff material (1.9%), is composed of CCS (n=51, 98.1%), mostly of a bright, semi-translucent orange-color, but several pieces of opaque peach-colored material were also noted.

Tool Analysis

The six tools recovered and analyzed from this site are divided evenly among bifacial and unifacial tools. All are made from CCS.

Bifaces. This assemblage consists of one hafted biface and two unhafted bifaces. The hafted biface is a basal corner fragment of a WF point (Figure 4.11a). It is made from a semi-translucent orange CCS with white mottling that contains light colored inclusions. The fragment snapped horizontally and vertically (roughly down the center-line) near the base, truncating the flute scar on each side. The remaining lateral edge and base are both heavily edge-ground, with the base expanding distally to the snap. The fragment appears to have a bi-concave cross section, and the flute scars diverge from each other distally.

The two unhafted bifaces (FS1 and FS2) are lateral and distal fragments (respectively) of bifaces. The former is a late stage biface with finely flaked margins (Figure 411b). The latter is a finished but unhafted biface tip with regular flaking around the margins.

Unifaces. The three unifacial tools present at this site are made from CCS. The tools include a retouched flake made from a biface thinning flake (Figure 4.11d); a backed knife with a slightly concave cutting edge showing non-intrusive edge-wear opposite a very steep and cortical lateral margin (Figure 4.11c); and a combination scraper/bifacial tool that exhibits steep invasive scraper retouch on the distal end, and invasive bifacial retouch on a lateral margin.

Debitage Analysis

The debitage assemblage consists of 46 flakes, 45 of which are CCS (97.8%), and one is a piece of a rhyolite-tuff like material (2.2%). Table 5.13 lists the flake classes by raw material. Platform preparation was not analyzed for 17 flakes as the proximal ends were missing. The remaining 29 flakes were scored as having cortical (n=1, 3.4%), simple (n=5, 17.2%), and complex platform preparation (n=23, 79.3%). The 46 flakes fit into all size categories, namely <1 cm (n=2, 4.3%), 1-3 cm (n=40, 87.0%), 3-5 cm (n=3, 6.5%), and >5 cm (n = 1, 2.2%). Two overshot flakes made of CCS were also detected, of which one contains only the distal margin (Figure 4.11e).

Table 5.13. Debitage Classes and Raw Material at Site 26Wp7735.

Site	Class	Raw Material CCS	 RHY	Total
26Wp7735	CS	-	1 (2.2%)	**1**
	F	21 (45.7%)	-	**21**
	RC	24 (52.2%)	-	**24**
	AS	-	-	**0**
Total		**45**	**1**	**46**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

Site 26Wp7738 (Illipah 8)

This small single-component WST site was collected entirely and consists of 15 lithic artifacts, including 10 pieces of debitage, two bifaces, and three unifaces. These tools are described below.

Raw Material

The 15 artifacts collected and analyzed from this site are represented by two types of raw material: CCS and FGV. The debitage and unifacial tools are all made from CCS (n=13, 86.7%), and the two bifaces are both made from FGV (13.3%).

Tool Analysis

Five tools were recovered from this site and are divided into bifacial (n=2) and unifacial tools (n=3). Both bifaces were made from FGV (40.0%), and the three unifaces were made from CCS (60.0%).

Bifaces. The two bifaces collected and analyzed from this site include one hafted and one unhafted biface. The hafted biface represents a Cougar Mountain stemmed point midsection made from Smith Valley FGV (Figure 4.8f). The point is broken diagonally across the point, removing the majority of the blade and one shoulder, and at the very base of the long contracting haft element, which exhibits edge-grinding. The remaining shoulder gently curves upward. Flaking is collateral. The unhafted biface is a middle stage biface made from Diamond Mountains FGV. It retains the original flake detachment scar and exhibits some cortex. Minor edge trimming is visible on the ventral face.

Unifaces. Three unifacial tools were collected and analyzed from this site, all made from CCS. The three tools include a scraper, a backed knife, and a combination notch/graver tool, all of which are made on thick, chunky flakes (with the notch/graver tool made on a biface thinning flake).

Debitage Analysis

The debitage assemblage consists of 10 CCS flakes. Table 5.14 lists the frequency of flake classes by raw material represented at this site. Platform preparation was not analyzed for two flakes as their proximal ends are broken. The remaining eight flakes were scored as cortical (n=3, 37.5%), simple (n=4, 50.0%), and complex platform preparation (n=1, 12.5%). The size values of these 10 flakes includes the categories 1-3 cm (n=2, 20.0%), 3-5 cm (n=6, 60.0%), and >5 cm (n=2, 20.0%).

Table 5.14. Debitage Classes and Raw Material at Site 26Wp7738.

Site	**Class**	**Raw Material** CCS	**Total**
26Wp7738	CS	5 (50.0%)	**5**
	F	4 (40.0%)	**4**
	RC	1 (10.0%)	**1**
	AS	-	**0**
Total		**10**	**10**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

Site 26Wp7739 (Illipah 9)

This site is a large, multi-component occupation spanning the Paleoindian through Middle Archaic period. No clear Paleoindian work areas were identified during the recordation process. Thus, only diagnostic Paleoindian artifacts were collected and analyzed. These tools are described below.

Tool Analysis

Four bifacial tools were collected and analyzed from this site. All four are made from FGV.

Bifaces. During the field recording process, four hafted bifaces were collected as representative WST diagnostic artifacts. Upon laboratory analysis, one of those bifaces was removed as a diagnostic WST artifact and categorized as an unhafted biface. FS1 is a complete Silver Lake stemmed point made from FGV sourced to the Diamond Mountains quarry. It was made from a large flake of which the original detachment scar forms one entire face that has been minimally modified (Figure 4.8d). The dorsal face exhibits collateral flaking and a tiny amount of cortex. The haft element is a short, expanding stem with a convex base with no edge-grinding. The shoulders are very distinct and flair at a near 90° angle. FS19 is a Cougar Mountain stemmed point midsection made from FGV sourced to the Smith Valley quarry. This stemmed point midsection was broken diagonally across the blade, removing one shoulder, and on the haft element removing the base (Figure 4.8e). The remaining haft element exhibits edge-grinding, and the remaining shoulder slopes gently upward and exhibits collateral flaking. FS29 is a highly reworked and near complete Haskett stemmed point midsection made from FGV sourced to the Smith Valley quarry. The blade has been severely reduced due to curation of the point and the very tip has been broken (Figure 4.8c). The haft element accounts for about 80% of the total tool length and exhibits edge-grinding and collateral flaking.

The unhafted biface is a near complete tool made from FGV sourced to the Little Smokey Quarry. It has been categorized as a middle stage biface, with large and irregularly spaced flake scars, with minimal edge trimming to straighten the sides. This biface was originally thought to be the blade of a stemmed point as it appears to exhibit shoulders above the broken edge, but this now seems unlikely.

Site 26Wp7746 (North Illipah Creek 1)

The lithic assemblage from site 26Wp7746 consists of 163 artifacts, including 147 pieces of debitage, 12 bifaces, and four unifaces. The artifacts from this single-component WST site are described below.

Raw Material

Three types of raw material are represented among the 163 artifacts collected and analyzed from this site, including CCS, FGV, and obsidian. The majority of artifacts are made from CCS (n=120, 73.6%), with lesser quantities of FGV (n=39, 23.9%), and very little obsidian (n=4, 2.5%).

Tool Analysis

Sixteen tools were collected and analyzed from this site and include 12 bifaces and four unifaces. The raw material types used to manufacture these tools do not reflect the overall picture of raw material use at this site. The majority of tools at this site are manufactured from FGV (n=9, 56.3%), with fewer specimens on CCS (n=6, 37.5%), and only one made on obsidian (6.3%).

Bifaces. Twelve bifacial tools were analyzed, consisting of nine hafted and three unhafted bifaces; however, two of the hafted bifaces refit, thus only 11 total bifaces exist. Eight of these bifaces are made from FGV (72.7%) and three are CCS (27.3%). The hafted bifaces represent several types of WST diagnostic point types, including one Cougar Mountain stemmed point (FS7, made from FGV sourced to Little Smokey Quarry; Figure 4.12c), two Parman stemmed points (FS10 and 13, both made from FGV sourced to Little Smokey Quarry; Figure 4.12e), one Haskett stemmed point (FS2 and 4, made from two CCS fragments that refit; Figure 4.12a), and four stemmed point fragments that could not be classified into a named stemmed category as the shoulders were broken (FS1, 6, and 9 are made from FGV sourced to Little Smokey Quarry, Figure 4.12b; FS14 is made from CCS, Figure 4.12d). Each WST point had edge-grinding on the haft element (except FS4, the blade fragment that refit to the Haskett point).

Three unhafted bifaces were also analyzed from this site. Two are made from FGV sourced to Little Smokey Quarry, and one is made from CCS. All three bifaces represent finished but unhafted types and are generally distal fragments with sharp tips. The two FGV bifaces (FS11 and 15) may represent the broken blades from stemmed points. Neither refits to any of the hafted biface stems discussed above. The CCS biface has apparently been subject to intense heat as numerous potlid scars are visible on the surface. This biface also exhibits edge-grinding, possibly suggesting its use as a stemmed point.

Unifaces. Of the four unifacial tools analyzed from this site, two are made from CCS (50.0%), one is made from FGV (25.0%) sourced to the Smith Valley quarry, and one is made from obsidian (25.0%) sourced to Obsidian Butte Variety 3. The tools are represented by two retouched flakes and two side scrapers (Figure 4.12f, g). Interestingly, one of the scrapers is made from the Obsidian Butte material.

Debitage Analysis

The debitage assemblage consists of 147 flakes manufactured from three different types of raw material: CCS, FGV, and obsidian. The clear majority are CCS (n=114, 77.6%), with fewer flakes of FGV (n=30, 20.4%) and very little obsidian (n=3, 2.0%). Table 5.15 lists the debitage classes by raw material. Platform preparation was not analyzed for 84 flakes as they had broken proximal ends. The remaining 63 flakes were classified into three categories: cortical (n=5, 7.9%), simple (n=25, 39.7%), and complex platform preparation (n=33, 52.4%). The 147 flakes fit into three size categories: <1 cm (n=8, 5.4%), 1-3 cm (n=126, 85.7%), and 3-5 cm (n=13, 8.8%).

Table 5.15. Debitage Classes and Raw Material at Site 26Wp7746.

Site	**Class**	**Raw Material** CCS	FGV	OBS	**Total**
26Wp7746	CS	19 (12.9%)	1 (0.7%)	-	**20**
	F	70 (47.6%)	19 (12.9%)	1 (0.7%)	**90**
	RC	20 (13.6%)	10 (6.8%)	2 (1.4%)	**32**
	AS	5 (3.4%)	-	-	**5**
Total		**114**	**30**	**3**	**147**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

Site 26Wp7748 (North Illipah Creek 3)

The lithic assemblage from this site consists of 29 artifacts, including 25 pieces of debitage, three bifaces, and one uniface. This site is multi-component, with Paleoindian and Middle Archaic periods represented; however, during initial site recordation, a clear

Paleoindian work area was identified as separated from the Middle Archaic work area. Artifacts associated only with the Paleoindian work area were collected and analyzed, and are described below.

Raw Material

Three types of raw material are represented among the artifacts collected from this site: CCS, obsidian, and FGV. The majority of artifacts are manufactured from CCS (n=15, 51.7%) and obsidian (n=12, 41.4%), with a small number made from FGV (n=2, 6.7%).

Tool Analysis

Four tools were collected and analyzed from 26Wp7748, including three bifaces and one uniface. Two of these tools (one biface and one uniface) are made from CCS (50.0%), and the other two bifaces are made from obsidian (50.0%).

Bifaces. Three bifaces were analyzed, including one hafted and two unhafted bifaces. The hafted biface is made from obsidian sourced to the Tempiute Mountain quarry. It is a stemmed point haft element fragment broken below the shoulders, and thus not typed further. This stemmed point haft element is a short, contracting stem with a straight base that exhibits collateral flaking, and edge and basal grinding. The unhafted bifaces were both classified as finished but unhafted fragments. FS3 was made from obsidian sourced to Obsidian Butte Variety 3.

Unifaces: The single unifacial tool collected and analyzed consists of a retouched flake fragment with two modified edges, made from CCS.

Debitage Analysis

The debitage assemblage from this site consists of 25 flakes and three different types of raw material: CCS, obsidian, and FGV. The majority of flakes are made from CCS (n=13, 52.0%) and obsidian (n=10, 40%), with very little use of FGV (n=2, 8.0%). Table 5.16 lists the flake classes by raw material. Platform preparation was not analyzed for 15 flakes as their proximal ends were broken. The remaining 10 flakes were scored under simple (n=3, 30.0%) and complex platform preparation (n=7, 70.0%). The 25 pieces of debitage fit within three size categories: <1 cm (n=1, 4.0%), 1-3 cm (n=22, 88.0%), and 3-5 cm (n=2, 8.0%).

Table 5.16. Debitage Classes and Raw Material at Site 26Wp7748.

Site	**Class**	**Raw Material** CCS	OBS	FGV	**Total**
26Wp7748	CS	-	-	1 (4.0%)	**1**
	F	8 (32.0%)	7 (28.0%)	1 (4.0%)	**16**
	RC	5 (20.0%)	3 (12.0%)	-	**8**
	AS	-	-	-	**0**
Total		**13**	**10**	**2**	**25**

Note: CS=Cortical Spall, F=Flake or Flake Fragment, RC=Retouch Chip, AS=Angular Shatter.

Inter-Assemblage Comparisons

In the Great Basin it is understood by many archaeologists that Western Fluted and Western Stemmed traditions represent separate technologies, based on the obvious morphological distinctions between them. Pendleton (1979) concluded that production and flaking techniques differ along with raw material selection between the stemmed and concave-based varieties in the Great Basin.

In this section I compare the two traditions using variables including raw material selection, technological organization, and landscape use to identify other measures of how WF and WST sites differ from each other. To accomplish this, chosen assemblages for comparison must fairly represent activities at the sites. For instance, the collected lithic assemblage for site 26Wp7336 includes a disproportionate amount of obsidian debitage that does not reflect the site's debitage assemblage (as discussed above). Thus, when using this site for comparative purposes I do not use the debitage attributes, but instead rely on the tools. Similarly, the debitage pieces at multi-component sites that do not contain clear Paleoindian work areas are excluded from analysis.

The WF assemblage is comprised of artifacts from the WF Concentration and other WF diagnostics from the Jakes Depression site, single-component WF sites (26Wp7729 and 26Wp7735), and diagnostic WF projectile points from multi-component sites (26Wp1173 and 26Wp1177). Table 5.17 lists all artifacts comprising the WF assemblage.

Table 5.17. Western Fluted Artifact Assemblage.

Tool Type	WF Conc. at JD	26Wp1173	26Wp1177	26Wp7729	26Wp7735	Total
Formal Tools						
Western Fluted point	5	1	1	2	1	**10**
Crescent	1	-	-	1	-	**2**
Early Stage Biface	1	-	-	-	-	**1**
Mid Stage Biface	2	-	-	-	-	**2**
Late Stage Biface	1	-	-	2	1	**4**
Finished/Unhafted Biface	3	-	-	1	1	**5**
Side Scraper Fragment	-	-	-	1	-	**1**
Unilateral Side Scraper	-	-	-	2	-	**2**
Convergent Side Scraper	-	-	-	1	-	**1**
Three-Sided Scraper	1	-	-	-	-	**1**
Multiple-Spurred Graver	-	-	-	1	-	**1**
Combination Tool	1	-	-	-	1	**2**
Informal Tools						
Single-Spurred Graver	1	-	-	-	-	**1**
Backed Knife	-	-	-	-	1	**1**
Retouched Flake	12	-	-	3	1	**16**
Other						
Core	-	-	-	2	-	**2**
Debitage	44	-	-	135	46	**225**
Total	***72***	***1***	***1***	***151***	***52***	***277***

The WST assemblage is comprised of artifacts from the WST Concentration and other WST diagnostics from the Jakes Depression site, single-component WST sites (26Wp7316, 26Wp7321, 26Wp7323, 26Wp7334, 26Wp7335, 26Wp7336, 26Wp7738, and 26Wp7746), diagnostic WST projectile points and/or artifacts within a WST concentration from multi-component sites (26Wp1173, 26Wp1175, 26Wp1177, 26Wp7317, 26Wp7318, 26Wp7739, and 26Wp7748). Table 5.18 lists the artifacts that comprise the WST assemblage.

Table 5.18. Western Stemmed Tradition Artifact Assemblage.

Tool Type	**WST Conc. at JD**	**26Wp 1173**	**26Wp 1175**	**26Wp 1177**	**26Wp 7316**	**26Wp 7317**	**26Wp 7318**	**26Wp 7321**	**26Wp 7323**	**26Wp 7334**	**26Wp 7335**	**26Wp 7336**	**26Wp 7738**	**26Wp 7739**	**26Wp 7746**	**26Wp 7748**	**Total**
Formal Tools																	
Cougar Mtn Point	17	-	-	-	1	-	-	1	-	-	-	-	1	1	1	-	**22**
Haskett Point	5	-	-	-	-	1	-	-	-	-	-	-	-	1	2	-	**9**
Parman Point	14	-	1	-	1	-	-	-	-	2	-	1	-	-	2	-	**21**
Silver Lake Point	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	**2**
Windust Point	1	1	-	3	-	-	-	-	-	-	1	3	-	-	-	-	**9**
Stemmed Point Fragment	41	1	-	2	1	-	1	1	2	1	-	1	-	-	4	1	**56**
Crescent	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1**
Early Stage Biface	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**3**
Middle Stage Biface	13	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	**14**
Late Stage Biface	20	-	-	-	1	-	-	1	2	-	-	1	-	-	-	-	**25**
Finished/ Unhafted Biface	9	-	-	-	-	-	-	2	-	-	-	-	-	-	3	2	**16**
Side Scraper Fragment	4	-	-	-	1	-	-	-	1	-	1	3	1	-	2	-	**13**
Unilateral Side Scraper	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	**2**
Angle Scraper	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1**
End Scraper Fragment	5	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	**8**
End Scraper on Flake	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	**2**
End/Side Scraper	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1**
Multiple-Spurred Graver	1	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	**3**
Combination Tool	1	-	-	-	-	-	-	-	-	-	1	2	1	-	-	-	**5**

Table 5.18 (continued). Western Stemmed Tradition Artifact Assemblage.

Tool Type	WST Conc. at JD	26Wp 1173	26Wp 1175	26Wp 1177	26Wp 7316	26Wp 7317	26Wp 7318	26Wp 7321	26Wp 7323	26Wp 7334	26Wp 7335	26Wp 7336	26Wp 7738	26Wp 7739	26Wp 7746	26Wp 7748	Total
Informal Tools																	
Backed Knife	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	**2**
Notch	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1**
Retouched Flake	21	-	-	-	4	-	-	4	-	-	4	-	-	-	2	1	**36**
Other																	
Core	1	-	-	-	2	-	-	2	-	-	-	-	-	-	-	-	**5**
Debitage	90	-	-	-	28	-	-	82	244	7	83	*	10	-	147	25	**716**
Total	***253***	***3***	***1***	***5***	***40***	***1***	***1***	***93***	***251***	***10***	***92***	***13***	***15***	***3***	***163***	***29***	***973***

Note: An asterisk (*) denotes that debitage was collected but removed from this analysis due to sampling problems.

Raw Material

The importance of raw material selection cannot be overstated. Toolstone may be selected for a number of purposes, primary among them being the intended purpose of its use. Is the toolstone expected to be durable, sharp, or curated? High quality crypto-crystalline silicates (CCS) are the all-around best material as they provide very sharp edges, are relatively easy to work (and certain types become easier to work after heat treatment), are very durable, and are fairly widespread in many areas of the Great Basin (Beck and Jones 1990). Obsidian, while providing the sharpest edge possible for toolstone and being very easy to work, is fairly brittle, and does not hold up when much torque is involved, besides being uncommon in the study area. Fine grained volcanics (FGV) are fairly common in many areas of the Great Basin, but do not carry as sharp an edge as CCS or obsidian, are difficult to knap and cannot be made more workable through heat-treatment, but are very durable (Jones and Beck 1999) and available somewhat locally.

The selection of one material over another usually depends on tool function. As can be seen in Figure 5.5, the Paleoindian occupants of Jakes Valley made very different choices when selecting toolstone. WF assemblages contain 84.8% CCS, 13% obsidian, and 2.4% FGV and other materials. High quality raw materials were preferentially selected and used at these sites. WST assemblages are noticeably very different in their choice of toolstone. Fine grained volcanics are what the makers of this tradition were after, being utilized for 64.4% of their assemblage, with only 28.7% CCS, and 6.9%

obsidian and other materials. Chi-Square analysis indicates a significant difference in raw material selection between WF and WST assemblages (X^2=350.255, d=3, P=.000).

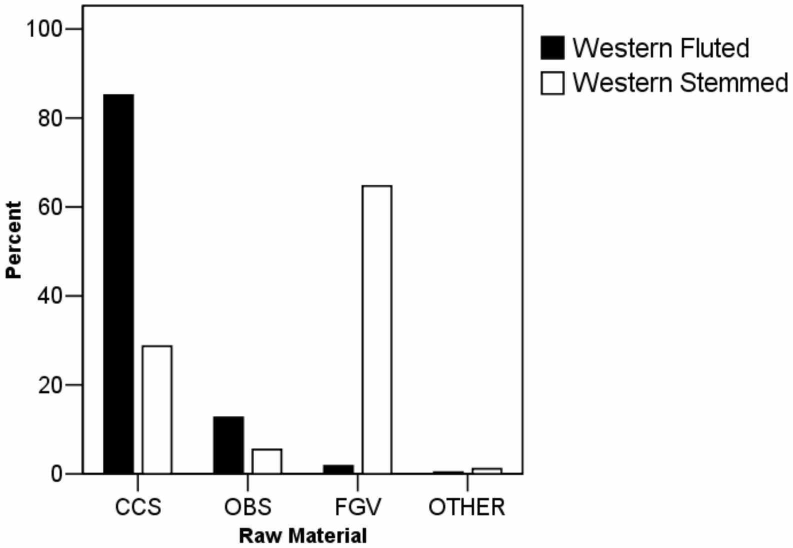


Figure 5.5. Raw material selection of all associated artifacts (tools and debitage) within Western Fluted and Western Stemmed Tradition Assemblages in Jakes Valley. Total artifacts: WF=277; WST=973.

The preference of certain raw materials has been known for a long time by Great Basin archaeologists studying Paleoindian inhabitants. The next logical question one can ask is whether Paleoindian groups preferentially selected specific raw materials for certain tool types? Jones and Beck (1999) observed a pattern, seen in two Great Basin WST assemblages, of the dominance of FGV among bifacial tool types, and near absence among formal unifacial tools, more often made of the more durable CCS. The Jakes Valley WST assemblage follows this trend (Table 5.19). The WF assemblage, expectedly, shows high CCS use among bifacial tools compared to FGV, and complete lack of FGV use among formal unifacial tools. These results indicate that WST groups selected FGV specifically for biface production and projectile point manufacture, only occasionally using the resulting debitage to create formal flake tools; rather they chose to use the more durable and higher quality CCS.

Table 5.19. Ratio of FGV to CCS Tools between Western Fluted and Western Stemmed Tradition Assemblages in Jakes Valley.

Artifact type	Western Fluted	Western Stemmed Tradition
Bifacial tools	0.07	5.61
Formal unifacial tools	0.00	0.82

Note: WF bifacial tool FGV:CCS count (1:15); WF formal unifacial tool FGV:CCS count (0:8); WST bifacial tool FGV:CCS count (129:23); WST formal unifacial tool FGV:CCS count (14:17).

Obsidian Use and Conveyance Zones

Obsidian is a high quality, extra-local volcanic glass often used by prehistoric hunter-gatherers as raw material that happens to have geochemical signatures traceable to specific quarry locations. Sourcing obsidian artifacts (using X-ray Fluorescence or XRF) provides a proxy for Paleoindian ranges and lithic conveyance zones (Jones et al. 2003). East-central Nevada lacks obsidian sources, yet this type of toolstone was brought into Jakes Valley from quarries 175 to 320 km distant. Obsidian samples from diagnostic WF and WST projectile points (including isolated points), and other associated artifacts, were submitted to Northwest Research Obsidian Studies Laboratory (NWROSL) for geochemical characterization and sourcing. Results show differences in obsidian source use between WF and WST assemblages (Figure 5.6). Table 5.20 lists obsidian source representation and frequency of source use.

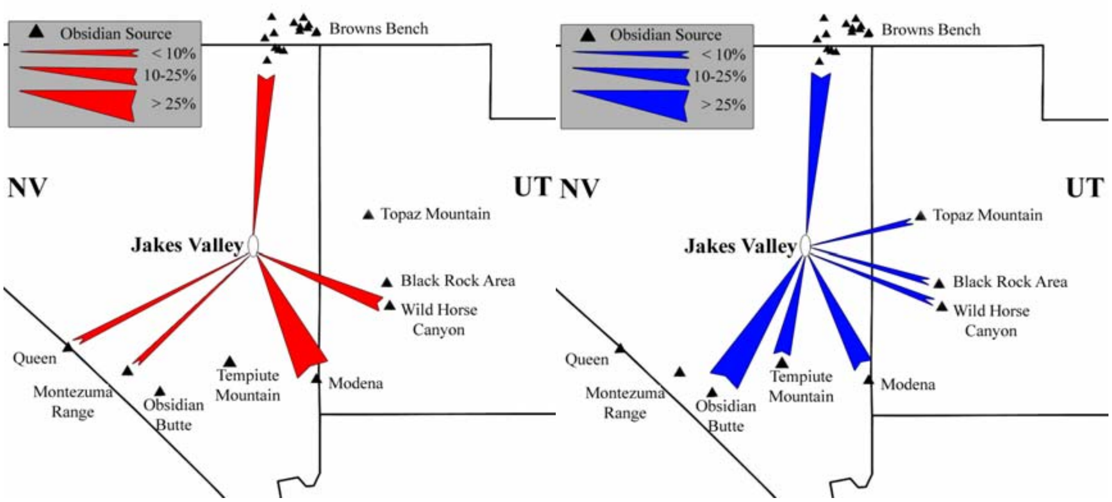


Figure 5.6. Frequency of Western Fluted (left, n=31) and Western Stemmed Tradition (right, n=62) obsidian source utilization. Arrow size indicates frequency.

Table 5.20. Obsidian Source Representation at Western Fluted and Western Stemmed Tradition Assemblages in Jakes Valley.

	Obsidian Source									
Tradition	Modena	Browns Bench	Wild Horse Canyon	Obsidian Butte	Tempiute Mountain	Black Rock Area	Queen	Montezuma Range	Topaz Mountain	**Total**
WF										
Tools	7	1	2	-	-	-	-	-	-	**10**
	22.6%	3.2%	6.5%							**32.3%**
Debitage	8	7	3	-	-	-	1	2	-	**21**
	25.8%	22.6%	9.7%				3.2%	6.5%		**67.7%**
WST										
Tools	7	8	1	3	5	1	-	-	-	**25**
	11.3%	12.9%	1.6%	4.8%	8.1%	1.6%				**40.3%**
Debitage	4	6	-	24	2	-	-	-	1	**37**
	6.5%	9.7%		38.7%	3.2%				1.6%	**59.7%**

Note: Totals reflect obsidian artifacts from all classes, including tools and debitage.

The Western Fluted assemblage contains nearly 50% Modena obsidian, with Browns Bench and Wild Horse Canyon comprising the bulk of the remaining obsidian, with very little use of Montezuma Range and Queen. This contrasts from the WST assemblage that contains over 40% Obsidian Butte, with large amounts of Browns Bench, Modena, and Tempiute obsidian, with little use of Wild Horse Canyon, Black Rock Area, and Topaz Mountain. The two traditions used several of the same sources, but overall preferred different obsidians: Modena for WF, and Obsidian Butte for WST.

Obsidian Hydration

Obsidian hydration analysis was applied to the Jakes Valley Paleoindian obsidian assemblages to determine if hydration differences could be identified between the WF and WST artifacts. Only those sources shared in common between each tradition were used; these included the Modena, Browns Bench, and Wild Horse Canyon obsidian sources. All types of lithic artifacts were included in this study. OHD samples were submitted to Craig Skinner at NWROSL and Tim Carpenter at Archaeometrics.

Results are ambiguous. Mean hydration band measurements are statistically similar among the Modena obsidian source, but dissimilar among the Browns Bench source (Table 5.21 and Figure 5.7). These results may be explained by an occupation in Jakes Valley at or near the same time. However, the standard deviation measurements on WST obsidian samples is roughly twice that of the WF obsidian samples from Modena and Browns Bench (Table 5.21). This large dispersal in measurements may suggest that WST hydration rinds are actually thinner (or thicker) than WF rinds or that WST groups occupied the valley for a longer period than WF groups. At this juncture I place little emphasis on these confusing OHD results.

Table 5.21. Obsidian Hydration Values from Three Obsidian Sources Utilized by Jakes Valley Paleoindians.

Source	Tradition	N	Mean (microns)	Standard Deviation	T-Test
Modena	Western Fluted	14	8.22	0.75	T=-0.28, P=0.784, df=13
	Western Stemmed	11	8.36	1.54	
Browns Bench	Western Fluted	5	12.33	0.80	T=-2.381, P=0.033, df=13
	Western Stemmed	14	13.58	1.43	
Wild Horse Canyon	Western Fluted	4	9.30	1.39	-
	Western Stemmed	1	8.70	-	

Note: Obsidian hydration values taken on artifacts from all classes, including tools and debitage.

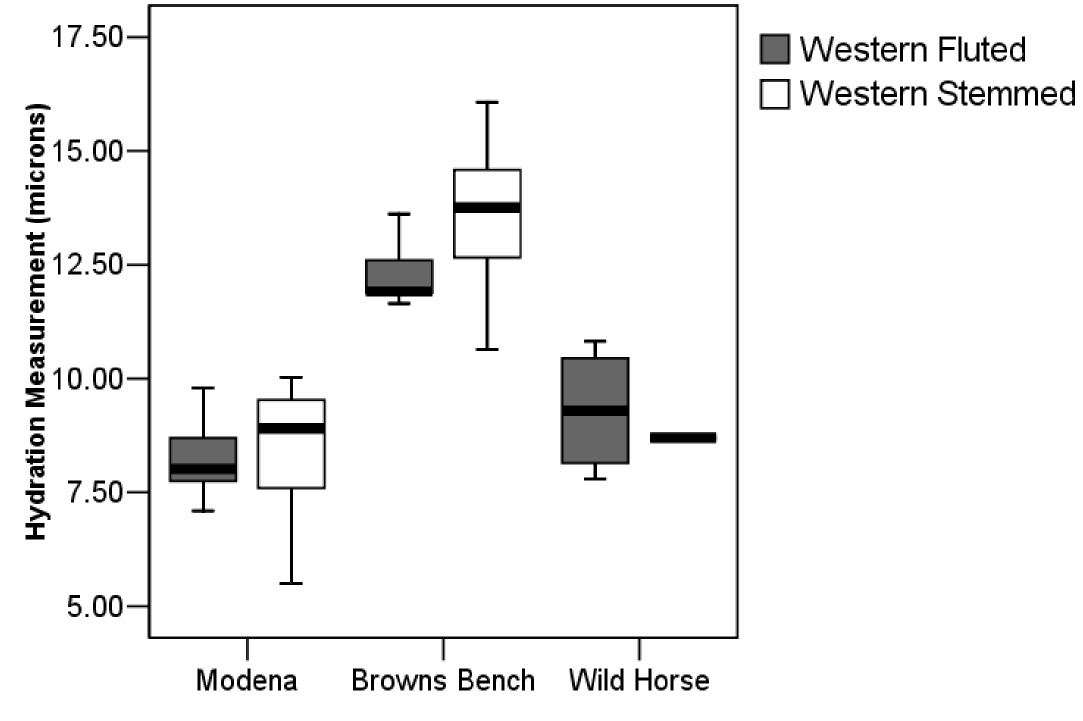


Figure 5.7. Boxplot of obsidian hydration values from Table 5.21. Thick horizontal lines represent median values; boxes represent upper and lower quartiles; vertical lines represent maximum and minimum values.

Biface-to-Core Ratio

Many researchers have demonstrated that lithic technological organization can be used to infer hunter-gatherer mobility patterns (Andrefsky 1994; Bamforth 1986; Binford 1979, 1980; Graf 2001; Kelly 1988; Parry and Kelly 1987; Smith 2006). Parry and Kelly (1987) employed a Biface-to-Core ratio to show that hunter-gatherer groups changed reliance on their technologies through time as they became less mobile, switching from formal and standardized bifaces to a more expedient and unstandardized core technology. I applied this ratio to determine how WF and WST assemblages are organized, either through the use of standardized and highly portable bifaces, or expedient cores. The results are in Table 5.22.

Table 5.22 Biface-to-Core Ratios for Western Fluted and Western Stemmed Assemblages in Jakes Valley.

Paleoindian Tradition	Biface	Core	Ratio
Western Fluted	24	2	12.0
Western Stemmed	186	5	37.2

This ratio includes hafted (projectile points and crescents) as well as unhafted bifaces, as each tool could have and likely did provide useable flakes for the knappers who would want to waste as little material as possible, especially if few known toolstone sources were available or of high quality. The ratio values of 12.0 and 37.2 are especially high when compared to those published in Parry and Kelly (1987) for the earliest groups. This indicates a high reliance on formal bifaces to use as multi-function tools and cores as opposed to informal and expedient cores. The extremely high Biface-to-Core ratio among WST assemblages reflects the greater proportion of hafted bifaces (n=127, 68.3%) than among the WF assemblages (n=12, 50.0%). When hafted bifaces are removed from this analysis and unhafted bifaces are compared to cores, the ratios drop to 6.0 (WF) and 11.8 (WST).

Formal-to-Informal Tool Ratio

Another index used to compare technological organization is the Formal to Informal tool ratio, used by Parry and Kelly (1987) and Andrefsky (1994). According to Andrefsky (1994), residentially mobile groups tend to create more formal than informal tools. This is explained as the need for a highly curated toolkit that is less likely to fail when needed, and can easily be resharpened or used for multiple purposes. This type of toolkit would be necessary for residentially mobile groups moving about an unfamiliar landscape where adequate toolstone sources may be few and far between. Logistically mobile groups have a centralized residence and send task groups out to collect raw materials as needed. These groups tend to create more informal than formal tools, as they do not need to be as cautious when using their material. However, this pattern may reverse depending on the abundance and quality of raw material in the area (Andrefsky 1994). If abundant high quality materials are nearby, both residentially and logistically mobile groups will create equal numbers of formal and informal tools from them.

The results of the formal-to-informal tool ratio indicate both traditions organized their toolkits around formal tool types over informal (Table 5.23); tools that could be used for multiple purposes, resharpened for future use, and curated. The large difference between WF and WST assemblages is likely the result of the extremely high number of hafted bifaces in the latter, similar to the Biface-to-Core ratio noted above. If hafted bifaces are removed, the total formal tool counts drop to 20 among WF assemblages and 93 among WST assemblages. This provides a formal to informal tool ratio of 1.11 (WF) and 2.27 (WST).

Table 5.23. Formal-to-Informal Tool Ratio for Western Fluted and Western Stemmed Assemblages in Jakes Valley.

Paleoindian Tradition	Formal	Informal	Ratio
Western Fluted	32	18	1.78
Western Stemmed	218	41	5.32

Biface Reduction Stages

Bifacial technology is a very efficient, portable, and convenient way to organize toolkits for highly mobile hunter-gatherers. Kelly (1988) identifies three specific functions of bifaces as multi-purpose tools. With this in mind, I classified further the reduction stage or sequence in which a biface was manufactured. These stages are likely not how indigenous populations viewed their actions, but they provide a useful application for the designation of highly variable tools. Categorizing bifaces into sequential stages allowed me to identify the staging behavior represented by each assemblage (Thomas 1983). From the observed bifacial stages within WF and WST assemblages (Figures 5.8 and 5.9) I see a trend towards finished products, somewhat resembling Thomas' Ideal Repair Curve; the WST biface reduction curve more closely resembles the Ideal Biface Reduction Curve. The low WF sample size does not permit

Chi-square statistical analysis for comparison between on these traditions. Five cells (62.5%) have expected counts less than five; the minimum expected count is 0.69.

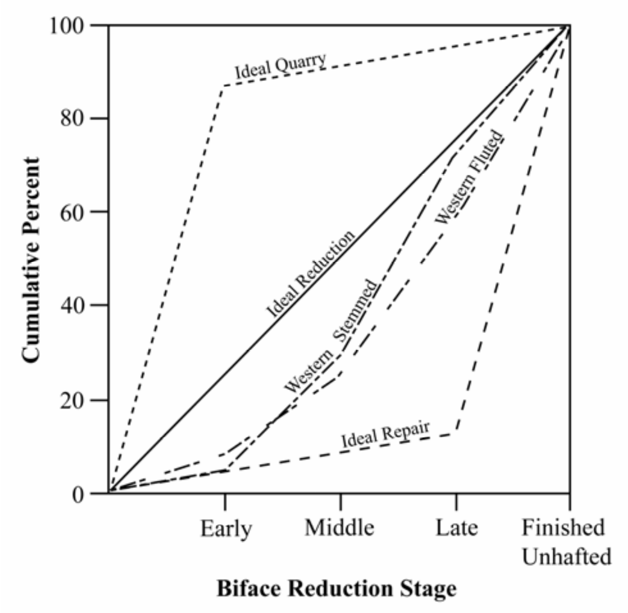


Figure 5.8. Biface reduction curve for Western Fluted and Western Stemmed Tradition assemblages graphed with Thomas' (1983) ideal curves.

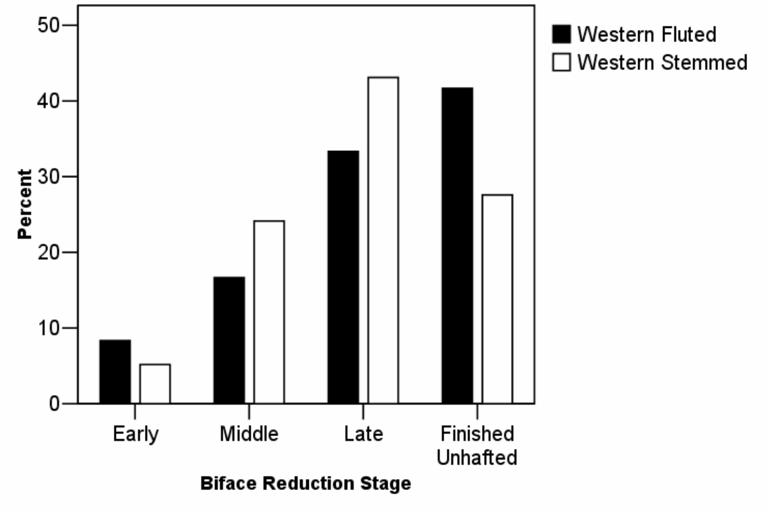


Figure 5.9. Bifacial reduction stages present at Western Fluted and Western Stemmed Tradition assemblages in Jakes Valley. Biface counts: WF=12; WST=58.

Debitage Analysis

As recently as 30 years ago, lithic debitage was considered an expendable component of the archaeological record, rarely, if ever, considered worthy of collecting, let alone analyzing. Archaeologists are now beginning to understand the importance of lithic debitage analysis and its power in interpreting archaeological assemblages. This new avenue of archaeological analysis grew primarily out of the work of Cultural Resource Management as one way of dealing with growing collections (Larson 2004). Debitage analysis has grown to incorporate methodological and theoretical frameworks from which analysts work and formulate their results. In this thesis I compare the debitage from WF and WST assemblages in hopes of finding any differences that may indicate a cultural or technological separation between them. Debitage attributes and definitions are described in Chapter 3.

Raw Material. The most obvious variable to observe when analyzing debitage is the raw material used in manufacture. In this section I include debitage from single-component WF and WST assemblages and discrete work areas within multi-component assemblages. Site 26Wp7336 (Liz 1) was removed from analysis because of its obvious collection bias (see Chapter 4 and site analysis earlier in this Chapter). Thus, the total debitage count for the WF assemblage is 225 specimens and 709 for the WST assemblage after the removal of 26Wp7336. Due to the very low frequency of materials other than CCS, FGV, and obsidian, all other toolstone types were collapsed into a single category, OTHER. Results of the raw material analysis are presented in Figure 5.10. As can be seen, WF and WST assemblages vary greatly in debitage toolstone selection. Chi-Square analysis indicates a significant difference in raw material selection between WF and WST assemblages (X^2=282.518, df=3, P=.000). The WF assemblage is comprised of nearly 90% CCS, with obsidian, FGV and OTHER filling it out. The WST assemblage contains only about 30% CCS, with its majority coming from FGV at 65%, and obsidian and OTHER filling in the remainder.

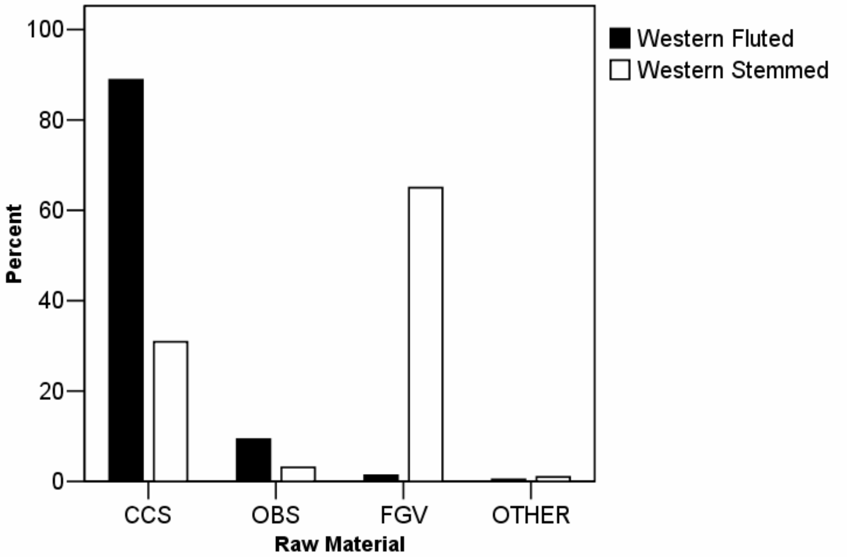


Figure 5.10. Raw material distribution of debitage associated with Western Fluted and Western Stemmed assemblages in Jakes Valley.

Debitage Class. As described in Chapter 3, flake classes are the four general categories used in this analysis, including cortical spall (any piece exhibiting cortex), flake (includes flake fragments and broken flakes), retouch chip (flakes with complex platform, or <1 cm in size), and angular shatter (no diagnostic flake characteristics). Figure 5.11 graphs the results of this analysis. Chi-Square analysis indicates a significant difference in debitage classes between WF and WST assemblages (X^2=20.224, df=3, P=.000). The WF assemblage contains significantly more retouch chips, and fewer cortical spalls and flakes than the WST assemblage.

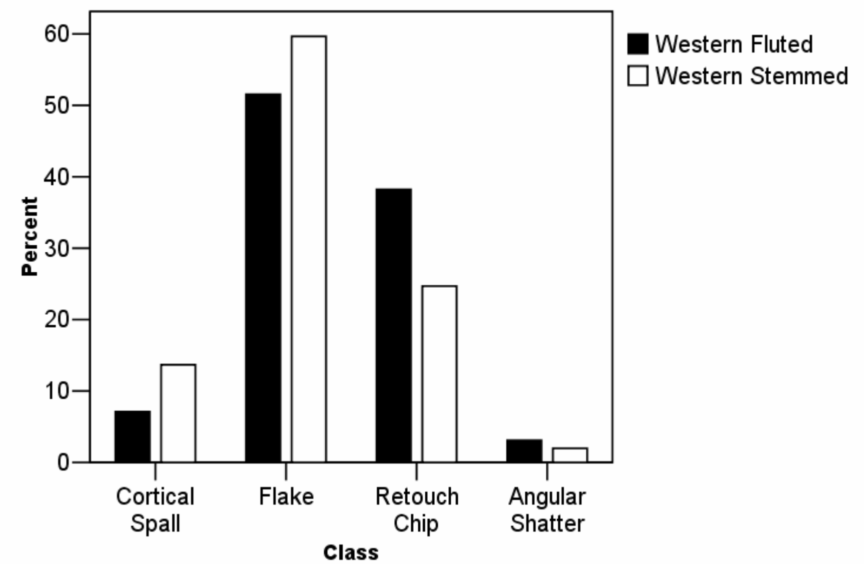


Figure 5.11. Debitage classes present among Western Fluted and Western Stemmed Tradition assemblages in Jakes Valley.

Platform Preparation. The method of platform preparation can inform on technology used by hunter-gatherers. Platform preparations are described in Chapter 3 and include broken (no observable proximal end containing the platform), cortical (platform consists of the original cortical surface of the stone), simple (platform has a single-faceted surface), and complex (platform has a multiple-faceted surface). The results of analysis are shown in Figure 5.12a. Figure 5.12b shows the same pattern, but with the broken category removed, reducing the flake count to 97 (from 225) for WF and 273 (from 709) for WST assemblages. This allows for comparison between the two assemblages only of flakes with proximal ends. Chi-Square analysis indicates no significant difference in platform preparation between WF and WST assemblages with or without the broken platform category (X^2=1.918, df=3, P=.590, and X^2=.381, df=2, P=.827, respectively).

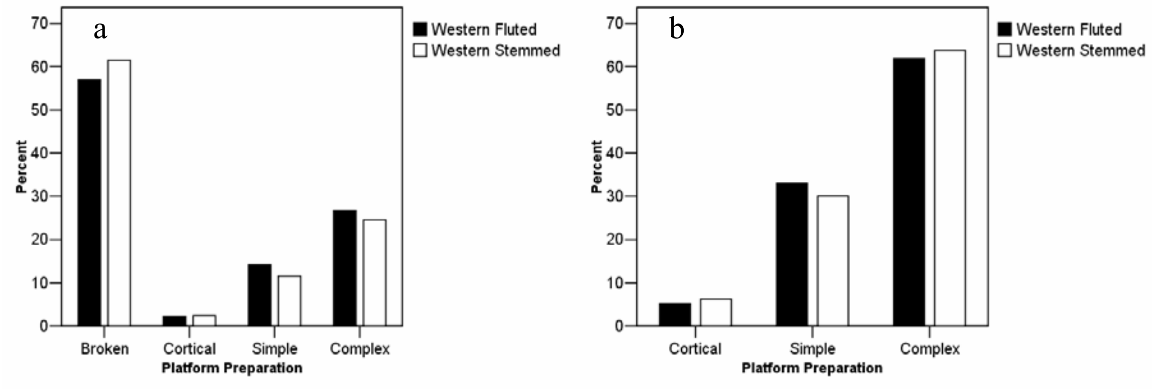


Figure 5.12. Platform preparation comparison between Western Fluted and Western Stemmed Tradition assemblages in Jakes Valley: (a) includes all four categories; (b) removes broken category to compare only those flakes with complete or measurable proximal ends.

Size Categories. Debitage was sorted according to size values using a circular measurement chart (after Andrefsky 2005) with four different diameter categories: less than 1 cm^2, 1-3 cm^2, 3-5 cm^2, and greater than 5 cm^2. All debitage was included, including broken flakes. Results are shown in Figure 5.13. Chi-Square analysis indicates a significant difference in size categories of flakes between Western Fluted and Western Stemmed Tradition assemblages (X^2=96.223, df=3, P=.000). In general, the WF assemblage contains a higher percentage of small flakes, whereas the WST assemblage contains fewer small flakes, and relatively more medium and large flakes.

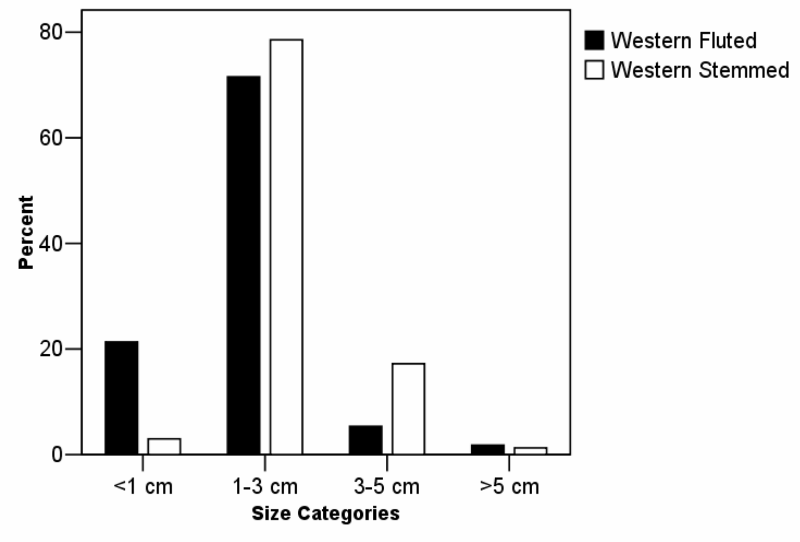


Figure 5.13. Flake size values between Western Fluted and Western Stemmed Tradition assemblages within Jakes Valley.

Weight. Another measure of aggregate analysis for debitage is weight, measured to the nearest gram and rounded (a weight of 0.4 g=0 g; 0.5 g=1 g, etc.). The entire debitage assemblage from each tradition was weighed individually and plotted in Figure 5.14. A Mann-Whitney U Test and Kolmogorov-Smirnov goodness-of-fit Z Test were applied to these two debitage assemblages. To illustrate these tests better, Figure 5.15 plots the cumulative percent of debitage weight between assemblages. Both statistical tests identified differences between the two assemblages, indicating they do not come from the same population (Mann-Whitney U Statistic=55890.5, Z=-6.779, P=.000; Kolmogorov-Smirnov Z Statistic=3.292, P=.000). This indicates that debitage from WF assemblages are typically smaller in size than debitage from WST assemblages.

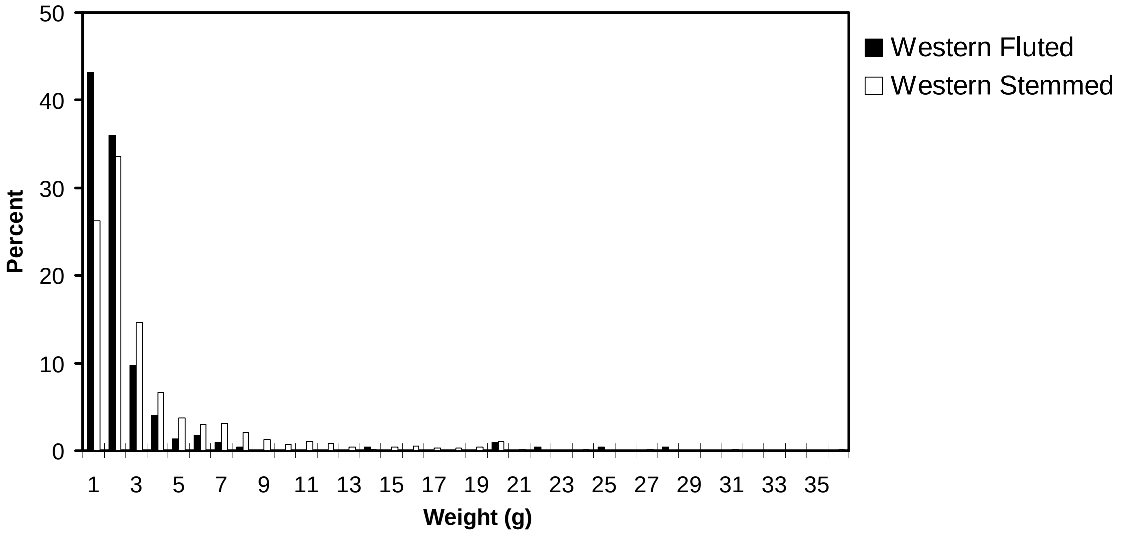


Figure 5.14. Debitage weight (g) between the Western Fluted and Western Stemmed Tradition debitage assemblages within Jakes Valley.

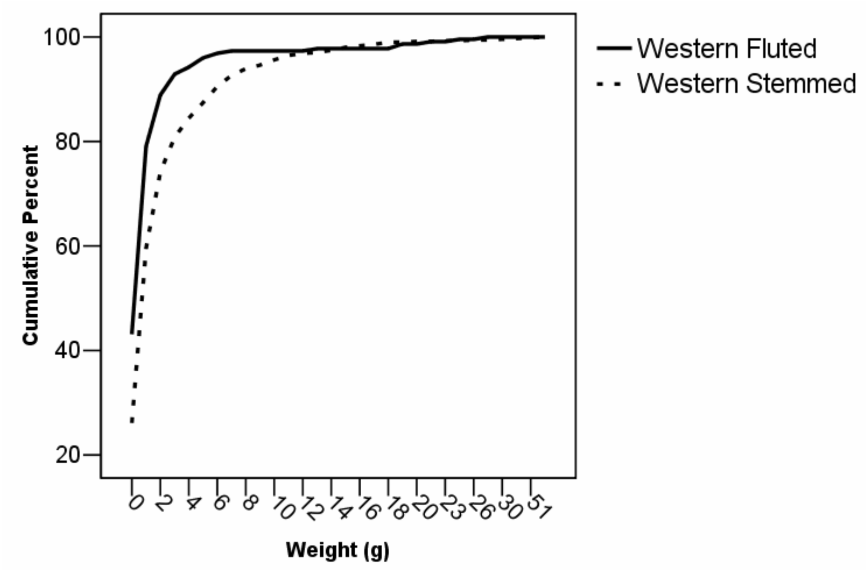


Figure 5.15. Cumulative debitage weight percentage between Western Fluted and Western Stemmed Tradition assemblages within Jakes Valley.

Amount of Cortex. The final variable scored for debitage was the amount of cortex present on the dorsal face. This is described in Chapter 3; briefly, the categories are: 0%

(also referred to tertiary flakes), 1-49% (also referred to as secondary flakes), and 50-100% (also referred to as primary flakes). The results are presented in Figure 5.16. Chi-square analysis indicates a significant difference in the amount of cortex on flakes between WF and WST assemblages (X^2=7.615, df=2, P=.022). This indicates the WF debitage assemblage contains significantly fewer cortex-bearing flakes than the WST assemblage.

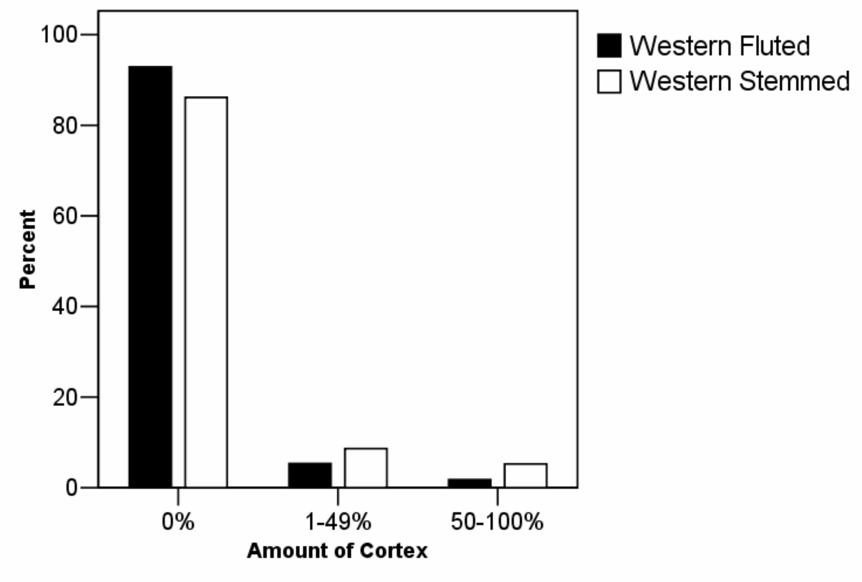


Figure 5.16. Percent cortex on flakes between the Western Fluted and Western Stemmed Tradition assemblages within Jakes Valley.

Richness and Diversity

Archaeologists have always been interested in comparison (whether it be by site, tradition, etc.) in efforts to understand what differences exist and how to explain them. Increasingly, artifact assemblages have been measured to identify diversity within and between populations (Rhode 1988) by determining functional breadth, as a greater diversity may indicate an increase in activities conducted at the site (Basgall 2007b). We can then use observed differences to interpret the archaeological record. How is this done? In biology, richness refers to the number of different taxa within a sampled environment or community (Reitz and Wing 1999). As sample size increases, generally the number of exotic or rare species in the sample will also increase. Archaeologists have borrowed this concept to compare artifact assemblages with tool classes substituting for animal taxa. Analyzing assemblage richness can inform on the conducted activities within the sample. Another measure is the diversity of an assemblage. This measures tool abundance across the separate tool classes. Diversity of each assemblage was measured using the Shannon-Weaver function (also called Shannon-Wiener function). Finally, the equitability of each assemblage was calculated to determine evenness; values nearer 1.0 indicate a more even distribution of tool abundance between classes. The formulas can be found in Chapter 3.

These measures were applied to the Jakes Valley Paleoindian assemblages to identify any functional distinctions between WF and WST collections. In addition, they provide a means to observe potential differences between the large Jakes Depression site and all other smaller sites. If the Jakes Depression site exhibits a larger and more diverse tool assemblage than the smaller sites, it may be argued that it represents a residential site, where the small sites are single-use camps or resource-extraction sites. If the large site appears similar to small sites in richness and diversity, it may be argued that this large site represents a series of short stays at a favorable location that was frequently revisited.

Six tool classes were used to identify richness in this analysis, including projectile points, unhafted bifaces, crescents, cores, formal flake tools, and informal flake tools. Because these applications deal specifically with tools, sites 26Wp7336 (Liz 1) and 26Wp1177 (Doug 3) are included in the analysis, as are two of the four upland sites not analyzed for this thesis. Lithic assemblage data for these upland sites were obtained from IMACS site records. The other two upland sites noted in Chapter 4 were multi-component sites where specific Paleoindian work areas were either not identified, or not fully described. Richness results are shown in Table 5.24.

Table 5.24. Richness and Tool Frequency at Western Fluted, Western Stemmed Tradition, and WF/WST-Mixed Assemblages within Jakes Valley.

Site	Proj. Point	Unhafted Biface	Crescent	Core	Formal Flake Tool	Informal Flake Tool	N	Richness
Mixed								
JD	89	110	14	8	84	94	399	6
26Wp1177	6	7	-	1	2	6	22	5
WF								
26Wp7729	2	3	1	2	5	3	16	6
26Wp7735	1	2	-	-	1	2	6	4
WST								
26Wp7316	3	1	-	2	1	5	12	5
26Wp7321	2	3	-	2	-	4	11	4
26Wp7323	2	2	-	-	3	-	7	3
26Wp7334	3	-	-	-	-	-	3	1
26Wp7335	1	-	-	-	4	4	9	3
26WP7336	5	1	-	-	7	1	14	4
26Wp7738	1	1	-	-	2	1	5	4
26Wp7746	8	3	-	-	2	2	15	4
26Wp7748	1	2	-	-	-	1	4	3
26Wp3808*	6	8	-	4	10	13	41	5
26Wp3809*	1	1	-	-	-	1	3	3

*Upland site assemblage not analyzed for this thesis; data were obtained from IMACS site forms.

The Jakes Valley Paleoindian site assemblages fall victim to the "sample-size effect" noted by Grayson (1981), Jones et al. (1983), and Rhode (1988). A Spearman's rank correlation coefficient test was conducted to determine if assemblage size affects the number of tool classes in an assemblage. The results indicate there is a highly significant correlation between assemblage size and number of tool classes ($r_s=0.85$, $p<0.001$). Obviously, a site with fewer than six artifacts cannot have a class richness of six. However, it doesn't take much more than six artifacts to attain the maximum richness. The Jakes Depression site and 26Wp7729 (Waldy Pond 9) both contain the highest class richness, yet they contain a very different number of tools (n=399 and 16, respectively). Three other sites contain a richness of five (26Wp1177 [Doug 3], 26Wp7316 [Jakes Pond 3] and 26Wp3808), yielding 22, 12, and 41 tools, respectively. Therefore, while sample size does affect site richness, sites with small tool counts may contain numerous tool types, indicating that numerous activities were conducted at small and large sites.

Diversity and equitability results appear in Table 5.25. As noted in Chapter 3, Shannon-Weaver values increase as site diversity increases. Results indicate that the most functionally diverse site in this data set is site 26Wp7729, followed by the Jakes Depression site and the upland site 26Wp3808. This suggests that a small site (26Wp7729) is more diverse in terms of tool classes and spread of tools than the largest site. Site 26Wp7334 contains a diversity value of 0.0 since it contains only a single tool class (projectile points). Equitability results indicate that nearly every small site has a more even distribution of tools across classes than the large Jakes Depression site. However, this can likely be attributed to the small quantity of tools in each class at small sites. For instance the upland site 26Wp3809 contains a perfectly even equitability value (1.0), but only contains three tools, each in its own class.

These results suggest that, at least occasionally, small sites can contain equal or slightly smaller richness values than the large site. Additionally, small sites can be nearly as, or more, diverse than the large site. Finally, small sites can be more evenly spread than the large site. These findings suggest that the large Jakes Depression site is no different than smaller Paleoindian sites in Jakes Valley.

Table 5.25. Shannon-Weaver and Simpson Diversity Functions, and Equitability among Western Fluted, Western Stemmed Tradition, and WF/WST-Mixed Assemblages within Jakes Valley.

Site	N	Richness	Shannon-Weaver Diversity	Equitability
Mixed				
JD	399	6	1.554	0.868
26Wp1177	22	5	1.432	0.889
WF				
26Wp7729	16	6	1.684	0.940
26Wp7735	6	4	1.330	0.959
WST				
26Wp7316	12	5	1.424	0.885
26Wp7321	11	4	1.342	0.968
26Wp7323	7	3	1.079	0.982
26Wp7334	3	1	0.000	-
26Wp7335	9	3	0.965	0.878
26WP7336	14	4	1.091	0.787
26Wp7738	5	4	1.332	0.961
26Wp7746	15	4	1.194	0.862
26Wp7748	4	3	1.040	0.946
26Wp3808*	41	5	1.540	0.957
26Wp3809*	3	3	1.099	1.000

*Upland site assemblage not analyzed for this thesis; data were obtained from IMACS site forms.

Landscape Use

The large number of known archaeological sites dating to the Paleoindian period allows landscape use to be examined for the entire valley. Figure 5.17 and Table 4.4 show differences in elevation and geographic setting between WF and WST occupations in Jakes Valley. These data indicate that WF occupations (n=6) are all found around wetland patches in Jakes Valley, the majority of which are near the playa where Illipah Creek would have drained. No WF sites or isolates are located in upland settings. The WST sites (n=24) are, to a greater degree, associated with other areas of the valley, not just wetland patches near the playa. Two sites (8%) are located between one and two kilometers north of the main cluster of sites situated near the playa. The placement of these two sites suggests either deliberate placement near Illipah Creek, good retooling stations, or kill-sites. Three other WST sites are located in the mountain foothills of the Egan Range, in the southeastern part of the valley, and one in a small valley between the Butte Mountains and the White Pine Range in the northwest part of the valley. The three southeastern sites are within present day pinyon-juniper woodlands overlooking Jakes Wash, and the other is in pinyon-juniper woodland between Antelope and Little Antelope Springs. These four upland sites (17%) contain numerous WST points and associated artifacts. The remaining 18 WST sites (75%) are closer to the valley and likely associated directly with wetland patches created by Illipah Creek in the northern and Circle and Hayden Washes in the southern portion of the valley.

The extreme difference in the number of WF projectile points (n=10) versus Western Stemmed Tradition points (n=119) in valley settings (numbers are from Jakes

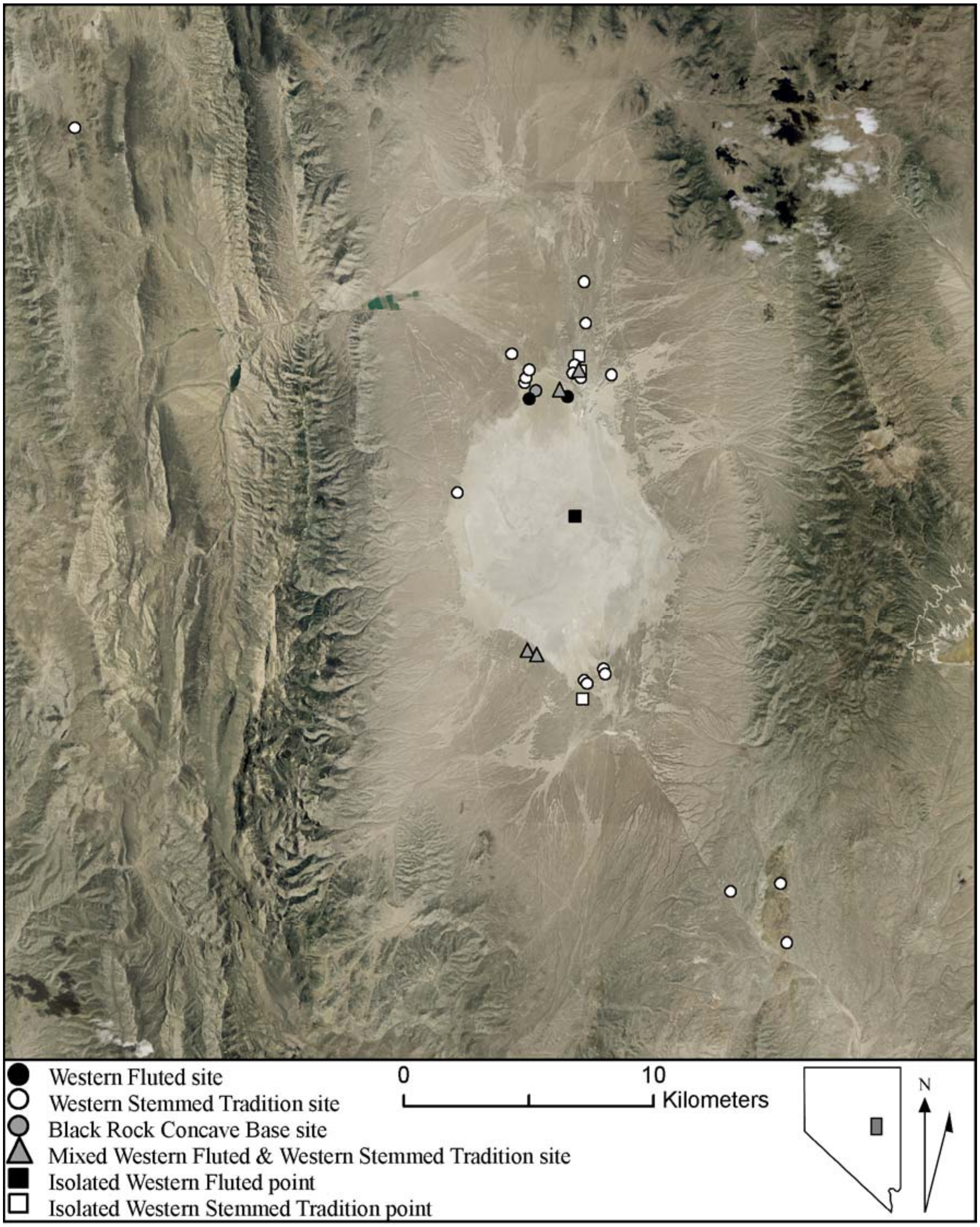


Figure 5.17. Western Fluted and Western Stemmed Tradition landscape use within Jakes Valley. Note the elevation differences between each tradition, and the inferred increased use of upland settings by WST occupations. Adapted from National Agriculture Imagery Program 2006: http://keck.library.unr.edu/data/naips/naips.htm.

Valley SARF collections, and do not include the three fluted points nor the hundreds of stemmed points from other known sites mentioned above) show that WF groups utilized the valley to a much lesser degree than WST groups. When this is viewed in the context of landscape use patterns, I infer that WST groups utilized, to a greater degree, a more diverse array of micro-environments than did the WF groups in Jakes Valley. Due to the enormous difference in number of projectile points, it appears that there may have also been a population expansion in the WST era, if it post-dates the WF era (although the WST era lasts nearly 4,000 years which may be 10 times as long as the WF era if it dates similarly to Clovis). The elevational segregation of WF and WST sites surrounding the playa may suggest occupation at different times. Water levels may have been slightly lower during the WF occupation of Jakes Valley, forcing groups to settle closer to the playa around 1,928 m asl. During the WST occupation of Jakes Valley, water levels appear to have been slightly higher creating larger wetland patches that forced groups to settle closer to 1,930 m asl.

Summary

In this chapter I described the lithic assemblages from 19 Paleoindian sites in Jakes Valley. These 19 tool assemblages were then combined into two distinct assemblages: Western Fluted and Western Stemmed Tradition in an effort to compare and contrast these two Paleoindian traditions. Statistical analyses revealed significant differences between these two traditions in raw material selection, debitage class, debitage size, debitage weight, and amount of cortex on debitage. In addition, preferred obsidian sources differ along with patterns of landscape use in mean elevation and environments occupied around Jakes Lake.

These groups do not differ on every variable. While WST assemblages contained higher biface-to-core and formal-to-informal tool ratios, both groups clearly organized their technology similarly: towards bifacial technologies that relied on formal tool-bearing equipment that was multi-functional, dependable, and curated. All of these qualities would have been important to highly mobile hunter-gatherers in a new and unexplored land. Additionally, OHD results were ambiguous in temporally separating the two traditions.

Finally, richness and diversity measures indicated that many sites were similar in tool class representation. Surprisingly, the large site, Jakes Depression, thought to represent a residential base within Jakes Valley, appears similar in richness, diversity, and evenness to many small sites thought to represent single events. This suggests to me that Jakes Depression and most other small sites represent residential base sites due to their great functional breadth evidenced by high richness values. Jakes Depression, however, is probably a palimpsest of small occupations around a favored or resource-rich location in the valley.

Chapter 6

Lithic Technological Organization, Mobility, Raw Material Procurement, Landscape Use, and Diversity

The majority of Western Fluted and Western Stemmed Tradition lithic assemblages described in the previous chapters appear to be small single occupation sites or small hunting camps where broken tools were discarded and replaced along with other activities. This is evidenced by the high number of proximal ends of diagnostic WF and WST projectile points and flake tools found at most sites. But what strategies were employed by these groups to provision themselves with raw material? Kuhn (1991, 1992, 1994, 1995) has shown that provisioning strategies employed by hunter-gatherers determine technological organizational patterns seen in the archaeological record. Knowing how hunter-gatherers provisioned themselves with raw material and organized their toolkits, along with added information on landscape use in Jakes Valley, may permit identification of settlement systems (*sensu* Binford 1980) and mobility patterns in the study area. Additionally, lithic conveyance zones inform on ranges traveled by early hunter-gathers who likely procured their raw materials directly, rather than through trade (Jones et al. 2003).

Several models of adaptation have been developed to describe Paleoindian lifeways and choices in the Great Basin and surrounding areas during the Pleistocene-Holocene Transition. Before describing the Paleoindian lithic assemblages, I discuss settlement-subsistence models and evidence on the Plains and Great Basin. I then operationalize two Great Basin Paleoindian models to identify their visibility in the archaeological record. Finally I describe the Jakes Valley Paleoindian lithic assemblages to determine the model of best fit.

Paleoindian Adaptation Models in the Great Basin

To increase the knowledge of Paleoindians it is vital to understand how these early hunter-gatherers organized themselves and exploited the landscape to acquire toolstone and food. In the Plains, Clovis points (made from high quality toolstone often several hundred kilometers from its source) are found in direct association with megafaunal taxa, mostly *Mammuthus* (Grayson and Meltzer 2002) and possibly *Equus*, *Camelops*, and *Bison antiquus* (Haynes 2002a) indicating that, at least occasionally, Paleoindian hunters killed and dined on these now-extinct Pleistocene mammals. Based on a few early finds of Clovis points with extinct megafauna, Paleoindians were described as “big game specialists” (Haury 1953; Haury et al. 1959). Recently, several Clovis sites (from all over North America) have provided further evidence (albeit minimal) of their diet, including deer, bison, pronghorn, caribou, moose, and smaller game such as rabbit, hare, various rodents, armadillo, badger, raccoon, and various types of turtles, amphibians, reptiles, fishes, and birds (Haynes 2002a: figure 5.1, p.177-178). While plant foods are believed to have been minimally exploited by Clovis groups (as evidenced by the lack of heavy processing tools such as grinding stones) the Shawnee Minisink site produced plant remains including blackberry, hawthorne plum, hackberry, and wild grape (Haynes 2002a: figure 5.3). It is now obvious that Clovis hunters did not subsist entirely on mammoth, but likely employed a big game specialist strategy taking these and other large mammals whenever possible or available (Haynes 2002a, 2002b; Waguespack and Surovell 2003), and also incorporating smaller game and even some plants to supplement their diets.

The Great Basin provides much less data on subsistence patterns of Paleoindian groups, especially of the Western Fluted tradition. It has not yet been substantiated if Western Fluted points in the Great Basin represent the same cultural group as Clovis in the Plains. This is primarily because of the surficial nature of the archaeological record in the Great Basin, and lack of buried sites containing fluted points that could permit radiometric dating. The dearth of buried sites explains the lack of preserved subsistence remains associated with fluted points. However, an array of megafaunal remains have been found at sites like Tule Springs (*Equus*, *Camelops*, and *Mammuthus*), Gypsum Cave (*Nothrotheriops*), Fishbone Cave (*Equus* and *Camelops*), Paisley Five Mile Caves No.3 (*Camelops*, *Bison antiquus*, *Equus*, and various types of waterfowl), Smith Creek Cave (*Camelops* and *Bison*), and the Sunshine Locality (*Camelops*) that were originally thought to be associated with cultural remains (only the Sunshine Locality contains diagnostic Paleoindian tools) (Beck and Jones 1997; Bryan 1988; Heizer and Baumhoff 1970; Jenkins 2007). However, all of these have been rejected as evidence for hunting due to equivocal cultural associations or ambiguous or incomplete reporting (Beck and Jones 1997; Cannon and Meltzer 2004; Heizer and Baumhoff 1970; Jones et al. 1996; Watters 1979).

Paleoindian subsistence remains are not altogether lacking in the Great Basin. Several Western Stemmed Tradition sites have yielded both plant and animal remains that could have been part of the diet. These sites include Danger Cave, Hogup Cave, Bonneville Estates Rockshelter, Spirit Cave, Dirty Shame Rockshelter, Connley Caves, Paulina Lake, and Fort Irwin (Beck and Jones 1997). A large variety of terrestrial and aquatic animals, including bighorn sheep, antelope, mule deer, bison, wapiti, jackrabbit, marmot, sagegrouse, various waterfowl including grebe, teal, and ducks, tui chub fish, and even grasshoppers (Beck and Jones 1997; Hockett 2007; Pinson 2007) appear to have been part of the diet between 11,000 and 8,000 B.P., supplemented by a high diversity of plants including pickleweed, prickly pear, bulrush, hackberry, ricegrass, dropseed sandgrass, and goosefoot (Beck and Jones 1997; Rhode and Louderback 2007). This diversity in diet has led many authors to suggest that WST groups living during the Pleistocene-Holocene Transition practiced a very diverse subsistence strategy similar to later Archaic groups that diversified their diets even further. Some authors refer to this time period as Paleo-Archaic (Willig and Aikens 1988), suggesting a continuity of diet diversification with differences not in the kind of resources exploited, but in degree (Pinson 2007).

The presence of Paleoindian (a.k.a., Paleoarchaic or Pre-Archaic) sites surrounding pluvial lakes in the Great Basin led some researchers to assume a specialized lacustrine adaptation, despite the meager evidence of subsistence, and patterns of landscape use that include caves and upland sites away from the lakes. Subsistence evidence is not present at any Paleoindian site in Jakes Valley, as they are all surface sites; thus stone tools must be used to infer settlement strategies and potential resources procured. In this next section, I identify two types of settlement-subsistence models put forth for Great Basin Paleoindian populations: the Western Pluvial Lakes Tradition (WPLT) or Tethered Forager (TF) and Highly Mobile Forager (HMF). Each is described and operationalized (see Table 6.1) to allow archaeological identification and classification.

Western Pluvial Lakes Tradition or Tethered Forager Model

For years researchers in the Great Basin have developed subsistence-settlement models to explain the apparent patterning of Paleoindian sites along the shorelines of pluvial lakes. Bedwell (1970, 1973) believed that this patterning, as seen along the western Great Basin, was indicative of a specialized exploitation and extraction of lakeside, marsh, and associated grassland resources, which were "…the focal points of the economy…" (Bedwell 1973:170). He believed these Paleoindians were dependent on lacustrine environments for their survival and never had to leave the lakes, referring to this specialized adaptation as the Western Pluvial Lakes Tradition. Later, this model was expanded to encompass the increasing evidence of Paleoindian assemblages on the boundaries of pluvial lakes across the entire Great Basin (Hester 1973; Price and Johnston 1988). Similarly, Willig (1988, 1989) proposed the Tethered Forager (TF) model in which groups were not specifically adapted to this lacustrine environment, but "tethered" to them while retaining flexible, wide-ranging strategies of broad resource procurement. Both models suggest a fairly sedentary occupation centered near highly productive lacustrine settings, exploiting terrestrial and aquatic game and plant foods.

Table 6.1. Archaeological Expectations of the WPLT/TF and HMF Models.

Archaeological Signature	WPLT or TF	HMF
Features		
Residential Structures (e.g., rock rings)	Common	Rare
Fire-Cracked Rock	Common	Rare
Technology, Mobility, Toolstone Procurement, and Landscape Use		
Provisioning Strategy	Places	Individuals
Technological Organization	Expedient	Curated
Logistical Mobility	High	Low
Residential Mobility	Low	High
Toolstone Procurement	Local	Exotic and Local
Landscape Use	Lacustrine , Riverine, Upland	Lacustrine, Riverine, Upland
Lithic Tool Types		
Formal Tools	Rare	Common
Informal Tools	Common	Rare
Biface to Core Ratio	Low	High
Formal to Informal Tool Ratio	Low	High
Combination Tools	Rare	Common
Lithic Tool Variables		
Unifacial Reduction Index Values	Low	High
Number of Retouched Edges on Unifaces	Low	High
Percentages of Total Margins Retouched on Unifaces	Low	High
Tool Blank Types	Flakes Possessing Simple Platforms, Cortical Spalls	Biface Thinning Flakes
Total Length/Haft Length Ratio Values	High	Low
Biface Reduction Ratio Values	Low	High
Inter-Assemblage Diversity	High	Low
Core Types		
Formal	Rare	Common
Informal	Common	Rare
Core Variables		
Number of Fronts	Low	High
Number of Platforms	Low	High
Debitage Variables		
Angular Shatter	Common	Rare
Cortical Spalls	Common	Rare
Flakes Possessing Simple Platforms	Common	Rare
Biface Thinning Flakes	Rare	Common
Retouch Chips	Rare	Common
Overshot Flakes	Rare	Common

Adapted from Smith (2006).

If Great Basin Paleoindian groups were sedentary, as the WPLT and TF models predict, we would expect to find evidence of features created at their occupation sites.

Features would likely include the remains of residential structures, which may take the form of rock rings as the outside edges of shelters. Being adapted to an environment or tethered to it, one would want to live as comfortably as possible, thus the need to create a semi-permanent residence. The rock rings would be the only remaining evidence of such a structure after 10,000 or more years. Additionally, we would likely find scatters of fire-cracked rock or other evidence of thermal activities indicating designated areas to boil water or cook food.

Kuhn (1991, 1992, 1994) predicts a sedentary lifestyle would be reflected in peoples' technological provisioning strategies. Sedentary groups, who organize themselves logistically, send task groups out to collect toolstone and return it to their residence (Binford 1980). This is called "provisioning places" by Kuhn (1991, 1992, 1994, 1995) and reflects a strategy in which groups stockpile raw material at a given place for activities conducted there. Provisioning places creates a toolkit where tools are used minimally and expediently; often flakes, for example, would be struck from an informal core and then discarded upon completion of the activity (i.e., informal tools). Tools are not used for extended periods of time or curated for future use, because toolstone can be procured at any time from a known source that is probably fairly local. Thus, groups practicing a WPLT or TF model would procure toolstone logistically while practicing a "provisioning places" technological strategy that is based on expediently made tools from local toolstone quarries.

It almost goes without saying that WPLT or TF groups would use landscape in a very specific manner. Being adapted, or tethered, to lacustrine environments would be reflected in landscape use and settlement patterning. Residential sites would be located strictly around the shorelines of pluvial lakes. Task specific sites may occur in other environmental settings (i.e., rivers and uplands), but these would appear technologically different, representing procurement of a single resource during a logistical foray. Thus, sites set away from the shorelines should exhibit low diversity and richness values, reflecting the solitary activity that occurred there. Residential sites should appear more diverse reflecting the numerous functions and activities conducted at the home base. Therefore a high inter-assemblage diversity should be present reflecting the fact that some sites have high diversity and some have low diversity values.

The tool assemblage of sedentary groups should exhibit few formal tools and a higher percentage of informal tools. This, again, reflects the provisioning places strategy employed by sedentary groups (Kuhn 1991, 1992, 1994, 1995). Creating formalized tools is an unnecessary time expenditure when unmodified flakes will do the same job. Bifaces should be relatively uncommon compared to cores as sedentary groups do not have a technological need for a flexible tool that also creates flakes (Parry and Kelly 1987). Tools should be used for a single task then discarded, as it is easier to remove another flake than to resharpen a flake which will never be quite as sharp. Combination tools should be rare for the same reasons.

If sedentary groups are using simple flake tools (i.e., informal) for single tasks before discarding them, the unifacial reduction index (URI) values should remain low, reflecting the minimal amount of resharpening conducted on the tool. Additionally, the number of retouched edges and percentage of total margins retouched on unifacial tools should be low, reflecting the expedient nature of their technological strategy. These flake tools should most often be manufactured on flakes possessing simple platforms, or cortical spalls, and rarely on bifacial thinning flakes. This reflects the use of informal cores and lack of bifaces used as cores. Bifaces, when present, should show minimal resharpening. Because toolstone could be acquired when needed, hafted and unhafted bifaces would not need to be curated and resharpened for future use or other tasks. Thus, total length/haft length ratio (TL/HLR) values should be high, while biface reduction ratio (BRR) values should be low, indicating this lack of curation and resharpening.

The cores used to manufacture useable flakes and tools should be informal, possessing few fronts from which flakes were removed, and few platforms. This reflects the minimal, informal, and expedient use of the core. Debitage created from these informal cores should be very distinctive. Because toolstone could be quarried from fairly local sources, a high proportion of flakes should be cortical (assuming the quarried material originally was cortical) reflecting the minimal amount of reduction at the quarry. Flakes possessing simple platforms and angular shatter should also be high in proportion compared to biface thinning flakes, which should be very low, reflecting the preferential use of informal cores over bifaces. Small retouch chips made from fine formal tool production and resharpening and overshot flakes made on bifaces should also be rare.

Highly Mobile Forager Model

Alternatively, another model, termed Highly Mobile Forager (HMF), makes no statement of environmental adaptation and specialization. Rather, the HMF model characterizes Paleoindian groups as extremely mobile with frequent residence shifts, possibly focusing on a narrow range of resources such as terrestrial game, but also exploiting plant and other lacustrine resources when available (Ames 1988; Basgall 1988; Elston 1982, 1986; Tuohy 1968, 1974a; Kelly and Todd 1988).

If highly mobile groups were frequently moving about the Great Basin in search of water, food, and raw materials, we should expect few permanent features to be left at their campsites. Temporary residential structures should be created expediently and not be archaeologically visible after 10,000 years. Additionally, foragers would not remain in any one place long enough to accumulate thermal features like fire-cracked rock concentrations or obvious hearths. However, some traces of different activities would likely be found, such as specialized tool classes or different toolkits

The technological provisioning strategy employed by highly mobile foragers would differ significantly from sedentary groups. Highly mobile foragers would likely practice an embedded procurement pattern for toolstone acquisition (Jones et al. 2003; Kelly and Todd 1988) within a residential mobility settlement pattern (*sensu* Binford 1980). A strategy of "provisioning individuals" would be used by highly mobile foragers (Kuhn 1991, 1992, 1994, 1995). This strategy provides individuals with the necessary equipment, or "personal gear" (*sensu* Binford 1977, 1979), needed to last them until they could replenish their toolkits. Tools (or bifaces that can be readily produced into tools) are made in anticipation of use so that one is not caught off guard without tools or raw material to make them when procuring food resources (Binford 1977, 1979; Kuhn 1995). Toolstone sources may be few and far between for a group that is residentially mobile, thus lithic assemblages should contain both local and exotic raw materials. When local raw materials are used, they should be manufactured into simple flake or informal tools.

Exotic or non-local raw materials should be found as finished, formal tools that are either broken or show extensive curation prior to replacement.

Being highly mobile, such foragers would likely take high-ranked resources as they became available, or on an encounter basis. Therefore, when moving about the landscape, if they happen upon a high-ranked resource, no matter where it might be, they would take it (Waguespack and Surovell 2003), leaving archaeological traces in all parts of the landscape, including lakeshore, riverine, and upland settings. Furthermore, these sites would likely contain the full spectrum of technological activities as people camped near the resource procurement site (e.g., kill site, toolstone quarry, etc.). Richness values should be high at all sites, while diversity within assemblages should be high (reflecting diverse functions), but low between tool assemblages (reflecting the homogeneity between sites), indicating that numerous and similar technological activities were conducted at each site.

Highly mobile foragers moving about the landscape may rarely come across high quality or adequate quantities of toolstone. Therefore, we should expect their tool assemblages to be adapted to this type of lifestyle. Kelly and Todd (1988) and Kelly (1988) predict that bifaces and other formal tools should constitute the majority of Paleoindian tool assemblages, with a reduced number of informal and expedient flake tools. Bifaces are the perfect multi-tools that allow for use as-is or slightly modified into hafted projectile points, or used as cores to provide flakes (Kelly 1988). Relying on a bifacial technology reduces the amount of toolstone being carried by each individual, an important factor for people moving frequently and who need to optimize portability. Being in areas of uncertain abundance and quality of toolstone would force a group to extend the use-life of their tools until the next adequate quarry could be found. Tools should be highly curated, or resharpened, for future use or until suitable raw material could be replenished and new tools manufactured to replace worn tools. We should also expect some tools to have multiple functions; combination tools would be common, and tools should be recycled for different functions. Therefore, highly mobile foragers would have numerous formal tools compared to informal, and rely primarily on bifacial technologies with few informal cores.

If highly mobile foragers were reusing their tools to such a degree, then we should observe this curation in the tool assemblages. Formal unifacial tools should be resharpened and reused creating high URI values. Additionally, these unifacial tools should exhibit a high number of retouched edges, and percentage of total margins retouched, reflecting the extent to which tools were held on to and reused. The high use of bifaces in this model would determine the flake types used for unifacial tools. Tools made from biface thinning flakes should be common, while those made from flakes possessing simple platforms and cortical spalls should be relatively rare. Hafted bifaces should be resharpened to a high degree reflected in low TL/HLR values and high BRR values.

The prevalence of bifaces in this model does not preclude the use of other formal or informal core types. While bifaces should outnumber cores, we may expect to find other formal core types over informal types. These cores should exhibit a number of fronts and platforms reflecting the degree to which highly mobile foragers were utilizing their toolstone, getting as much from it as possible.

Finally, debitage types found at these sites should reflect their technological strategies. If bifaces form the primary component of these assemblages, the debitage should consist primarily of biface thinning flakes. Retouch chips should also be common along with overshot flakes reflecting the high amount of resharpening and biface production. Cortical spalls and flakes possessing simple platforms should be rare.

Character of the Jakes Valley Assemblages

As previously stated, the majority of Paleoindian sites in Jakes Valley represent small, single-use camp-sites, situated primarily along the edge of the playa. Lithic tool assemblages from these sites generally number less than 20 total specimens. In this section, I review all variables listed in Table 6.1 to identify which model characterizes each Paleoindian tradition (all WF and WST assemblages were combined to facilitate comparison and identify if they represent separate systems). Diversity indices are calculated for each site assemblage to identify differences in technological activities conducted at each site. These diversity measurements are also used to compare each small site to the larger Jakes Depression site to determine if any functional or technological discrepancies are observed. Large differences in diversity values between large and small sites would indicate different site functions, with large values indicating numerous activities, while small values indicate a limited range of activities. Analyzing the variables listed in Table 6.1 informs on provisioning strategies, technological organization, mobility and settlement strategies, lithic conveyance zones, and landscape use practiced by Paleoindians in Jakes Valley during the Pleistocene-Holocene Transition.

Features

No residential structures (e.g., rock rings) were observed during survey or recordation of any of the Jakes Valley Paleoindian occupation sites. Sites were surveyed using closely-spaced five-meter wide transects to identify cultural materials. If obvious rock ring features were on-site and not deeply buried, they would have been detected. Additionally, no instances of fire-cracked rock concentrations were observed at these sites. The complete lack of such features is not unexpected, as most Paleoindian sites are small, single-use occupation sites that are not apt to contain long-term residential features such as rock rings or cooking remains. The lack of these features is consistent with the HMF model.

Lithic Technology

Raw Material Distribution and Use. Jakes Valley Paleoindian lithic assemblages contain three primary types of raw material, CCS, FGV, and obsidian. Obsidian and FGV have geochemical properties that allow for characterization and sourcing to specific quarries. Crypto-crystalline silicates (CCS), on the other hand, cannot be geochemically sourced with much reliability as these materials are more heterogeneous in elemental composition than obsidians (Beck and Jones 1990), and are, in general, much more widely distributed across the landscape; also, CCS quarries are less well studied in the Great Basin than volcanic sources. For these reasons, volcanic raw materials (FGV and obsidian) provide the best source of information regarding Paleoindian territorial range, or more properly, lithic conveyance zones (Jones et al. 2003).

Crypto-Crystalline Silicates. As mentioned above, CCS is probably ubiquitous across the Great Basin, although abundance and quality of these toolstone sources likely varies to a high degree. Unfortunately, very few sources are known in or around the study area. A well-known exception is the Tosawihi opalite quarry located approximately 230 km northwest of Jakes Valley in north-central Nevada. Tosawihi opalite is a high quality, white-colored material that fluoresces green under shortwave ultra-violet (UV) light, and dark purple under longwave UV light (Elston 1992). However, Elston (1992:78) notes that weathering can cause Tosawihi opalite to fluoresce "deep rosy purple" blotches under shortwave UV light, causing some specimens to fluoresce green on one face, and purple on the other. One Western Fluted point base (see Chapter 5) from Jakes Valley was manufactured on a white CCS that fluoresced a deep maroon under shortwave UV light, leading Rondeau (2006b) to conclude that it was not from the Tosawihi quarry. However, if weathered Tosawihi opalite can fluoresce deep rosy purple then it is possible that this specimen actually was manufactured from Tosawihi material. This requires further testing before definitive results can be reported, but is important because a Clovis point preform was found at the Tosawihi quarry made of Tosawihi opalite (Ataman and Drews 1992) suggesting that Paleoindian groups knew of this source and utilized it.

Three other CCS quarries near the study area are noted by Beck and Jones (1990). One is roughly 15 km northwest of Jakes Valley and has material with a distinctive green color, and while several pieces of green CCS debitage were found among these assemblages, the "distinctive green" color of this source is unknown by the author. Another is located roughly 25 km north of the previous source in the Buck Mountains, but is not described. The third is a low-quality chert located in Egan Canyon, roughly 45 km northeast of Jakes Valley. Therefore, no CCS specimens have any source information and I cannot discuss procurement patterns relating to its use. This is unfortunate, as a large proportion of lithic debitage at both WF and WST sites were manufactured from CCS (88.9% [n=200], and 30.9% [n=219], respectively). WF tool assemblages (cores removed) consist largely of CCS (66.0%, n=33), while WST assemblages show less reliance on it (21.9%, n=56), reflecting a pattern similar to the lithic debitage.

Fine Grained Volcanics. This category includes various dark-colored volcanic rocks (excluding obsidians) that have flaking properties to allow tool manufacture, including such rocks commonly referred to as basalt (Amick 1995; Basgall and Hall 1991; Beck and Jones 1988, 1990, 1997; Clewlow 1968; Davis 1963, 1967; Leonardy and Rice 1970; Rice 1972; Tadlock 1966; Tuohy 1974; Warren and Phagan 1988; among many others), but whose plotted weight percent silica against sodium and potassium oxides reveals these raw materials should be more accurately called andesite, trachyandesite, rhyolite, dacite, and trachydacite (Page 2008). I collapse all these rock types (except rhyolite, which I separate out) into a single category called fine grained volcanics (FGV) as whole rock XRF analysis—a destructive technique—was not used on my sample to distinguish the minute differences in silica content. Rather, trace element analysis was conducted using energy dispersive X-ray fluorescence to identify individual chemical fingerprints for each sample to match it to its quarry source. X-ray fluorescence of FGV artifacts was conducted by Craig Skinner of Northwest Research Obsidian Studies Laboratory. Elemental compositions of unknown specimens were later sent to George T. Jones of Hamilton College to compare with their records, which are much more extensive from this part of the Great Basin. In general, only bifacial tools were submitted for XRF analysis (n=63); however, 14 pieces of debitage were also submitted (26Wp7746, n=12; 26Wp7748, n=2).

Tools manufactured from FGV consist primarily of stemmed points or unhafted bifaces that could represent stemmed point blades; few flake tools were created from FGV. No single-component WF site contained any FGV; however, three flakes (1.3%) and two tools (4.0%) (an informal flake tool and an unhafted biface) were found in the WF concentration at the Jakes Depression site; none were submitted for XRF analysis. This near complete lack of FGV use, or near avoidance by WF groups, indicates the preference of higher quality raw materials like CCS and obsidian. The overwhelming majority of FGV use is found at WST sites, accounting for 65.0% of debitage (n=460) and 64.8% of tools (n=166). The 63 tools that were sourced include 55 hafted bifaces (nine Parman, nine Cougar Mountain, four Haskett, four Windust, one Silver Lake, one Black Rock Concave Base, and 27 untypeable stemmed), six unhafted bifaces (one mid-stage, three late-stage, and two finished/unhafted), one core, and one unifacial flake tool.

Six known FGV sources were utilized by Paleoindian groups in Jakes Valley (Figure 6.1) accounting for 71.4% of the total (n=45), whereas the remaining 28.6%

(n=18) were unknown sources. The six FGV sources include: Smith Valley (n=17) located 22 km northeast of Jakes Valley; Little Smokey Quarry (n=14) located 58 km west; Duckwater (n=5) located 58 km southwest; Diamond Mountains (n=4) located 59 km west by northwest; Murray Canyon (n=4) located 82 km north; and Buck Mountain/Orchard Canyon (n=1) located 54 km northwest. The Little Smokey Quarry is a high quality FGV that flakes very well. It is a dark black color with light-colored inclusions, quite distinct in its appearance from other FGV sources, allowing for visual identification. Thus, three unifacial tools and 126 pieces of debitage from two single-component WST sites (26Wp7323 and 26Wp7336) were visually sourced to this quarry.

XRF analysis indicates that WST groups preferentially selected two FGV sources for the majority of their tools (Smith Valley and Little Smokey Quarry). I believe two factors can explain this pattern: (1) distance, and (2) quality. The Smith Valley quarry is the closest FGV source utilized located 22 km from the center of the valley. Since no known lithic source is located in Jakes Valley FGV is considered "local" raw material in this thesis due to its proximity compared to obsidian. The Little Smokey Quarry (LSQ) source, however, is probably the highest quality FGV in this area, which likely represents its high occurrence in these assemblages. The high amount of debitage visually sourced to LSQ likely reflects maintenance of old tools or manufacturing of new ones. While XRF analysis was biased towards finished bifaces, it is important to note that 55 WST unifacial tools were made from FGV, of which 56.4% (n=31) are expedient flake tools, and the remaining 43.6 % (n=24) are formal flake tools. This shows a high utilization of "local" (i.e., FGV) materials for all types of tools by WST groups. The low occurrence of FGV in WF assemblages suggests a low utilization of these local raw materials.

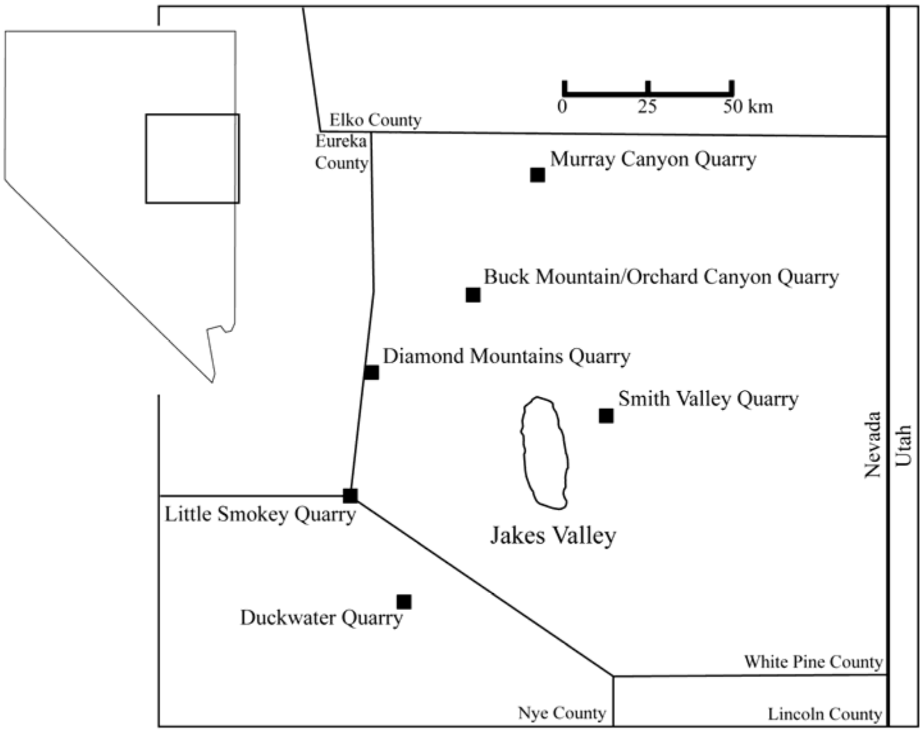


Figure 6.1. Fine grained volcanic toolstone sources utilized by Jakes Valley Paleoindians. Black squares indicate FGV quarry.

Obsidian. As mentioned earlier, obsidian sources are rare in eastern Nevada, especially near the study area. This raw material was brought into Jakes Valley from 175-320 km distant and is thus labeled as extra-local or exotic material. Obsidian is of great importance in lithic studies because of its traceable geochemical signature analyzed using XRF analysis. This analysis was also conducted by Craig Skinner of the Northwest Research Obsidian Studies Laboratory. Tracing the source origins of obsidian artifacts can inform on preferred quarries, lithic conveyance zones and mobility, and possible patterns of movement used to acquire raw material (Jones et al. 2003).

Obsidian use in the WF assemblage accounts for 9.3% (n=21) of the debitage and 30.0% (n=15) of the tool assemblage. XRF analysis was conducted on 32 artifacts revealing five distinct sources (Table 6.2). However, one artifact, an informal flake tool, was too small to yield positive identification results and has been left out of the remainder of this analysis, hence the listing of only 31 artifacts. The Modena source, located 230 km southeast of Jakes Valley near the present-day border of Nevada and Utah (Figure 5.5), was utilized to manufacture 15 artifacts. This includes two Western Fluted points, two unhafted bifaces, three informal flake tools, and eight pieces of unmodified debitage, of which only two have intact platforms (both are complex). The Wild Horse Canyon source, located 230 km east-southeast of Jakes Valley in eastern Utah, was utilized to manufacture five artifacts found in Jakes Valley. This includes one Western Fluted point, one finished but unhafted biface fragment, and three pieces of debitage, of which two have intact platforms (one simple and one complex). The Montezuma Range source, located 240 km southwest of Jakes Valley near the present-day border of Nevada and California, was utilized to manufacture two artifacts, both of which are flakes without intact platforms. The Browns Bench source is a large and scattered obsidian quarry located 280 km north-northeast of Jakes Valley, straddling the present-day border of Nevada and Idaho. This source was utilized to manufacture eight artifacts, including one finished but unhafted biface and seven pieces of debitage, of which only one has an intact platform (complex). The Queen source, located 320 km southwest of Jakes Valley near the present-day Nevada-California border, was utilized to manufacture only a single artifact found in Jakes Valley; a piece of debitage with a broken platform.

Table 6.2. Sources of Obsidian Paleoindian Artifacts.

		Artifact Class							
Tradition	**Obsidian Source**	Hafted Biface	Unhafted Biface	Formal Flake Tool	Informal Flake Tool	Cores	Debitage	**Total**	**Distance from Jakes Valley**
Western Fluted	Modena	2	2	-	3	-	8	15 (48.4%)	230 km
	Wild Horse Canyon	1	1	-	-	-	3	5 (16.1%)	230 km
	Montezuma Range	-	-	-	-	-	2	2 (6.5%)	240 km
	Browns Bench	-	1	-	-	-	7	8 (25.8%)	280 km
	Queen	-	-	-	-	-	1	1 (3.2%)	320 km
Total		**3**	**4**	**-**	**3**	**-**	**21**	**31 (100.0%)**	
Western Stemmed Tradition	Tempiute Mountain	4	-	-	1	-	2	7 (11.1%)	170 km
	Topaz Mountain	-	-	-	-	-	1	1 (1.6%)	190 km
	Black Rock Area	1	-	-	-	-	-	1 (1.6%)	215 km
	Modena	6	-	-	-	1	4	11 (17.5%)	230 km
	Wild Horse Canyon	1	-	-	-	-	-	1 (1.6%)	230 km
	Obsidian Butte	-	1	2	-	-	24	27 (42.9%)	250 km
	Browns Bench	8	-	-	-	-	6	14 (22.2%)	280 km
	Unknown 1	1	-	-	-	-	-	1 (1.6%)	Unknown
Total		**21**	**1**	**2**	**1**	**1**	**37**	**63 (100.1%)**	

Obsidian use in the WST assemblage accounts for 5.5% (n=53) of the debitage and 11.7% (n=30) of the tool assemblage. XRF analysis was conducted on 63 artifacts revealing seven distinct sources and one unknown source (Table 6.2). The artifact from the unknown source (Unknown 1) is a Windust stemmed point fragment. Because of its unknown location, this specimen is left out of further XRF analysis, dropping the analyzed obsidian total for the WST assemblage to 62 which alters the percentages in Table 6.2 minimally. The Tempiute Mountain source, located 170 km south of Jakes

Valley (Figure 5.5), was utilized to manufacture seven artifacts. This includes two stemmed point fragments, one complete but reworked Cougar Mountain stemmed point, and one complete but highly reworked Silver Lake stemmed point, one informal flake tool, and two pieces of debitage, of which one has an intact platform (complex). The Topaz Mountain source, located 190 km east of Jakes Valley in eastern Utah, was utilized to manufacture one artifact, a flake with a complex platform. The Black Rock Area source, located 215 km east of Jakes Valley in eastern Utah, was utilized to manufacture one artifact, an untypeable stemmed point fragment. The Modena source was utilized to manufacture 11 artifacts, including two stemmed point fragments, three Windust stemmed point fragments, one Haskett stemmed point midsection, one exhausted core, and four pieces of debitage, of which all have complex platforms. The Wild Horse Canyon source was utilized to manufacture one artifact, a stemmed point fragment. The Obsidian Butte source, located 250 km southwest of Jakes Valley on the grounds of the present-day Nevada Test and Training Range (Wagner 2005), was utilized to manufacture 27 artifacts. This includes one finished but unhafted biface, two formal flake tools (both side-scrapers), and 24 pieces of debitage, of which 11 have intact platforms (all complex). The Browns Bench source was utilized to manufacture 14 artifacts, consisting of eight stemmed point fragments and six pieces of debitage, of which only one has an intact platform (complex).

Availability. As shown above, no Paleoindian site in Jakes Valley is located on or near a toolstone source; the closest is located roughly 20 km distant. Therefore, the availability of raw material (*sensu* Andrefsky 1994) has the potential to affect the lithic tool assemblages found in Jakes Valley. Andrefsky (1994) notes that the abundance and quality of lithic raw material influences the kinds of stone tools that will be produced and may be the single most important aspect in determining the organization of technology, not settlement patterning. Relatively sedentary populations may have toolkits dominated by formal tools made from high quality extra-local toolstone if no high quality raw material is available locally (Andrefsky 1994:28). While raw material availability is indeed important when discussing lithic technological organization, it should be kept in mind that Paleoindian technology across the continent is primarily organized around bifacial and formal tool types (Kelly and Todd 1988). The rapid appearance of Clovis and Clovis-like projectile points throughout North America in a small time frame (about 400 years [Fiedel 1999]) likely results from high mobility and the need for high quality toolstone that can be curated (Kelly and Todd 1988).

Mobility. Straight-line distances to obsidian sources from Jakes Valley are used here to identify lithic conveyance zones and mobility. Obsidian from WF assemblages was procured from five known sources (Table 6.2) that cover an area of approximately 115,500 km^2 (determined using ArcMap 9.0 by drawing a polygon with vertices at the nearest point of each obsidian source). The maximum distance in an east-west direction is 495 km, and 490 km north-south. Obsidian from WST assemblages (seven sources) covers an area of approximately 94,500 km^2. The maximum distance in an east-west direction is 350 km and 520 km north-south. These lithic procurement zones are similar, but results indicate that WF groups traveled further east-west covering an area roughly 20% larger than the WST groups that appear to be more north-south oriented in their obsidian procurement strategies. Both traditions relied primarily on the obsidian procured from sources north and south of Jakes Valley (e.g., Browns Bench, Modena, Tempiute Mountain, and Obsidian Butte) rather than those to the east and west (e.g., Wild Horse Canyon, Black Rock Area, Topaz Mountain, Queen, and Montezuma Range).

With such large foraging ranges, I surmise that these Paleoindian groups were highly mobile, exploiting high-quality raw materials to manufacture tools that were carried long distances. Jones et al. (2003), working in eastern Nevada, compared obsidian source representation between diagnostic Paleoarchaic (WST), Early Holocene (Pinto and Windust), and Archaic (Elko Series, Gatecliff, Large Side-notched, Rosespring, Eastgate, and Desert Series) projectile points. They concluded that Early Holocene and Archaic groups shifted reliance to different obsidian sources, exploiting Browns Bench and Modena to a lesser degree than Paleoarchaic groups, while increasing emphasis on source B (Tempiute Mountain) and Utah sources (Wild Horse Canyon, Black Rock Area, and Topaz Mountain), suggesting that these groups shifted from a north-south obsidian conveyance zone to one more east-west oriented. Similarly, the Jakes Valley obsidian data from both WF and WST assemblages show high reliance on Browns Bench and Modena obsidian, especially for finished tools, with a low reliance on Utah sources. The reduction in use of northern and southern sources of obsidian, along with increased diet breadth during the Archaic period as temperatures rose, indicates a contraction of foraging range as mobility decreased (Jones et al. 2003).

Lithic Procurement Strategies. As described above, exotic raw materials (obsidian) were brought into Jakes Valley from quarries up to 320 km distant. However, distance does not inform on *how* this material was procured and moved. As discussed earlier, logistically and residentially mobile groups practice different types of procurement and provisioning strategies. Logistically mobile groups would send small task-specific groups to procure raw materials. If this material was procured logistically, we would expect a high proportion of local toolstone compared to exotic. This is the case among WST groups (with high proportions of FGV compared to obsidian) but not among WF assemblages. Additionally, logistically procured material should be manufactured into a high number of informal tools compared to formal. As can be seen in Table 6.2, this is not the case. Formal tools manufactured on obsidian comprises 70.0% (n=7) of the WF tool assemblage and 92.3% (n=24) of the WST tool assemblage. That the majority of these formal tools are hafted and unhafted bifaces, with only a few formal flake tools, further suggests that this material was primarily used to manufacture hunting weapons that were favored and curated until they could be replaced. This suggests that this toolstone was not acquired logistically, but by highly mobile groups practicing a residentially mobile settlement strategy. The low occurrence of obsidian among formal flake tools is probably a factor of raw material preference. The high quantity of CCS in assemblages of both traditions was favored for formal flake tools that would be more durable than those of obsidian.

Movement Patterns. I refer to the obsidian tool assemblage and their sources to propose movement patterns across the landscape by Paleoindian traditions. Following Jones et al. (2003) I categorize WF and WST sourced obsidian assemblages into three categories: debitage, unhafted bifaces, and hafted bifaces (Table 6.3). I assume that as highly mobile groups moved around the landscape and encountered toolstone sources, the most recently accessed obsidian source should contain the highest number of flakes (products of biface manufacture) with lower numbers of finished tools like bifaces and projectile points. As time increases since the toolstone source was visited, flakes should drop in proportion to bifaces and finished projectile points. By comparing the proportions of these artifact types I surmise how each tradition moved around the landscape and how they entered the valley. I use obsidian sources only if the number of artifacts is greater than or equal to five.

Careful examination of Table 6.3 reveals two patterns of movement of Jakes Valley Paleoindians to procure obsidian toolstone. WF obsidian use and source representation indicates that Wild Horse Canyon was likely the initial quarried obsidian source following a clockwise pattern passing through Modena, and ending at Browns Bench before stopping in Jakes Valley (Figure 6.2). The WST pattern, on the other hand, appears very different. Tempiute Mountain was likely the initial quarried obsidian source; movement then carried them in a counter-clockwise pattern through Modena, Browns Bench, and ending at Obsidian Butte before stopping in Jakes Valley (Figure 6.2).

These patterns are purely demonstrative. Paleoindian groups likely did not follow these exact patterns prior to entering Jakes Valley. However, the toolstone use-life patterns do suggest that Browns Bench and Obsidian Butte were the latest quarries visited by these groups. These data contradict Jones et al. (2003) that showed WST entry into Jakes Valley from the north. Cultural distinction may account for these two dissimilar patterns of movement across the Great Basin. However, it should be kept in mind that these artifacts were collected from numerous sites, representing multiple occupations in Jakes Valley. It might be expected that Paleoindians would arrive from different directions at different times. Additionally, sample sizes are quite low, suggesting that the apparent patterns in Figure 6.2 may be inaccurate and the result of a limited sample.

Table 6.3. Relative Frequencies of XRF Sourced Obsidian Artifacts.

Tradition	Debitage	Unhafted Bifaces	Hafted Bifaces	Total	Source
Western Fluted	7 (87.5%)	1 (12.5%)	-	8	Browns Bench
	8 (66.7%)	2 (16.7%)	2 (16.7%)	12	Modena
	3 (60.0%)	1 (20.0%)	1 (20.0%)	5	Wild Horse Canyon
Western Stemmed Tradition	24 (96.0%)	1 (4.0%)	-	25	Obsidian Butte
	6 (42.9%)	-	8 (57.1%)	14	Browns Bench
	4 (40.0%)	-	6 (60.0%)	10	Modena
	2 (33.3%)	-	4 (66.7%)	6	Tempiute Mountain

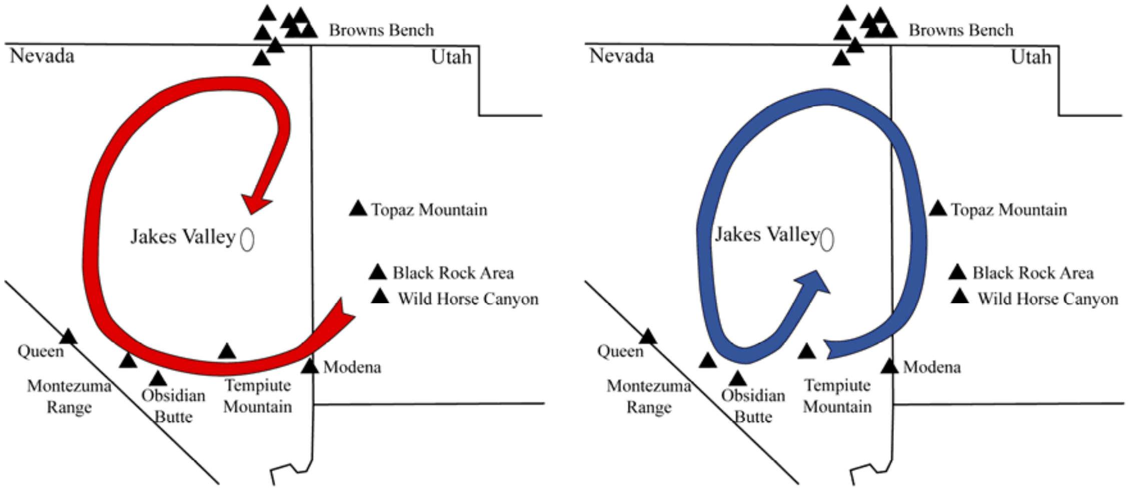


Figure 6.2. Suggested movement patterns of Western Fluted (left) and Western Stemmed (right) traditions using obsidian source provenance.

Landscape Use and Diversity

Every WF site in Jakes Valley is situated at or near the inferred Pleistocene-Holocene Transition margin of Jakes Lake, while WST sites are most often on the valley floor (75%), but also occur near riverine settings (8%) and in the uplands (17%) (see Table 4.4; Figure 5.17). However, landscape use must be measured in conjunction with lithic assemblage diversity to identify and interpret potential settlement patterns. Both the WPLT and HMF models predict sites occurring in all environments, but according to WPLT, sedentary groups should create *residential* sites near the lake margins, and logistic *task-specific* sites elsewhere in the landscape, indicating high inter-assemblage diversity. Residential sites should show a very diverse set of activities represented by high richness, diversity, and equitability values which indicates a more even spread of tools across tool classes. Logistic task-specific sites should have low richness, diversity, and equitability values indicating a single activity area marked by an uneven spread of tools across tool classes. The HMF model predicts low inter-assemblage diversity (all sites should be fairly similar in their activities), represented by high richness, low diversity, and high equitability values, indicating that numerous and similar activities were conducted wherever these groups stopped.

It is apparent when looking at Table 5.24 (Chapter 5) that despite the size of the site, or number of tools present, certain tool types appear regularly. Projectile points were necessary diagnostic tools to identify the site as WF or WST and are thus present in every site; unhafted bifaces and informal flake tools are present in 13 (86.7%) sites; formal flake tools are present in 11 (73.3%) sites; while cores are present in six sites

(40.0%) and crescents are present in only two sites (13.3%). From these data it is apparent that the main tool types at Paleoindian sites are hafted and unhafted bifaces, followed by informal and formal flake tools. Cores and crescents are more peripheral in use in Jakes Valley. Most Paleoindian sites in Jakes Valley contain four or more tool classes (n=10, 66.7%) with equitability values ranging from 0.787 to 0.968, with a mean value of 0.926, indicating that these assemblages exhibit highly even distributions of tools between tool classes. Of the five sites (33.3%) with three or fewer tool types, four have three tool classes, and one site has only one tool class. However, the four sites with three tool classes fit comfortably within the equitability range of the others (0.878, 0.946, 0.982, and 1.000) with a mean value of 0.952. Site 26Wp7334 contained only three tools in its entire assemblage along with seven flakes. An equitability value could not be determined for this site since it contains only a single tool type. Therefore this site represents the most specialized Paleoindian site in Jakes Valley.

Mann-Whitney U tests were conducted on the Shannon-Weaver diversity values and Equitability values to identify any significant differences (Table 6.4). The Mann-Whitney U test was conducted between two variables for each index listed above: sites with large (four and greater) and small (three and fewer) richness values; WF and WST sites; WF sites and the Jakes Depression site; and WST sites and the Jakes Depression site. Results indicate that only one of the eight tests has a significant correlation (between large and small richness for the Shannon-Weaver index), indicating that those sites with more than three tool classes have a more even distribution of abundance between tool classes than those assemblages with three or fewer classes. The remaining

Table 6.4. Mann-Whitney U Statistics.

Assemblages	U	z	P
Shannon-Weaver Diversity (H´)			
Large vs Small Richness	1	-2.939	.001
WF vs WST	4	-1.382	.231
WF vs JD	1	.000	1.000
WST vs JD	0	-1.593	.167
Equitability (V´)			
Large vs Small Richness	11	-1.273	.240
WF vs WST	10	.000	1.000
WF vs JD	0	-1.225	.667
WST vs JD	2	-.949	.545

Note: Comparisons for each Function are between paired values from Large (Richness of four or more) vs Small (Richness of three or less) Richness, Western Fluted vs Western Stemmed Tradition, Western Fluted vs Jakes Depression site; and Western Stemmed Tradition vs Jakes Depression site.

seven tests show no significant correlations between the data. This indicates that Paleoindian assemblages in Jakes Valley are statistically similar in their diversity and equitability, with no major differences between the equitability of sites with large richness values and small richness values. Neither are there any major differences between the "large" site (Jakes Depression) and small site assemblages. Finally, a Kruskal-Wallis H test was conducted comparing the diversity and equitability values from the Jakes Depression site, WF, and WST assemblages. The results indicate no significant difference in both the Shannon-Weaver diversity values (H=3.940, df=2, p=0.139) and equitability values (H=1.147, df=2, p=0.563) between these three assemblages. This confirms that the diversity and equitability values of the Jakes Depression site are no different from those of smaller sites in Jakes Valley; only in total number of tools. I believe this indicates that the Jakes Depression site represents a series of small sites placed in a favorable position in the valley that had a similar function as other Paleoindian sites.

Lithic Tool Types

Biface-to-Core Ratio. Reliance on bifacial technology has been postulated for highly mobile Paleoindian hunter-gatherers (Kelly 1988, 1992; Kelly and Todd 1988; Parry and Kelly 1987). Therefore, if WF and WST groups in Jakes Valley were highly mobile I expect them to have provisioned their personal gear towards bifaces instead of informal flake cores. If WF and/or WST groups were more sedentary, as the WPLT model predicts, informal cores should outnumber bifaces.

The results listed in Table 5.22 confirm the highly mobile forager expectation of a high biface-to-core ratio (WF: 12.0; WST: 37.2). However, Table 5.22 combines hafted and unhafted bifaces. When comparing unhafted bifaces to informal flake cores the ratios drop to 6.0 for the WF assemblage (12:2) and 11.8 for the WST assemblage (59:5). These values are still quite high and again confirm the preference for bifaces over informal cores, and are consistent with the HMF model.

Formal-to-Informal Tool Ratio. If Paleoindians were highly mobile their assemblages should also contain high numbers of formal tools compared to informal and expedient tools. As a group becomes more sedentary they tend to create more informal and expedient tools as the idea of conservation of raw material in uncertain times is relaxed (Parry and Kelly 1987).

Table 5.23 (Chapter 5) lists the formal-to-informal tool ratios for WF and WST assemblages in Jakes Valley. Formal tools (including hafted and unhafted bifaces, scrapers, combination tools, multiple-spurred gravers, and any tool created on a channel flake) account for 64.0% of the WF assemblage (n=32), while informal tools (including retouched flakes, single-spurred gravers, backed knives, notches, and wedges) account for the remaining 36.0% (n=18). Formal tools account for 84.2% (n=218) of the WST assemblage, while informal tools account for the remaining 15.8% (n=41) of the assemblage. These ratios (WF: 1.78; WST: 5.32) indicate the preference of formal over informal tools and conform to the expectations for highly mobile foragers. It is interesting to note that the WST formal-to-informal tool ratio is about three times higher than it is among the WF assemblage. I do not speculate on this observation, but note that similar results were observed when classic Clovis, Folsom, and Goshen assemblages were compared to Great Basin WST site assemblages (Graf 2001: Table 6.8).

As shown in Chapter 5, raw material preference among these two traditions is strongly correlated with tool type and function. This is further evidenced when formal and informal tools are compared. Table 6.5 lists raw material frequency on formal and informal tools manufactured by each tradition. Once again, WF assemblages are noted to contain a high proportion of tools made of CCS with one-quarter to one-third of the assemblage made of obsidian. Obsidian appears to have played a substantial role in formal and informal tool production, which should not be a big surprise as sharp edged tools and flakes were needed for a variety of tasks. The WST assemblage is geared heavily towards FGV in both formal and informal tool production. Obsidian is used minimally for informal tool production; instead WST groups preferred the more durable (and local) FGV and CCS. Chi-square analysis between WF and WST formal tools indicates a significant difference in raw material use (X^2=53.684; df=3; p=.000). However, these results may not be accurate as three cells (37.5%) have expected counts less than five. If the OTHER category is removed, Chi-square analysis still indicates a significant difference (X^2=52.032; df=2; p=.000) and only one cell (16.7%) has an expected count less than five. Chi-square analysis between WF and WST informal tools also indicates a significant difference in raw material use (X^2=17.453; df=2; p=.000) with only one cell (16.7%) having an expected count less than five. Clearly, raw material was an important factor when manufacturing tools, and these two traditions had their own preferences.

Table 6.5. Raw Material Used to Manufacture Formal and Informal Tool Types in Paleoindian Assemblages.

	Raw Material				
Tradition	CCS	OBS	FGV	OTHER	**Total**
WF					
Formal tool	23 (71.9%)	8 (25.0%)	1 (3.1%)	-	32 (100.0%)
Informal tool	10 (55.6%)	7 (38.8%)	1 (5.6%)	-	18 (100.0%)
WST					
Formal tool	40 (18.3%)	30 (13.8%)	143 (65.6%)	5 (2.3%)	218 (100.0%)
Informal tool	17 (41.5%)	2 (4.9%)	22 (53.6%)	-	41 (100.0%)

Additionally, when flake tools are examined separate from bifacial tools, another picture of raw material selection and preference becomes apparent. Formal flake tools (scrapers, combination tools, and multiple-spurred gravers) are those tools that require a durable toolstone to perform the heavy tasks, like scraping, cutting, etching, etc. and are more likely to be curated for future tasks. WF groups exclusively chose to manufacture their formal flake tools from CCS, while opting to use obsidian and CCS for informal tools (Table 6.6). WST assemblages also appear to have preferred the durable CCS toolstone when manufacturing formal flake tools along with FGV, which is also the preferred material for informal tools (Table 6.6). Obsidian is rarely used among the WST flake tool assemblage, accounting for only about 9% or less of the flake tools. Apparently, obsidian was selected to manufacture bifacial rather than flake tools among the WST assemblages. WF assemblages used obsidian for both bifacial and unifacial flake tools almost equally. Chi-square analysis was conducted on the formal flake tool raw material choices at WF and WST assemblages. The results could not be accepted as four cells (66.7%) have a minimum expected count less than five. The informal flake tool Chi-square analysis is the same as reported above as no tool frequencies changed in this category.

Table 6.6. Raw Material used to Manufacture Formal and Informal Flake Tools in Paleoindian Assemblages.

		Raw Material		
Tradition	CCS	OBS	FGV	**Total**
WF				
Formal flake tool	8 (100.0%)	-	-	8 (100.0%)
Informal flake tool	10 (55.6%)	7 (38.8%)	1 (5.6%)	18 (100.0%)
WST				
Formal flake tool	17 (50.0%)	3 (8.8%)	14 (41.2%)	34 (100.0%)
Informal flake tool	17 (41.5%)	2 (4.9%)	22 (53.6%)	41 (100.0%)

Combination Tools. Highly mobile groups are restricted in the amount of material that can be carried with them at any one time (Kelly 1988; Kelly and Todd 1988). Therefore, I expect these groups to carry tools with multiple functions to reduce the total weight of their toolkit. Combination tools (see description in Chapter 3) represent a curated technology used to function as a multi-purpose tool, thus fulfilling the functions of two or more tools while reducing overall weight. Groups practicing a more sedentary arrangement would not necessarily need to conserve raw material to the degree highly mobile foragers do, and thus their toolkits should not contain combination tools. Tools would be manufactured for each function as the need arises to ensure tasks are completed efficiently with fresh edged tools.

Combination tools occur in both traditions' assemblages. The WF assemblage contains two such tools, a retouched flake/graver, and biface/end scraper combination tools. The WST assemblage contains five combination tools, two scraper/gravers and one each of the following: biface/side scraper, retouched flake/scraper, and scraper/notch tools. Additionally, 12 combination tools were found at the Jakes Depression site, but not associated with either the WF or WST concentration area; however, remember this site is strictly a Paleoindian-age site. The 12 combination tools include two scraper/gravers, two scraper/notches, one notch/graver, six retouched flake/scrapers, and one scraper/burin. Thus, while not extremely numerous, combination tools are present in WF and WST assemblages, consistent with the HMF model.

Lithic Tool Variables

Unifacial Reduction Index. As a measure of unifacial tool resharpening, the unifacial reduction index (URI) informs on the extent to which tools were kept in the toolkit and resharpened for repeated use and to prolong uselife. Highly mobile groups are expected to hold on to their tools for extended periods of time resulting in increased resharpening episodes creating higher URI values than sedentary groups that should not resharpen their flake tools to the same degree. By measuring flake tool maximum thickness, extent of retouch, and edge angle (Figure 3.5) I calculated URI values for the Jakes Valley flake tool assemblage (excluding gravers and notches). Additionally, tools were compared by raw material to examine the extent to which toolstone selection played a role in tool manufacture and extended use.

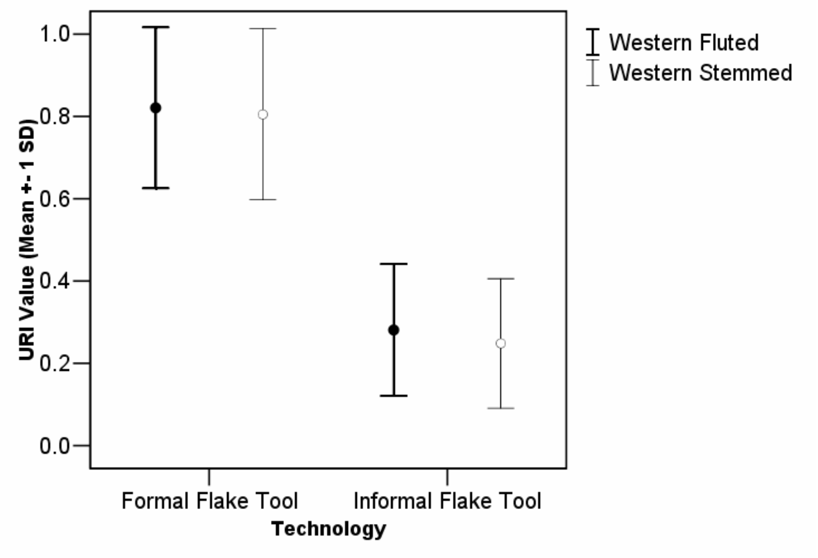


Figure 6.3. Unifacial Reduction Index (URI) values for formal and informal unifaces from WF (dark line and filled dot) and WST (light line and hollow dot) assemblages. Dots represent mean URI value; lines represent one standard deviation from the mean.

The WF formal unifaces (n=7) possess a mean URI value of 0.821 with a standard deviation of 0.196 (Figure 6.3). The WF informal unifaces (n=17) possess a mean URI value of 0.281 with a standard deviation of 0.160. The WST formal unifaces (n=32) possess a mean URI value of 0.805 with a standard deviation of 0.208. The WST informal unifaces (n=38) possess a mean URI value of 0.249 with a standard deviation of 0.158. A Kruskal-Wallis H test was chosen to be performed on this data set for its utility on non-normal distributions. The resulting analysis was corrected for ties and indicates there is a highly significant difference between URI values of formal and informal unifaces among both the WF and WST assemblages, respectively (H=12.88, df=1, p=.000; H=45.45, df=1, p=.000). This indicates that formal unifaces were resharpened to a greater degree than informal unifaces and suggests they were a curated part of the toolkit. In-depth analysis of the flake tool assemblages is presented next.

Formal Unifaces. The formal unifaces present in Jakes Valley Paleoindian assemblages have been extensively resharpened. All seven WF formal unifaces are manufactured from CCS, suggesting preferential selection of this material due to its durability and ability to keep a sharp edge after multiple resharpening episodes. Because CCS was used on all the WF formal unifaces, the mean and standard deviation are the same as mentioned earlier. The WST formal unifaces are manufactured on all materials, but the preferred raw material is CCS (n=17, 53.1%) followed by FGV (n=12, 37.5%) and obsidian (n=3, 9.4%). The formal unifaces manufactured on CCS possess a mean URI value of 0.860 with a standard deviation of 0.148 (Figure 6.4). The formal unifaces manufactured on FGV possess a mean URI value of 0.678 with a standard deviation of 0.239. The formal unifaces manufactured on obsidian possess a mean URI value of 1.000 with no standard deviation as they all possess the same URI value. A Kruskal-Wallis H test was conducted on the WST formal uniface assemblage to determine if raw material choice impacted the extent of reduction in a significant manner. Results were adjusted for ties and indicate a significant difference in the URI values between raw material types in the WST assemblage (H=9.000, df=2, p=0.011). Formal unifaces made from obsidian were reduced to the greatest extent followed by a CCS unifaces, while FGV exhibits a wide range of reduction with some artifacts heavily reduced while others were not. This suggests that when obsidian was manufactured into formal tools (which occurred infrequently) they were used to their maximum potential and carried far distances. The more durable CCS was also reduced extensively but exhibited a greater range of URI values than obsidian tools. Finally, formal unifaces made on FGV were sometimes heavily reduced, sometimes not, which likely reflects the local nature of its availability. The results of formal uniface analysis indicate heavy reduction to sharpen edges for repeated use. This is consistent with the HMF model of toolstone provisioning, and tool use and maintenance.

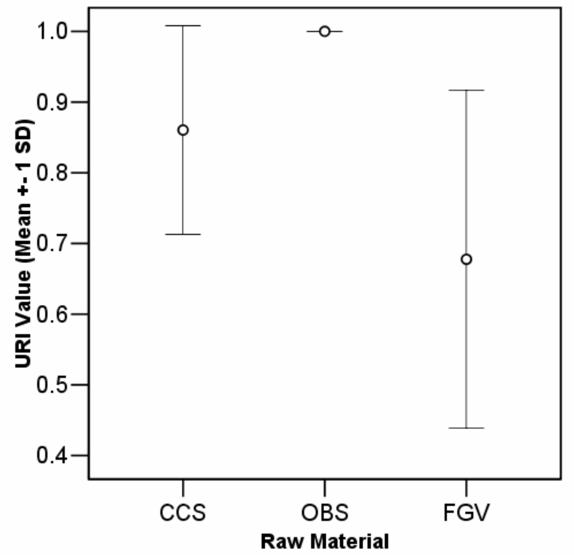


Figure 6.4. Unifacial reduction index (URI) values for WST formal unifaces by raw material.

Informal Unifaces. The informal unifaces at Jakes Valley Paleoindian sites are expectedly reduced to a lesser degree than the formal unifaces. The WF informal uniface assemblage (n=17) is divided between three raw material types, including CCS (n=10, 58.8%), obsidian (n=6, 35.3%), and FGV (n=1, 5.9%). The CCS informal unifaces have a mean URI value of 0.252 with a standard deviation of 0.117 (Figure 6.5). The obsidian informal unifaces have a mean URI value of 0.313 with a standard deviation of 0.230. The FGV informal uniface has a mean URI value of 0.377 with no standard deviation. A Kruskal-Wallis H test was conducted on these informal unifaces to determine if raw material influenced the degree of reduction in a significant manner. The results indicate that raw material is not a significant determinant in the degree of informal uniface reduction among WF assemblages (H=1.199, df=2, p=0.549). Thus, when expedient flake tools were needed, WF groups used whatever raw material was at hand. However, obsidian does appear to have been reduced slightly more, but not significantly so.

The WST informal uniface assemblage (n=38) is similarly divided between three raw material types, including FGV (n=21, 55.3%), CCS (n=15, 39.5%), and obsidian (n=2, 5.3%). The FGV informal unifaces possess a mean URI value of 0.260 with a standard deviation of 0.169. The CCS informal unifaces possess a mean URI value of 0.243 with a standard deviation of 0.152. The obsidian informal unifaces possess a mean URI value of 0.165 with a standard deviation of 0.093. A Kruskal-Wallis H test was conducted on these informal unifaces to determine if raw material influenced the degree of reduction in a significant manner. The results indicate that raw material is not a significant determinant in the degree of informal uniface reduction among WST assemblages (H=0.505, df=2, p=0.777). Similar to the WF assemblage, WST groups did not reduce their informal unifaces dependent on raw material. Rather, each toolstone type was reduced similarly. However, Figure 6.5 does show that CCS and FGV were reduced to a greater degree than obsidian.

Further, I conducted a Kruskal-Wallis H test comparing mean URI values for each raw material type between WF and WST assemblages to identify if each tradition reduced a particular raw material to a greater degree. Results indicate no significant differences between URI values of any raw material type between tradition (CCS: H=0.278, df=1, p=0.598; OBS: H=0.444, df=1, p=0.505; FGV: H=0.895, df=1, p=0.344). This indicates that neither tradition reduced their informal unifaces of the same raw material to different degrees.

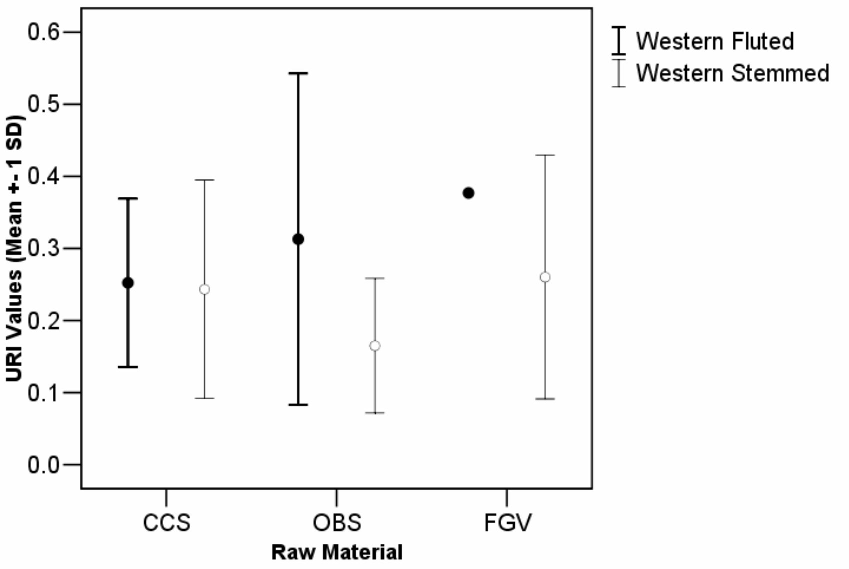


Figure 6.5. Unifacial reduction index (URI) values of informal unifaces of all raw material types between WF (dark line and filled dot) and WST (light line and hollow dot) assemblages.

Number of Retouched Edges. Another measure of unifacial tool reduction and use identifies the total number of retouched edges per artifact. I count four possible edges that could be retouched per flake tool (Figure 3.3). Tools with higher numbers of edges that have been retouched indicates maximizing utility from each unifacial tool; a necessity for highly mobile groups to conserve raw material. Below I present the results of this analysis by raw material on formal and informal unifaces and tradition. I then compare each tradition's results to identify if they maximized utility differently.

The WF formal uniface assemblage (n=8) possesses a mean number of retouched edges of 1.875 with a standard deviation of 0.835 (Figure 6.6). The WF informal uniface

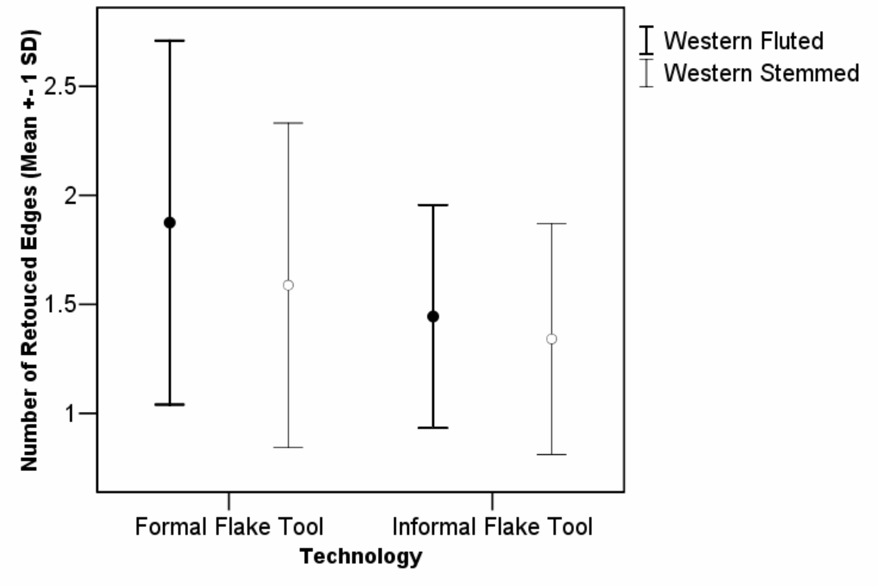


Figure 6.6. Mean number of retouched edges among formal and informal unifaces at WF (dark line and filled dot) and WST (light line and hollow dot) assemblages. Dots represent mean number of retouched edges value; lines represent one standard deviation from the mean.

assemblage (n=18) possesses a mean number of retouched edges of 1.444 with a standard deviation of 0.511. The WST formal uniface assemblage (n=34) possesses a mean number of retouched edges of 1.588 with a standard deviation of 0.743. The WST informal uniface assemblage (n=41) possesses a mean number of retouched edges of 1.342 with a standard deviation of 0.530.

Formal Unifaces. Every formal uniface from the WF assemblage is manufactured from CCS. Thus a comparison by raw material is not possible, and the mean number of retouched edges and standard deviation is the same as stated above. The WST formal uniface assemblage contains artifacts manufactured from CCS (n=17, 50.0%), FGV (n=14, 41.2%), and obsidian (n=3, 8.8%). The formal unifaces manufactured from CCS possess a mean number of retouched edges of 1.706 with a standard deviation of 0.849 (Figure 6.7). The formal unifaces manufactured from FGV possess a mean number of retouched edges of 1.500 with a standard deviation of 0.650. The formal unifaces manufactured from obsidian possess a mean number of retouched edges of 1.333 with a standard deviation of 0.577. A Kruskal-Wallis H test was conducted on these data to determine if raw material choice significantly affects the number of edges retouched within the WST assemblage. Results were adjusted for ties and indicate no significant difference in the number of retouched edges by raw material choice (H=0.50, df=2, p=0.732). This indicates that raw material selection played no role in the decision to maximize utility from formal unifaces. Further, the high mean numbers of retouched edges on WF and WST formal unifaces is consistent with the HMF model, where people try to maximize the utility of every formal artifact by retouching multiple edges.

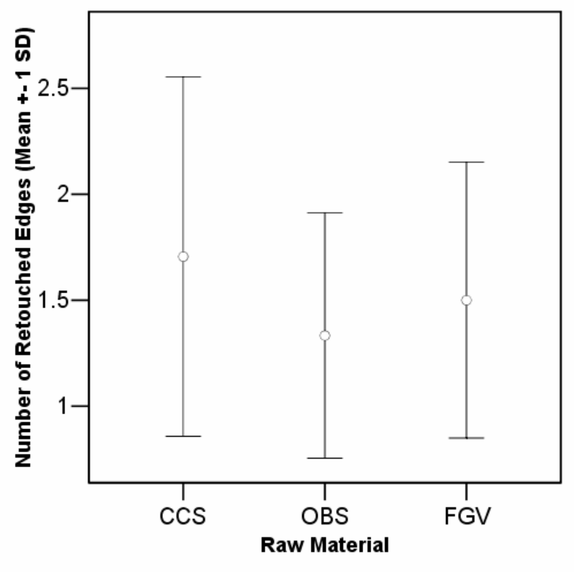


Figure 6.7. Mean number of retouched edges on formal unifaces among the three raw material types in the WST assemblage.

Informal Unifaces. Eighteen informal unifaces were analyzed from the WF assemblage and are divided among CCS (n=10, 55.6%), obsidian (n=7, 38.9%), and FGV (n=1, 5.6%). The informal unifaces manufactured from CCS possess a mean number of retouched edges of 1.400 with a standard deviation of 0.516 (Figure 6.8). The informal unifaces manufactured on obsidian possess a mean number of retouched edges of 1.429 with a standard deviation of 0.535. The informal uniface manufactured on FGV possesses a mean number of retouched edges of 2.000 with no standard deviation. A Kruskal-Wallis H test was conducted to determine if raw material significantly influenced the number of retouched edges on informal unifaces. Results were adjusted for ties and indicate no significant difference in the number of retouched edges between raw material types (H=1.263, df=2, p=0.532).

Forty-one informal unifaces were analyzed from the WST assemblage and are divided among CCS (n=17, 41.5%), obsidian (n=2, 4.9%), and FGV (n=22, 53.7%). The informal unifaces manufactured from CCS possess a mean number of retouched edges of 1.294 with a standard deviation of 0.470 (Figure 6.8). The informal unifaces manufactured on obsidian possess a mean number of retouched edges of 2.500 with a standard deviation of 0.707. The informal unifaces manufactured on FGV possess a mean number 1.273 with a standard deviation of 0.456. A Kruskal-Wallis H test was conducted to determine if raw material significantly influenced the number of retouched edges on informal unifaces. Results were adjusted for ties and indicate a significant difference in the number of retouched edges between raw material types (H=6.278, df=2, p=0.043). Informal unifaces manufactured from obsidian have statistically more edges retouched than either CCS or FGV. However, this may be due to the small number of obsidian artifacts from the WST assemblage.

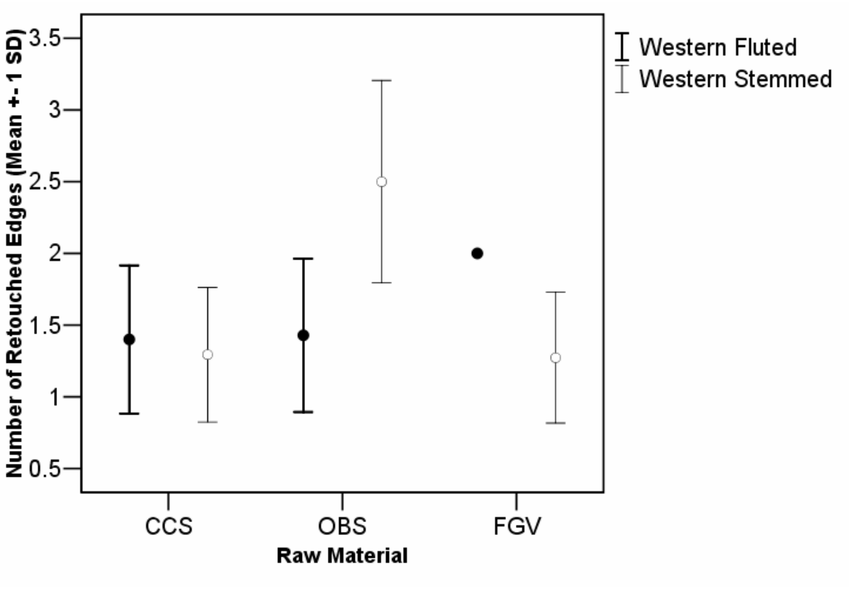


Figure 6.8. Mean number of retouched edges on informal unifacial tools by raw material type in the WF (dark line and filled dot) and WST (light line and hollow dot) assemblages.

Finally, I compared the mean number of retouched edges in each raw material type by tradition to identify if WF or WST assemblages worked their raw materials differently. A Kruskal-Wallis H test was conducted on the data and, after being adjusted for ties, resulted in no significant differences between WF and WST number of edges retouched among any of the raw material types (CCS: H=0.306, df=1, p=0.580; OBS: H=3.111, df=1, p=0.078; FGV: H=2.286, df=1, p=0.131). These results indicate that raw material choice does not differ significantly when choosing to maximize the utility of a specific informal uniface. The results of this analysis show that the mean number of retouched edges is greater than one for each tradition and each raw material, indicating to me that even informal unifaces were repeatedly used, and in a sense curated. This is consistent with the HMF model where every tool is being fully utilized before it is discarded, likely as a result of maximizing lithic economy by getting the most out of every tool and wasting as little raw material as possible.

Percentage of Total Margins Retouched. The final variable that was measured on unifacial tools from the WF and WST assemblages was the percentage of total margins retouched. This measurement was estimated based on the length of the retouched margins on each uniface compared to the total amount of edge. Four categories were employed for this measurement (0-25%, 26-50%, 51-75%, and 76-100%). In theory, tools should show a high percentage of total margins retouched among groups that are highly mobile and reuse their tools for numerous tasks. The opposite should be true for less mobile groups, which should be more apt to discard used tools and manufacture new tools for new tasks, not needing to conserve their raw materials to the degree that mobile groups would.

The results of the Jakes Valley Paleoindian assemblage are at odds with the other analyzed unifacial flake tool traits. The WF assemblage (n=26) contains 13 unifaces (50.0%) with 0-25% retouched margins, three unifaces (11.5%) with 26-50% retouched, eight unifaces (30.8%) with 51-75% retouched, and two unifaces (7.7%) with 76-100% retouched. The clear majority (16, 61.5%) or WF unifaces have half or less of the total margins retouched. The WST assemblage (n=75) contains 29 unifaces (38.7%) with 0-25% retouched margins, 30 unifaces (40.0%) with 26-50% retouched, 11 unifaces (14.7%) with 51-75% retouched, and five unifaces (6.7%) with 76-100% retouched. Like the WF assemblage, the majority (n=59, 78.7%) of WST unifaces have half or less of the total margins retouched. I now describe these results in more detail and divide them into formal and informal unifaces as well as raw material.

Formal Unifaces. Eight formal unifaces were analyzed from the WF assemblage, all made from CCS. Three unifaces (37.5%) have 0-25% of their total margins retouched, one (12.5%) has 26-50% retouched, two (25.0%) have 51-75% retouched, and two (25.0%) have 76-100% retouched (Table 6.7). These results show that just as many formal unifaces have less than 50% of their edges retouched as more than 50%. Thus, WF formal unifaces show no obvious correlate with mobility style. Chi-square analysis could not be conducted as there was only a single raw material category from which formal tools were manufactured.

The WST assemblage contains 34 formal unifaces manufactured from CCS (n=17, 50.0%), FGV (n=14, 41.2%), and obsidian (n=3, 8.8%). Among the CCS unifaces, three (17.6%) have 0-25% of their margins retouched, eight (47.1%) have 26-50% retouched, two (11.8%) have 51-75% retouched, and four (23.5%) have 76-100%

Table 6.7. Observed and Expected Counts of the Percentage of Margins Retouched on Formal Unifaces by Raw Material in WF and WST Assemblages.

Percentage of Total Margin Retouched	Count	Raw Material CCS	 Obsidian	 FGV	Total
WF					
0-25%	Observed	3	-	-	**3**
	Expected	3	-	-	
26-50%	Observed	1	-	-	**1**
	Expected	1	-	-	
51-75%	Observed	2	-	-	**2**
	Expected	2	-	-	
76-100%	Observed	2	-	-	**2**
	Expected	2	-	-	
WST					
0-25%	Observed	3	1	5	**9**
	Expected	4.5	0.8	3.7	
26-50%	Observed	8	2	6	**16**
	Expected	8	1.4	6.6	
51-75%	Observed	2	0	3	**5**
	Expected	2.5	0.4	2.1	
76-100%	Observed	4	0	0	**4**
	Expected	2	0.4	1.6	
Total		**25**	**3**	**14**	**42**

Note: Chi-square analysis could not be conducted due to small sample size. The WF assemblage contains only a single raw material type, and the WST assemblage contains 10 cells (83.3%) with expected counts less than five.

retouched (Table 6.7). Among the FGV unifaces, five (35.7%) have 0-25% of their margins retouched, six (42.9%) have 26-50% retouched, and three (21.4%) have 51-76% retouched. Among the obsidian unifaces, only one (33.3%) has 0-25% of its margins retouched, and two (66.7%) have 26-50% retouched. Chi-square analysis comparing the raw material types to the total percentage of margins retouched could not be calculated due to small sample size as 10 cells (83.3%) had expected counts less than five. Ignoring the raw material types, nine unifaces (26.5%) have 0-25% of their total margins retouched, 16 (47.1%) have 26-50% retouched, five (14.7%) have 51-75% retouched, and four (11.8%) have 76-100% retouched. Among the WST formal uniface assemblage nearly three quarters have less than 50% of their margins retouched (n=25, 73.5%), with the remaining 26.5% (n=9) having more than 50% of their margins retouched.

Informal Unifaces. Eighteen informal unifaces were analyzed from the WF assemblage, manufactured from CCS (n=10, 55.6%), obsidian (n=7, 38.9%), and FGV (n=1, 5.6%). Among the CCS informal uniface assemblage, seven (70.0%) have 0-25% of their margins retouched, and three (30.0%) have 51-76% retouched (Table 6.8). Among the obsidian informal uniface assemblage, three (42.9%) have 0-25% of their margins retouched, one (14.2%) has 26-50% retouched, and three (42.9%) have 51-76% retouched. Only one informal FGV uniface is present in the WF assemblage and 26-50% of its margins were retouched. Chi-square analysis was conducted comparing the raw material types to the percentage of margins retouched, but could not be analyzed due to small sample size. Eight cells (88.9%) had expected counts less than five. Ignoring raw material type, ten unifaces (55.6%) have 0-25% of their total margins retouched, two (11.1%) have 26-50% retouched, and six (33.3%) have 51-75% retouched. Again, the majority of unifacial tools (n=12, 66.7%) have less than 50% of their margins retouched.

The WST assemblage contains 41 informal unifaces manufactured from CCS (n=17, 41.5%), FGV (n=22, 53.7%), and obsidian (n=2, 4.9%). Among the CCS unifaces, eight (47.1%) have 0-25% of their margins retouched, seven (41.2%) have 26-50% retouched, one (5.9%) has 51-75% retouched, and one (5.9%) has 76-100% retouched (Table 6.8). Among the FGV unifaces, twelve (54.5%) have 0-25% of their

Table 6.8. Observed and Expected Counts of the Percentage of Margins Retouched on Informal Unifaces by Raw Material in WF and WST Assemblages.

Percentage of Total Margin Retouched	Count	Raw Material CCS	 Obsidian	 FGV	Total
WF					
0-25%	Observed	7	3	0	**10**
	Expected	5.6	3.9	0.6	
26-50%	Observed	0	1	1	**2**
	Expected	1.1	0.8	0.1	
51-75%	Observed	3	3	0	**6**
	Expected	3.3	2.3	0.3	
WST					
0-25%	Observed	8	0	12	**20**
	Expected	8.3	1.0	10.7	
26-50%	Observed	7	0	7	**14**
	Expected	5.8	0.7	7.5	
51-75%	Observed	1	2	3	**6**
	Expected	2.5	0.3	3.2	
76-100%	Observed	1	0	0	**1**
	Expected	0.4	0.0	0.5	
Total		**27**	**9**	**23**	**59**

Note: Chi-square analysis could not be conducted due to small sample size. The WF assemblage contains eight cells (88.9%) with expected counts less than five, and the WST assemblage contains eight cells (66.7%) with expected counts less than five.

margins retouched, seven (31.8%) have 26-50% retouched, and three (13.6%) have 51-76% retouched. Among the obsidian unifaces, both have 26-50% of their margins retouched. Chi-square analysis comparing the raw material types to the total percentage of margins retouched could not be calculated due to small sample size, as 8 cells (66.7%) had expected counts less than five. Ignoring the raw material types, 20 unifaces (48.8%) have 0-25% of their total margins retouched, 14 (34.1%) have 26-50% retouched, six (14.6%) have 51-75% retouched, and one (2.4%) has 76-100% retouched. Among the

WST formal uniface assemblage, over 80% have less than 50% of their margins retouched (n=34, 82.9%), with the remaining 17.1% (n=7) having more than 50% of their margins retouched.

The results of the percentage of total margins retouched analysis appear to be contrary to the results for the URI values and number of retouched edges described earlier. The reason for this is unclear. It appears that unifacial tools at Paleoindian sites in Jakes Valley are highly curated with high URI values and contain fairly high numbers of retouched edges, but this retouch does not extend across the entire edge when worked. When formal unifaces were created (especially scrapers), they appear to have been almost exclusively used for that purpose, which does not always cover more than 50% of the artifact. Many informal unifacial tools have several reworked edges, but only a small portion of each edge is worked, creating low percentages of retouched margins. This does not conform to the expected pattern for the HMF model. Thus I conclude that the unifacial tools at WF and WST sites in Jakes Valley exhibit two of the three expectations for highly mobile populations, and one that may or may not fit the model.

Tool Blank Types. The types of flake blanks used to manufacture flake tools should correlate with the types and ratios of flakes produced. If highly mobile foragers were creating bifaces (Kelly and Todd 1988; Kelly 1988) then I expect to find more biface thinning flakes than single-faceted (simple) flakes. In turn, when flake tools were needed they would have been manufactured on the predominate type of flake created while thinning and preparing cores and tools: the biface thinning flake. Less mobile groups tend to create more single-faceted flakes from cores rather than bifaces, as well as more cortical spalls, and I expect their flake tools would display those attributes more often than those of biface thinning flakes. Five flake blank categories were used in this analysis: indeterminate, those flake tools with broken or unmeasurable platforms; cortical spall, those flake tools with a cortical platform; blade-like flake, those flake tools with a single-faceted platform and a maximum length at least twice as long as the maximum width; flake, those flake tools with a single-faceted platform, and; biface thinning flake, those flake tools exhibiting a multi-faceted platform and lipping.

Twenty-six unifacial flake tools are present in the WF assemblage and were analyzed for flake blank type. Fifteen (57.7%) of those have broken or unmeasurable platforms and were classified as indeterminate flake blank types. Of the remaining 11 none were manufactured on cortical spalls; one unifacial flake tool (9.1%) was manufactured on a blade-like flake; two unifacial flake tools (18.2%) were manufactured on single-faceted flakes, and; eight unifacial flake tools (72.7%) were manufactured on biface thinning flakes. Not surprisingly, the majority of WF flake tools were manufactured on biface thinning flakes, while very few were manufactured on any other flake blank type.

Dividing the WF assemblage into raw material types and flake blank types reveals a similar pattern. Among the unifacial flake tools manufactured on CCS (n=18) half are Indeterminate flake blank types. Of the remaining nine CCS unifacial flake tools one (11.1%) is made on a blade-like flake, two are made on single-faceted flakes (22.2%), and six (66.7%) are made on biface thinning flakes. Among those unifacial flake tools manufactured on obsidian (n=7), five (71.4%) have indeterminate flake blank types. The remaining two obsidian unifacial flake tools are made on Biface Thinning Flakes. The only unifacial flake tool made on FGV is of an indeterminate flake blank type.

The WST assemblage contains 75 unifacial flake tools that were analyzed for flake blank type. Forty-nine (65.3%) have broken or unmeasurable platforms and were classified as indeterminate. The remaining 26 unifacial flake tools were classified in the following categories: cortical spalls (n=6, 23.1%); blade-like flakes (n=2, 7.7%); single-faceted flakes (n=4, 15.4%); and biface thinning flakes (n=14, 53.8%). Over half of the unifacial flake tools with measurable platforms are manufactured from biface thinning flakes, with a fairly substantial number made from cortical spalls, flakes and blade-like flakes.

Similar to the WF assemblage, the WST unifacial flake tool blank types follow the same general pattern when categorized by raw material, except among those tools made on FGV. Those unifacial flake tools made on CCS (n=34) contain 22 (64.7%) indeterminate flake blanks. The remaining 12 CCS unifacial tools are made on cortical spalls (n=1, 8.3%), single-faceted flakes (n=1, 8.3%), and biface thinning flakes (n=10, 83.4%). Of the five obsidian unifacial flake tools, three (60.0%) have indeterminate flake blank types. The remaining two obsidian flake tools were made on a blade-like flake, and a biface thinning flake. Thirty-six unifacial flake tools were made on FGV, with 24 (66.7%) having indeterminate flake blank types. Of the remaining 12 FGV unifacial flake tools, five (41.7%) are cortical spalls, one (8.3%) is a blade-like flake, three (25.0%) are made on single-faceted flakes, and three (25.0%) are made on biface thinning flakes.

In general, these patterns fit the highly mobile forager model of flake blank tool use. The WF assemblage contains tools primarily manufactured from biface thinning flakes, indicating that the flakes produced while reducing bifaces were desired for flake tool use. Among the WST assemblage, the CCS pattern follows the WF and expected highly mobile forager models, while the obsidian sample is too small to make any statements. The FGV sample in the WST assemblage, however, is likely a product of more local acquisition and reduction of this toolstone. Because FGV was quarried fairly close to Jakes Valley, it is likely to be in earlier stages of reduction than the more exotic materials and contain a higher percentage of Cortical Spalls and single-faceted Flakes than Biface Thinning Flakes.

Total Length/Haft Length Ratio. The total length/haft length ratio (TL/HLR) is used here to determine the amount of resharpening conducted on hafted bifaces, excluding crescents. Hafted bifaces that have little or no resharpening should exhibit high TL/HLR values (Figure 3.4). Highly resharpened hafted bifaces should exhibit values closer to 1.0 as the blade of the point is reworked and the haft element remains the same length. This ratio was applied only to complete or near complete hafted bifaces to minimize error in estimating blade or stem length and skew the results. The Jakes Valley Paleoindian assemblage contains only nine complete or near complete hafted bifaces. This includes one WF point, one Black Rock Concave Base (BRCB) point, and seven WST points.

The only complete WF point is manufactured on CCS and has undergone extensive reworking of the blade and possibly the base as evidenced by one flute scar overlapping an impact break on the blade that travels toward the proximal end. It appears that this fluted point was broken upon impact distally and proximally, and was subsequently reworked to form a tip and refluted to be hafted again. This point has a TL/HLR value of 1.58, indicating that its blade is just over half as long as its haft element. The complete BRCB point was manufactured on FGV and has a TL/HLR value of 1.75.

The complete WST points include two Cougar Mountain, two Silver Lake, one Parman, one Haskett, and one Windust type stemmed point types. The Cougar Mountain stemmed points are made from obsidian and FGV and have TL/HLR values of 1.63 and 1.65, respectively. The Silver Lake stemmed points are also made from obsidian and FGV and have TL/HLR values of 1.72 and 3.81, respectively. The Parman stemmed point is made from obsidian and has a TL/HLR value of 2.71. The Haskett stemmed point is made from FGV and has a TL/HLR value of 1.35. The Windust stemmed point is made from obsidian and has a TL/HLR value of 1.37.

Seven (77.8%) of the nine Paleoindian hafted bifaces have TL/HLR values less than 2.0, indicating haft element lengths greater than half the total length, which suggests fairly extensive resharpening. The remaining two are stemmed points which show very minimal resharpening and thus exhibit greater TL/HLR values. These results are consistent with the predictions of the HMF model in that most hafted bifaces exhibit extensive resharpening creating low TL/HLR values. This suggests that these hafted bifaces were highly curated and discarded only after the blade barely exceeded the haft element.

Biface Reduction Ratio. Another measure of the extent to which hafted bifaces in the Jakes Valley Paleoindian assemblage were reduced and curated is the Biface Reduction Ratio (BRR). The BRR divides the maximum thickness of the hafted biface blade by the maximum width of the hafted biface blade (Figure 3.5). This ratio requires that a diagnostic Paleoindian hafted biface retain enough of its blade to measure maximum width and thickness. As a hafted biface is used, broken, and subsequently resharpened, the maximum width should decrease in relation to the maximum thickness, assuming that collateral flaking techniques were employed. As the point is resharpened, the BRR value should increase towards 1.0, with values closer to 0.0 when little resharpening has occurred. Therefore, if the Paleoindian hafted bifaces are resharpened and curated to a large degree, as predicted by the HMF model, BRR values should be closer to 1.0 than to 0.0. In practice, however, projectile points rarely (if ever) approach values of 1.0; more common for highly resharpened points are values over 0.3, but never as high as 0.5. Therefore, the upper range of BRR values is closer to 0.25 and above.

Forty-seven hafted bifaces retained sufficient blade elements to allow BRR analysis including one WF point, three BRCB points, and 39 WST points. The WF point has a BRR value of 0.360 with no standard deviation as it is solitary. The BRCB points (n=3) have a mean BRR value of 0.236 with a standard deviation of 0.025. The WST points (n=43) have a mean BRR value of 0.273 with a standard deviation of 0.077. A Kruskal-Wallis H test adjusted for ties comparing the three traditions BRR values indicates no significant difference (H=2.23, df=2, p=0.328). Thus, while is appears that the WF point has the highest BRR value, followed by WST and then BRCB points, the difference is not statistically significant.

When each tradition is compared by raw material a similar pattern emerges. The WF point is made from CCS and retains the same value. The BRCB points are each made of a different raw material (CCS, FGV, and OTHER) with BRR values of 0.214, 0.263, and 0.231, respectively with no standard deviations as each is solitary in its raw material category (Figure 6.9). The WST points include four types of raw material, CCS (n=6, 14.0%), obsidian (n=9, 20.9%), FGV (n=26, 60.5%), and OTHER (n=2, 4.7%). The points manufactured on CCS have a mean BRR value of 0.271 with a standard deviation of 0.073. The points manufactured on obsidian have a mean BRR value of 0.319 with a standard deviation of 0.085. The points manufactured on FGV have a mean BRR value of 0.255 with a standard deviation of 0.072. Finally, the points manufactured on OTHER materials have a mean BRR value of 0.295 with a standard deviation of 0.075. Kruskal-Wallis H tests were conducted by raw material on the BRR values of each tradition, and all contained too few samples. Therefore, a Kruskal-Wallis H test combining all the traditions' points into raw material categories was conducted and found no significant difference (H=3.45, df=3, p=0.326). This indicates that raw material played no role in the degree to which hafted bifaces were reduced.

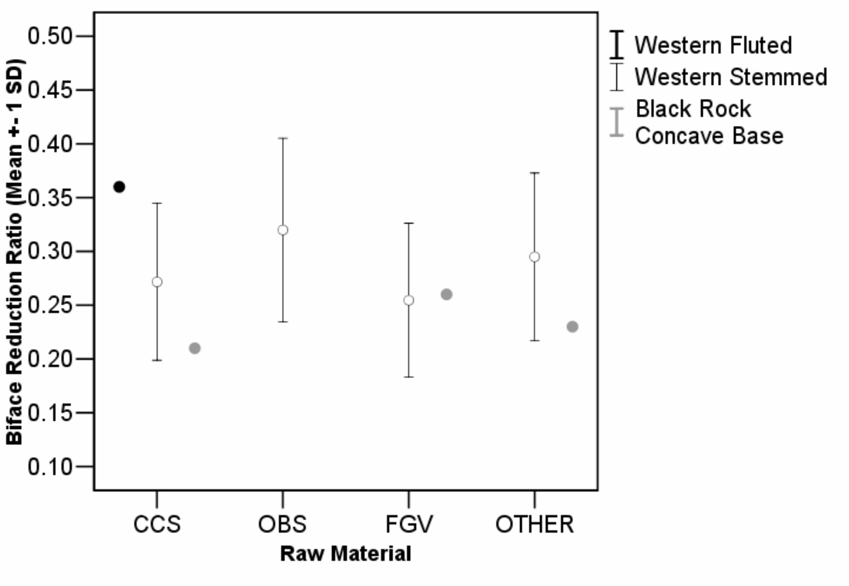


Figure 6.9. Mean biface reduction ratio (BRR) values by raw material type in the WF (dark line and filled dot), WST (light line and hollow dot), and BRCB (gray line and dot) assemblages.

As stated previously, this ratio assumes that these hafted bifaces were collaterally flaked. Three types of flaking techniques were noted on these 47 diagnostic points, including 25 collaterally flaked (flakes meeting in the center of the point), nine regularly flaked (regular sized and spaced flakes, not necessarily meeting in the middle), and 13 irregularly flaked (irregular sized and spaced flakes). The BRR technique should theoretically only work on points that have been collaterally flaked, where flakes feather towards the midline removing more mass from the edges and relatively little from the maximum thickness. Regularly or irregularly flaked points often have flakes that cross the midline reducing the maximum thickness of the blade and width together. Mean BRR values for each flaking technique follow this predicted pattern. Collaterally flaked points (n=25) have a mean BRR value of 0.302 with a standard deviation of 0.077 (Figure 6.10). Regularly flaked points (n=9) have a mean BRR value of 0.233 with a

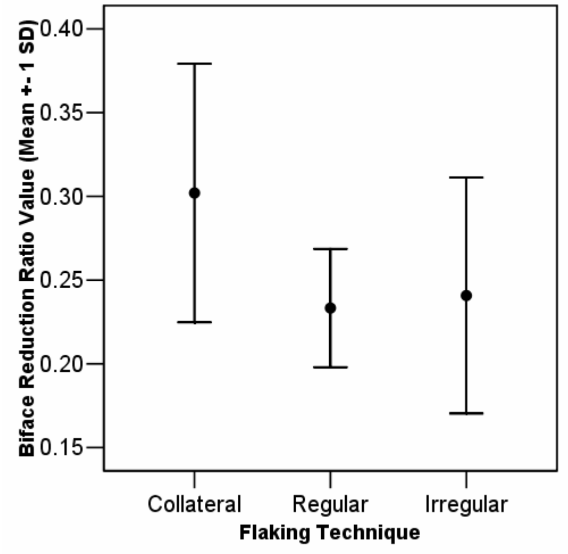


Figure 6.10. Mean biface reduction ratio (BRR) values by flaking technique used to resharpen diagnostic Paleoindian points within Jakes Valley. Mean values are significantly different (H=8.38, df=2, p=0.015).

standard deviation of 0.035. Irregularly flaked points (n=13) have a mean BRR value of 0.241 with a standard deviation of 0.071. A Kruskal-Wallis H test was conducted to determine if these differences were significantly different. The results were adjusted for ties and indicate a significant difference between the mean BRR values of the three flaking techniques used to resharpen diagnostic Paleoindian points (H=8.36, df=2, p=0.015). Therefore, collaterally flaked points follow the expected pattern exhibiting thicker BRR values than regular or irregularly flaked points. These results are consistent with the predicted pattern of the HMF model.

Recycled/Reworked Tools. Another measure of tool curation is recycling or reworking broken formal tools into other tools. Occasionally the blade of a hafted biface will break in a way that does not allow for resharpening and reuse for the original function. Sometimes these tools will be discarded, but also they may be recycled by reworking them into new tool types. The Jakes Valley Paleoindian assemblage contains three such tools (Figure 6.11). All were found at the Jakes Depression site, and all were formerly diagnostic WST points.

FS140 began as a small Parman stemmed point manufactured from obsidian (probably Browns Bench) and was reworked into a graver bit after the blade broke. FS224 was originally a Cougar Mountain stemmed point manufactured from CCS. After the very tip was broken, the remaining blade segment was reworked into a steep edge and then used as a hafted end scraper as its haft element is intact. FS450 was manufactured on CCS and was probably a Cougar Mountain stemmed point, but was broken at the shoulders and the tip. The remaining blade section was reworked into a drill before failing again.

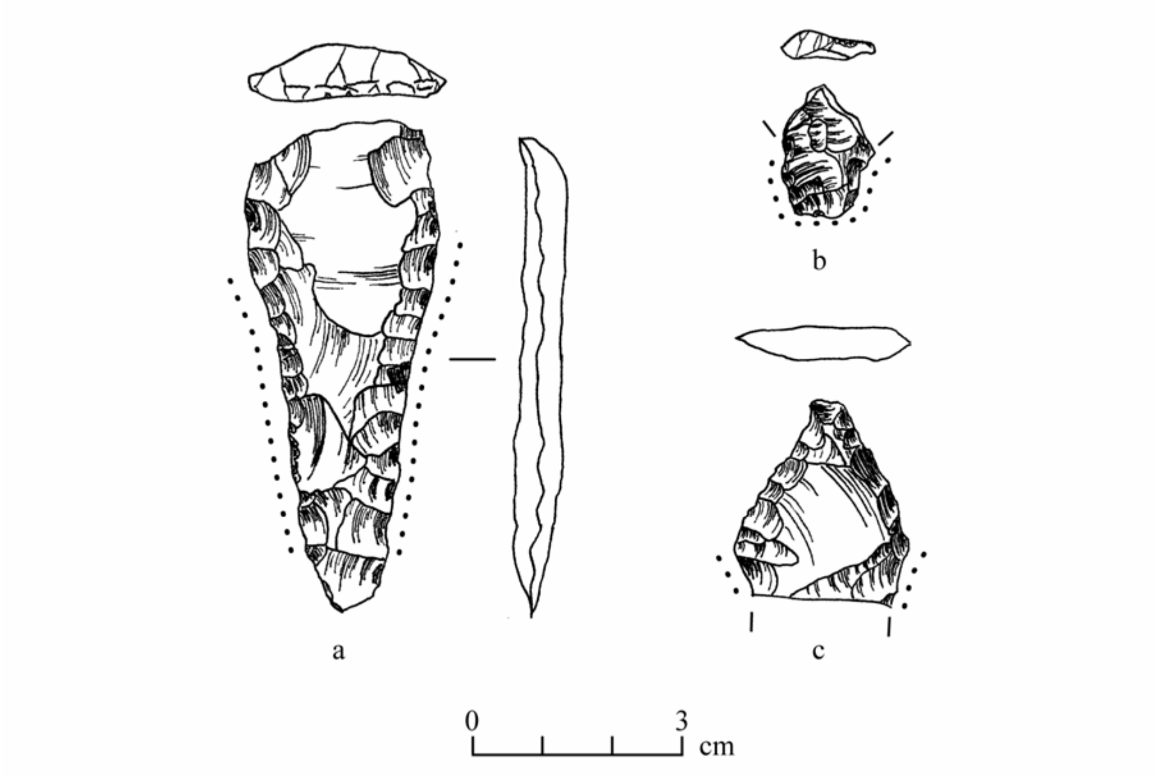


Figure 6.11. Recycled/reworked tools found at Jakes Depression: (a) FS224, CCS Cougar Mountain Stemmed reworked into end scraper; (b) FS140, obsidian Parman Stemmed reworked into graver; (c) FS450, CCS Cougar Mountain Stemmed reworked into drill and subsequently broken. Illustrations by author.

These three tools evidence the fact that, at least occasionally, Paleoindians in Jakes Valley would attempt to get the most use out of broken formal tools by refashioning them into new tools with new functions. Recycling and refashioning of old tools into new tools that serve new functions is a hallmark of a curated toolkit and of highly mobile foragers practicing a provisioning of individuals strategy. If the location of raw materials were unknown, or of poor quality, reworking of broken tools into a new functioning tool would help conserve toolstone while limiting discarded tools that could still serve some purpose in the toolkit.

Core Types and Variables

As described throughout this thesis, highly mobile foragers should exhibit a very formalized toolkit. This includes core types utilized. Formal cores include those with single or multiple platforms from which flakes are struck, in a uni-directional pattern (see Chapter 3), and may also include blade cores. These cores should be maximally utilized with numerous fronts from which flakes are struck. Informal cores are those with multiple platforms with flakes removed from numerous directions (multi-directional), as well as blocky cores, bipolar cores, and tested and split cobbles. Informal cores usually are minimally or randomly reduced. Highly mobile groups should be associated with formal core types, and less mobile groups with informal cores.

Few cores were recovered from the Jakes Valley Paleoindian assemblages. Of the 17 cores analyzed, 15 are strictly from Paleoindian sites; the other two are multi-component sites with Paleoindian and Archaic diagnostics and were excluded from this analysis. Of those 15 remaining cores, only seven can confidently be placed within a Paleoindian tradition; two are associated with a WF assemblage, and five with a WST assemblage (Table 6.9). The remaining 8 cores are found within mixed Paleoindian assemblages and may be associated with either the WF or WST assemblage. The two WF cores are both informal types, consisting of an expended multi-directional core and a tested cobble. The five WST cores include one formal uni-directional core with numerous detachment scars but few fronts, and four informal multi-directional cores with many fronts and detachment scars.

The remaining 8 cores are all informal multi-directional cores, some heavily expended (Table 6.9). The only obsidian core in this assemblage has 18 flake removal scars while being the second smallest core by size value (maximum linear dimension multiplied by weight). The fact that 14 of 15 Paleoindian cores are informal types does not correlate with the expectations of the HMF model. However, it should be remembered that bifaces were often used as cores (Kelly 1988; Parry and Kelly 1988) and are very common in these assemblages. Bifaces also represent a very formal core type. Therefore, the lack of formal core types in this analysis is somewhat misleading.

Table 6.9. Core Variables from Jakes Valley Paleoindian Assemblages.

Tradition	Core Type	Raw Material	Max Linear Dimension (cm)	Wt (g)	Size Value (MLD x Wt)	# of Detachment Scars	# of Platforms	# of Fronts (faces)
WF								
	Multi-directional	CCS	3.5	12.6	44	3	3	3
	Tested Cobble	CCS	8.3	96.8	803	6	3	3
WST								
	Multi-directional	CCS	5.5	39.0	215	6	4	3
	Multi-directional	OBS	4.7	30.6	144	6	3	4
	Multi-directional	CCS	6.2	42.0	260	8	6	4
	Multi-directional	OBS	3.9	13.4	52	18	7	3
	Uni-directional	CCS	3.5	11.5	40	6	1	2
Unknown Paleoindian								
	Multi-directional	CCS	3.6	18.4	66	4	4	3
	Multi-directional	CCS	5.4	63.2	341	6	4	3
	Multi-directional	CCS	4.7	20.9	98	6	4	3
	Multi-directional	CCS	4.7	36.0	169	10	4	3
	Multi-directional	CCS	3.5	15.3	54	4	2	2
	Multi-directional	CCS	7.7	96.1	740	7	4	3
	Multi-directional	FGV	9.8	338.9	3321	5	4	3
	Multi-directional	CCS	4.6	21.2	98	4	4	4

Note: Data assembled from Tables 5.1, 5.3, 5.4, and 5.6.

The HMF model also predicts that cores should exhibit high numbers of fronts (faces from which flakes have been removed) and platforms (prepared areas of the core that were struck to remove flakes). The majority (86.7%) of Paleoindian cores exhibit three or more fronts, and three or more platforms. These are high values for cores but are generally related to the core type: multi-directional, which by definition has numerous flake removals from numerous directions, often on numerous fronts, creating numerous platforms. The mean number of fronts on CCS cores is 3.083 with a standard deviation of 0.193; the mean number of platforms on CCS cores is 3.5 with a standard deviation of 0.359. The mean number of fronts on FGV cores is 3.0 with no standard deviation as both cores have three; the mean number of platforms on FGV cores is 4.0, again with no standard deviation. The mean number of fronts on obsidian cores is 3.0 with no standard deviation as it is the lone core of this material; the mean number of platforms on obsidian cores is 7.0 with no standard deviation. There are too few samples to allow a Kruskal-Wallis H test to compare cores by raw material and number of platforms, fronts, detachment scars, and size value. The mean size value of CCS cores is 238.1 with a standard deviation of 265.5. The mean size value of FGV cores is 1768 with a standard deviation of 1553. The mean size value of obsidian cores is 52 with no standard deviation. While these raw materials possess very different mean size values, there are too few specimens to allow statistical comparison. However, one FGV core (quarried from Smith Valley) is extremely large and likely a product of the close proximity to this source. Also of interest is the only obsidian core (from the Modena quarry) which is extremely small and likely a product of the far distance traveled to acquire it. The CCS cores range from large to small, suggesting that some may have been quarried fairly locally and others more distant.

Debitage Types

While there are a wide variety of types of debitage that one can create while manufacturing tools, the technology employed by a group shapes the overall characteristics of the assemblage. For instance, highly mobile foragers who rely on a bifacial technology should also show characteristics of this technology in their debitage assemblage. This technological organization strategy should be apparent in the debitage assemblage by increased quantities of biface thinning flakes, overshot flakes, and retouch chips at the expense of cortical spalls, angular shatter, and single-faceted flakes. Less mobile populations, who create fewer bifaces and rely more on informal core technology, should create assemblages opposite of more mobile groups. Single-faceted flakes, cortical spalls, and angular shatter should dominate debitage assemblages with few instances of biface thinning flakes, overshot flakes, and retouch chips.

The majority of these debitage categories are defined on platform preparation, which requires the presence of a visible and measurable platform to place it in its correct class. Therefore this analysis includes only those platform bearing flakes from the WF and WST assemblages. Also, all debitage from site 26Wp7336 was removed from this analysis as it is not representative of the site (see Chapters 4 and 5). After removing non-platform bearing flakes and the debitage assemblage from site 26Wp7336, remaining flakes total 106 for the WF assemblage and 287 for the WST assemblage. Figure 6.12

details the debitage assemblage for each tradition. While the two traditions are quite similar in appearance, Chi-square analysis indicates a very significant difference in debitage classes between the two traditions (X^2=16.404, df=5, p=0.006). However, three cells (25%) have expected counts less than five. To combat this potential analytical error, I combined overshot flakes with biface thinning flakes, as they are simply a specialized form of thinning a biface. Chi-square analysis was conducted on this new transformed data set and indicates a significant difference (X^2=10.815, df=4, p=0.029) with only a single cell (10%) having an expected count less than five. The WF assemblage appears

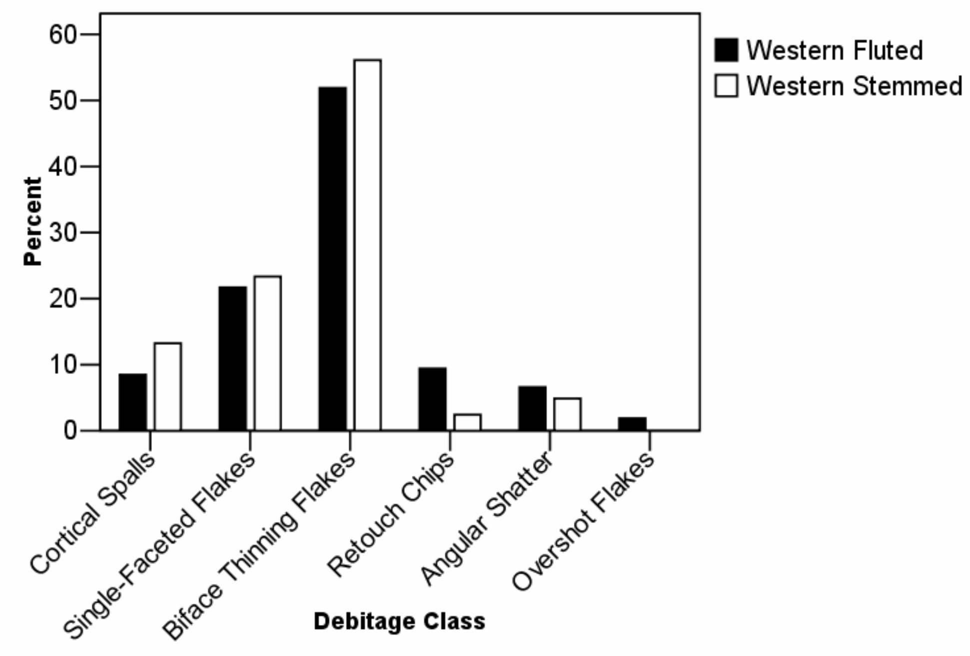


Figure 6.12. Debitage classes present in the WF and WST assemblages. This relationship is significantly different (X^2=16.404, df=5, p=0.006).

to have significantly fewer cortical spalls and biface thinning flakes, and significantly more retouch chips than the WST assemblage. However, it is important to note that both traditions are dominated by debitage consistent with bifacial technologies, including biface thinning flakes, retouch chips, and a few overshot flakes, while a smaller percentage of the assemblage is made up of cortical spalls, angular shatter, and single-faceted flakes. These results are consistent with the HMF model of debitage characteristics.

Summary

The Jakes Valley Paleoindian lithic assemblages produced data that are extremely informative on the organization of lithic technology, procurement and use of raw materials, provisioning strategies, mobility patterns, landscape use, and diversity within and between assemblages. Analysis concentrated on the lithic tools and debitage from five sites containing WF materials that were combined to form the WF assemblage, and 16 sites and three isolates containing WST materials that were combined to form the WST assemblage.

At the beginning of this chapter, I detailed the two models of Great Basin Paleoindian adaptation and their expected archaeological signatures. The lithic analysis presented in this chapter now allows for conclusions regarding Paleoindian technological organization, provisioning strategies, landscape use, mobility and diversity. Table 6.10 details the results by marking the appropriate model for each archaeological signature analyzed in these two Paleoindian assemblages.

Features indicating long-term stays in one place, such as rock rings or fire-cracked rock, are not present at any of the Paleoindian sites in Jakes Valley. The absence of these features suggests that stays in the valley were short-lived and any associated features built by these mobile hunter-gatherers were temporary and did not survive into the present day, especially if said features were made from organic materials. Not found were more permanent construction materials, such as stone for rock rings (house rings) or fire-cracked rocks used for heating and cooking purposes. The lack of evidence for semi-permanent features is consistent with the HMF model.

Table 6.10. Jakes Valley Paleoindian Data Correlated to Adaptation Model.

Archaeological Signature	WPLT or TF	HMF
Features		WF, WST
Toolstone Procurement		WF, WST
Biface to Core Ratio		WF, WST
Formal to Informal Tool Ratio		WF, WST
Unifacial Tool Use		WF, WST
Tool Blank Types		WF, WST
Total Length/Haft Length Ratio		WF, WST
Biface Reduction Ratio		WF, WST
Core Use	?	
Lithic Debitage		WF, WST
Inter-Assemblage Diversity		WF, WST
Provisioning Strategy		WF, WST
Landscape Use		WF, WST
Mobility Patterns		WF, WST

Toolstone was quarried and brought into Jakes Valley from both local and non-local sources. Locations of CCS quarries utilized by WF and WST populations are unknown at present and were removed from this analysis. Volcanic sources of toolstone, however, lend themselves to very precise sourcing determination. In this thesis, FGV is considered a “local” toolstone, despite being 22-82 km distant. This raw material was dominant in the WST assemblage, but was infrequent in the WF assemblage. Non-local toolstone, in this case obsidian, was also present among the WF and WST assemblages. Despite the use of several similar obsidian quarries, the extent of use, procurement strategies, and possible movement patterns to acquire it differed among each group. The HMF model predicts use of both local and non-local toolstone, and both groups conform to this pattern, with some major differences in the amount of local toolstone utilization.

Both Paleoindian traditions exhibit high biface-to-core ratios, indicating a reliance on highly versatile tools. Differences exist in the ratio values, with WST assemblages containing several times more bifaces than cores than in WF assemblages. The exact reasoning for this is unknown, but may be caused by population expansion, or a result of a slightly different strategy even more reliant on bifacial tools. Highly mobile foragers inhabiting areas for short periods of time need to deal with the possibility of toolstone shortages. By organizing their lithic technology around bifaces these mobile Paleoindians insured their lithic economy against failure or impoverishment until the next toolstone source could be located.

Additionally, both the WF and WST assemblages exhibit high formal-to-informal tool ratios. Again, reliance on formal tools that allow for continual resharpening, curation, and/or recycling takes precedence over informal tools that are expediently produced, used, and then discarded. Toolstone among Paleoindians was an important and vital resource, not to be used recklessly. Paleoindians were limited in the amount of raw material that could be carried by the individual. This results in the preferential use of formalized tools that have multiple functions and allow for extended curation.

The extent to which unifacial tools were resharpened for repeated use is consistent with the HMF model. As stated above, formal tools were held onto for extended periods of time and reused, resharpened, and recycled into new tools. The high URI values and number of retouched edges suggests that both formal and informal flake tools underwent such treatment; minimal amounts of lithic material were wasted. These flake tools were manufactured, predominantly, on biface thinning flakes, an expected outcome if bifaces were the preferred technology among highly mobile foragers. Interestingly, despite exhibiting extremely high numbers of bifaces, the WST assemblage contains fewer flake tools (proportionately) made from biface thinning flakes than the WF assemblage, and a greater number of flake tools manufactured on cortical spalls. The high frequency of cortical spall flake tools can be attributed to the material from which they were manufactured: FGV. As a local toolstone, FGV should show a higher degree of early stage manufacture, which would be reflected in the use of it for flake tools.

As stated previously, formal tools of highly mobile foragers, especially hafted bifaces, should exhibit evidence of resharpening. Because this process is generally done while still hafted, only the blade of the hafted biface will be affected and reduced in length. Reducing the length of the blade while maintaining the original haft element length of the hafted biface reduces the TL/HLR value. The Paleoindian hafted biface assemblage follows this expected pattern with the majority of complete or near complete hafted bifaces having TL/HLR values less than 2.0, indicating that extensive resharpening occurred. Additionally, three hafted bifaces were recycled into other useful formal tools upon breakage, including a drill, graver, and end scraper, indicating curation and reuse of broken tools. These results are consistent with the HMF model.

Another ratio I employed to determine the extent to which hafted bifaces had been resharpened was the biface reduction ratio (BRR). If Paleoindian tool makers used a collateral flaking technique, as the blade of a hafted biface was resharpened the width decreased as thickness remained stable, creating a higher BRR value. The Jakes Valley hafted bifaces with collateral flaking possess higher BRR values than those with regular and/or irregular flaking techniques. The BRR values of Jakes Valley tools are consistent with the HMF model.

The types of cores used by Paleoindians in Jakes Valley do not appear to fit the HMF models predictions of formal over informal types. However, the extent of utilization and reduction of the informal cores is consistent with a group of highly mobile foragers. The cores that are present have been extensively reduced to gain the maximum amount of useable flakes. This conservation and extreme maximizing is consistent with the HMF model.

The debitage created at these Paleoindian sites are also consistent with the HMF model. Biface thinning flakes and retouch chips account for over 50% of the Paleoindian debitage assemblages with measurable platforms. This should not be surprising since bifaces are the primary formal tools found at WF and WST sites in Jakes Valley.

The size of Jakes Valley Paleoindian tool assemblages is correlated to the observed class richness. However, the inter-assemblage diversity and equitability values were compared resulting in no statistical difference between assemblages. This indicates that small site assemblages have similar spreads of tools across tool classes as do larger sites. Thus, small sites with relatively few tools are roughly equal to large sites with numerous tools, suggesting that there is no difference in function between the large and small sites. These results are consistent with the HMF model that predicts all sites should be relatively equal in functional diversity. Only a single Paleoindian site in Jakes Valley

(26Wp7336) appears to represent a specialized site, possibly a kill site, as it contains very few flakes (none collected) and only one tool class represented by three WST points. Most other sites are small (consisting of 20 or fewer tools), but contain nearly the full spectrum of Paleoindian lithic economy suggesting the same numerous activities were conducted at each site as they moved residences frequently around the landscape.

All of the above analyses indicate that Jakes Valley Paleoindians practiced a lithic technological strategy of provisioning individuals, where toolstone is carried large distances, toolkits are biased towards formal tool types, and tools are highly curated being resharpened often and occasionally recycled into other useful tools.

My analysis of Paleoindian landscape use in and around Jakes Valley focused on plotting site locations on topographic maps using IMACS site forms and ArcMap 9.0. Trends emerged regarding landscape use among the WF and WST sites. Wetland patches immediately adjacent to the playa were the only environments used by WF groups. A single isolated fluted point was found near the center of the playa. No WF sites occur in the upland areas of the valley. The WST landscape use pattern is very different. While WST sites primarily occur around the wetland patches near the playa, the people also set up camps along the ephemeral streams flowing into Jakes Valley and upland settings as well. These sites appear just as diverse and as even as those along the shorelines. This expansion of landscape use may represent an increased area of resource exploitation once these areas became viable sometime after the end of the Pleistocene (Grayson 1993).

Taken together, these data indicate a mobility and settlement pattern used by Paleoindian groups in Jakes Valley, and the east-central Great Basin, of frequent residential moves where individuals supplied themselves with toolstone and exploited resources near wetland patches. Sites are focused around the north and south ends of the playa that were likely well watered wetland patches indicating that Paleoindian groups were drawn to these areas for their survival. Possible reasons include the obvious need for water for both themselves and terrestrial game that were likely hunted. Wetland patches would also provide a variety of resources including plants that may or may not have been exploited. Regardless, occupational stays were brief, creating small sites where old and heavily curated tools were discarded and replaced with newly manufactured tools. One site in particular was frequently returned to (CRNV-046-7211), although the reason is unclear. The most likely interpretation is that it was a favored spot where food resources were in high number and easy to exploit.

All the lithic and spatial data analyzed from Jakes Valley Paleoindian sites, from both WF and WST assemblages, conform to the Highly Mobile Forager model of adaptation in the Great Basin. The lithic technology of these Paleoindians is geared towards a highly mobile lifestyle where each person provisioned him or herself with high quality toolstone, created highly formalized tools that were reused, curated, and recycled into other tools before being discarded, and used the debitage manufactured primarily from bifaces. Wetland patches near the playa were the preferred environments in Jakes Valley, but riverine and upland settings were also utilized by WST populations. Similar functional activities were conducted in all of these environmental settings indicating frequent residential moves instead of logistic forays to acquire specific resources.

Chapter 7

Discussion & Conclusions

In this study my goal was to determine if Paleoindian settlement systems in Jakes Valley were either logistically or residentially mobile. To this end, I identified and operationalized the leading settlement and adaptation models for Paleoindian foragers in the Great Basin, and then tested them using data collected from Jakes Valley. Two models were outlined in the preceding chapters: (1) the Western Pluvial Lakes Tradition or Tethered Forager (WPLT/TF) model; and (2) the Highly Mobile Forager (HMF) model. The WPLT/TF model hypothesizes that Great Basin foragers were more-or-less restricted to wetlands during the Pleistocene-Holocene transition thereby becoming specially adapted to wetland resources seldom with reason to leave (Bedwell 1970, 1973; Willig 1988, 1989), essentially living in a more logistically mobile settlement system. An alternative model, HMF, suggests Paleoindian foragers were frequently moving (likely following high-ranked resources), stopping for short periods near whatever productive environment was in their path (Ames 1988; Basgall 1988; Elston 1982, 1986; Tuohy 1968, 1974; Kelly and Todd 1988). The HMF model allows more leeway in environments visited, distances traveled, and technologies utilized, indicating a more residentially mobile settlement system.

The only surviving aspects of Jakes Valley Paleoindian culture, their lithic assemblages and locations on the landscape, were analyzed and described in great detail in this study to identify the best fitting model of adaptation. Information gleaned from lithic technology informed on numerous aspects of ancient lifeways, such as mobility and provisioning strategies. Landscape use in and around Jakes Valley helped broaden the picture of Paleoindian movement within a confined area. Together, lithic technology and landscape use helped identify the most likely settlement system employed by Paleoindians who visited Jakes Valley. By dividing the Paleoindian era into Western Fluted and Western Stemmed Tradition groups I characterized and compared each tradition to identify whether they used the Great Basin and its resources in similar manners.

To accomplish the goal of identifying system mobility, I developed a series of research questions to identify the likeliest settlement system for each tradition:

(1) What technological activities occurred at these sites, and what are the differences between Western Fluted and Western Stemmed occupations?

(2) What raw material provisioning strategies were employed at Western Fluted and Western Stemmed occupations?

(3) Did landscape use differ between Western Fluted and Western Stemmed occupations?

I now answer these questions using the data presented in the preceding chapters and then conclude with my final thoughts on Paleoindian technology and settlement systems in Jakes Valley and the Great Basin.

Technological Activities

The Paleoindian assemblages analyzed in this study consist entirely of open-air surface assemblages. Any organic materials left at these sites would have deteriorated or otherwise been removed from the archaeological record in the 8-12,000 years that have passed. Thus, the technological activities that occurred at these occupations are inferred based on the remaining lithic assemblages. This paints a limited picture of Paleoindian technology and activities, but such is life in Great Basin surface archaeology.

The Jakes Depression site was littered with hundreds of formal and informal tools, the majority consisting of expended and broken hafted and unhafted bifaces. Reduction stages of unhafted bifaces very nearly duplicate Thomas' (1983) ideal reduction curve, containing only slightly fewer than anticipated among the earliest stages of manufacture (Figure 7.1). The high number of unhafted bifaces in every stage of manufacture indicates that this location was used primarily to further reduce bifaces for later transport and to shape and finish hafted bifaces to replace broken ones. In essence, Jakes Depression is a retooling station. But the high number of scrapers and retouched pieces indicates that other activities were performed here that required high amounts of scraping, cutting, incising, and piercing.

Diversity and evenness indices reported in the last chapter indicate that this site, while much richer in the frequency of tools, contained the same tool classes as smaller sites, suggesting that Jakes Depression was set at a favorable spot and repeatedly returned to for maintenance activities. Repeated visits to Jakes Depression resulted in the accumulation of high numbers of discarded stemmed points and, to a lesser degree, fluted points.

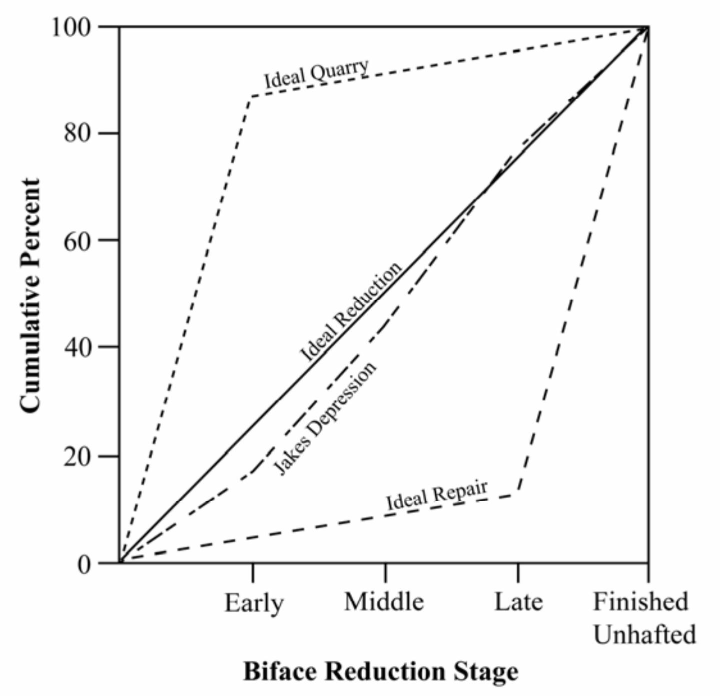


Figure 7.1. Biface reduction stages present at the Jakes Depression site graphed with Thomas' (1983) Ideal Curves.

Western Fluted sites in Jakes Valley are few in number and appear to be less heavily used than those containing Western Stemmed Tradition points. However, WF sites show the same technological activities as WST sites, containing high numbers of retouched pieces, scrapers, and bifaces, but with fewer projectile points and cores. WF technology is geared towards bifaces and other formal tools, although people did make significant use of informal flake tools. Cores are few, numbering only two in the entire valley, both coming from a single site (26Wp7729), but were heavily reduced. The WF biface reduction curve is slightly skewed towards Thomas' (1983) ideal repair curve (see

Figure 5.8), indicating that the majority of bifaces brought into the valley were already reduced to a great degree, suggesting that they were being held on to for long periods of time before they were replaced. This is also evidenced by the high proportion of biface thinning flakes compared to simple flakes. Scraping, cutting, slicing, and incising activities were also performed at WF sites in Jakes Valley.

Small sites containing mostly late stage bifaces and large numbers of cutting and scraping tools indicate that WF groups were quickly passing through Jakes Valley with curated tools, and those created expediently from bifacial cores, to process whatever resources they were after, likely high-ranked animals stopping near waters' edge. The small size and low number of WF sites in Jakes Valley suggest a low population density.

The evidence for Western Stemmed Tradition groups in Jakes Valley is more common. Not only are WST assemblages much more numerous and densely populated with artifacts than WF sites, but they also appear in a wider array of environments. WST assemblages, in general, contain high numbers of discarded stemmed points, broken at or near the shoulders; very few projectile point blades were found, probably because they were reworked into new tools. Unhafted bifaces and other formal tools such as scrapers also frequently occur at WST sites. Rare are informal tools, leading to extremely high formal-to-informal tool ratios. Cores, similar to WF assemblages, are almost non-existent, creating very high biface-to-core ratios. However, it has been noted that unhafted bifaces likely served this purpose, thus cores are not completely lacking. The debitage contains high proportions of biface thinning flakes, and formal and informal flake tools are often made on them. Biface reduction stages present in WST assemblages fall between Thomas' (1983) ideal reduction and ideal repair curves (Figure 5.8). The fact that bifaces (hafted and not) far outnumber any other tool class at WST sites speaks to the high reliance on these tools, often carried from far distances before being discarded. Having relied on bifaces does not eliminate the probability of other activities conducted at WST sites. Formal and informal flake tools indicate that scraping, cutting, slicing, incising, and other activities were performed at these sites too.

The high frequency of WST sites in Jakes Valley and high density of artifacts at their sites may suggest a higher population density than among WF groups, or may be a factor of the relatively long duration of the WST era (roughly 4,000 years). The lithic assemblages, like those at WF sites, suggest short stays in Jakes Valley by highly mobile groups.

Raw Material Provisioning Strategies

The technological activities interpreted in the preceding section provide data that can be used to understand how WF and WST Paleoindians acquired, reduced, used, maintained, and ultimately discarded their raw materials. In conjunction with certain geologic source locations of raw material (i.e., obsidian and FGV) an accurate view of provisioning strategies is ascertained as well as rough approximations of the ranges covered to acquire it.

Kuhn (1991, 1992, 1994, 1995) identified two types of raw material provisioning strategies used prehistorically: (1) provisioning places and (2) provisioning individuals. Put simply, provisioning places is a strategy where groups leave a home base in search of raw material and, upon finding adequate quantities of quality toolstone, collect and return with it, essentially stockpiling their home-bases. They may also make extensive use of whatever toolstone is locally available, no matter its quality. The provisioning individuals strategy equips each person with useable toolstone (often exotic) that is manufactured into flexible and dynamic tools to be carried with them and repeatedly used and resharpened, creating a curated toolkit. Based on my lithic analysis, Jakes Valley Paleoindians (WF and WST) practiced a strategy of provisioning individuals.

The presence of such a highly formalized toolkit in WF assemblages, including projectile points, bifaces, scrapers, and combination tools, manufactured primarily from high quality raw materials (including exotic materials like obsidian), and low use of local materials (i.e., FGV), indicates that these people geared up at preferred high quality toolstone sources to prepare for the unpredictable future. WF tools are heavily worn and resharpened, indicating that they have been reused and maintained for some time. Toolstone from obsidian flows was brought in from up to 320 km distant, again indicating the length of time toolstone was carried and maintained, as well as the great distances these people traveled in pursuit of food and other resources.

It appears that WST groups were just as mobile as WF groups, with lithic assemblages containing high numbers of projectile points, bifaces, scrapers, and combination tools compared to expediently-made flake tools. Tools are extensively utilized and were maintained through resharpening, characteristics of a curated toolkit. Toolstone comes from exotic and local sources. Lithic assemblages contain high quantities of FGV tools and debitage indicating that people knew of, and regularly quarried material from, more local sources of toolstone. Despite the common use of local toolstone, WST provisioning strategies appear largely similar to those of WF groups.

Alternatively, it may be argued that the availability (*sensu* Andrefsky 1994) of utilized raw materials in association with the technological organization found at Jakes Valley Paleoindian sites may be associated with either sedentary or mobile populations. However, while raw material availability is indeed important when describing lithic technological organization and provisioning strategies, I believe that the extensive evidence presented in the preceding chapters argues for high residential mobility, as has been shown in previous Paleoindian studies in the Great Basin (Graf 2001; Smith 2006). Additionally, it could be argued that these groups practiced a more sedentary lifestyle where only males procured raw materials from distant high quality sources and prolonged stays in Jakes Valley by making frequent but shorter-distance moves within a resource patch, causing extended use-wear on tools (after Madsen 2007; Oviatt et al. 2003; Schmitt et al. 2007). Unfortunately, this cannot be tested properly due to lack of clearly identifiable gender-specific tools in the Paleoindian toolkit. Further, the available wetland patches along the northern and southern portions of the Jakes Valley playa were probably not of adequate size or productivity to allow longer-term stays in the valley.

The results of analyses presented in this thesis indicate that both Paleoindian traditions in Jakes Valley provisioned individuals with the proper gear to facilitate survival in the uncertain times and places they traveled. People maximized toolstone utility by creating formalized toolkits that could readily be adapted to any situation, but still function properly and efficiently when used for their original purposes. This provisioning strategy helped promote a population that practiced a highly residentially mobile settlement strategy.

Landscape Use

Landscape use refers not only to the geographic locations *where* Paleoindians settled for some amount of time but also *how* that location was used by the group that settled there. For instance, it was shown in this study that WST occupations are found away from the playa margins, along rivers and in the uplands far from the wetland environment and its resources. But are there functional differences in the use of upland, riverine, and playa-level occupations? Unfortunately, defining landscape use solely through the sites created by lithic discard may skew these results towards environments with enhanced surface visibility. For example, these groups clearly traveled through the upland environments to enter Jakes Valley and may have moved upslope to hunt, leaving few identifiable remains or those which have been covered by recent alluvial fans or vegetation cover. However, this study can only analyze clearly identifiable Paleoindian sites, and this is done primarily through the identification of diagnostic Paleoindian tool types. Therefore, this section will focus discussions on both the *where* and *how* of Paleoindian landscape use consisting strictly of clearly identifiable Paleoindian sites.

As described in previous chapters, Western Fluted occupations are limited to areas immediately surrounding the lake margin in Jakes Valley. These sites are located at 1,926-1,928 m (6,319-6,327 ft) in elevation, averaging around 1,928 m (6,324 ft) (see Table 4.4). Those sites with WF and other diagnostic projectile points average around 1,929 m (6,327 ft). This indicates that WF occupations have a limited range of landscape use in Jakes Valley, preferring wetland patches immediately adjacent to the playa. This fact, however, does not necessarily indicate that WF groups specialized in lacustrine resource procurement. Rather, I suggest that as these highly mobile groups (as shown through the organization of lithic technologies) moved through Jakes Valley, the best (and most productive) location to set up camp for the day would be around these well watered patches near the northern and southern edges of the playa. High-ranked animals would have been attracted to these areas and be easily accessible along with other resources, such as plant foods.

All of the locations containing Western Fluted points were used similarly (see Tables 5.22 and 5.23). Richness and diversity indices indicate that WF sites had multiple functions, as predicted among residentially mobile foragers; none exhibit evidence of specialization (i.e., single activities) which should be seen in logistically mobile foragers extracting a single resource to bring back to camp. Rather, each WF site is a camp likely placed at or near the location of resource extraction. These camps functioned for tool maintenance and manufacturing as well as resource extraction and preparation where small groups stopped for short periods of time before moving on.

Western Stemmed Tradition landscape use is more diverse in both location and activities performed. First, WST sites are found primarily adjacent the playa near wetland patches at 1,927-1,939 m (6,322-6,360 ft), averaging around 1,930 m (6,331 ft), about two meters higher in elevation than WF settlements. But WST sites are also found along the main drainages into Jakes Valley (Illipah Creek and Jakes Wash) and upland environments, indicating a more diverse landscape use than that seen among WF foragers. Upland sites are located at 1,942-2,190 m (6,370-7,185 ft) in elevation. The use of more diverse environments in Jakes Valley by WST groups may be the result of a number of possible reasons. It may be that the increased use of Jakes Valley by WST groups (seen in the higher frequency of sites) led some to spread out into untapped areas. Perhaps as warming increased during the early Holocene upland areas became more productive allowing groups to venture further from permanent water and take advantage of new resources (Grayson 1993). These are but a few of numerous possible influences, but whatever the reason(s), WST groups were clearly more inclined to discard artifacts in upland settings than WF groups, who may have kept their artifacts longer or left the valley environs altogether before discarding them.

Now that I've established that WST groups used different areas in the Valley, functional differences in landscape use can be examined. The high number of WST sites in Jakes Valley provides the potential for more diverse tool assemblages. Examination of Tables 5.22 and 5.23 attest to this diversity, showing that WST sites have highly variable richness, diversity, and equitability values. The majority of WST sites contain Richness values between three and four tool classes (n=8) while only two sites have a Richness of five, and only a single site has one tool class. This indicates that, unlike WF sites, WST sites are more diverse in the types of sites that they created. Some sites appear very diverse, where many activities occurred (similar to WF), and some are less diverse, where a narrower range of activities occurred. This does not appear to be correlated to site location as sites on the valley floor have richness values varying between one and five; riverine site values are between three and four; and upland site values are between three and five. The presence of one site consisting entirely of projectile points indicates that WST groups may have occasionally practiced logistic resource procurement, where only a single resource was procured and brought back to a main camp. However, lithic analyses of WST tool assemblages as a whole argues for a residentially mobile group.

Nevertheless, WST sites are more variable than WF sites in both the range of environments exploited and site function. They also made extensive use of local resources, especially FGV toolstone quarries, to replenish and replace their broken tools made from higher quality, non-local obsidian toolstone.

Conclusions

The data presented in this study (including lithic technological organization, provisioning strategies, and landscape use) all point to the same conclusion, that Paleoindian groups in the Great Basin were primarily residentially mobile. Small groups of hunter-gatherers in search of food, water, and raw materials to make tools were far-ranging and traveled mainly in a north-south direction to survive, occasionally stopping in Jakes Valley to acquire these necessary resources. Residential stays in Jakes Valley were short-lived, creating many small sites surrounding the lake edge and other areas further away before moving on to other locations, possibly in other valleys. It appears that one location, Jakes Depression, was returned to numerous times by highly mobile Paleoindians. The tools they manufactured and activities they conducted at Jakes Depression are the same as those conducted at smaller, single-use sites scattered throughout the valley. That similar activities were conducted at “large” and “small” sites indicates that each site was a residential camp.

Given two possible models of adaptation (the Western Pluvial Lakes Tradition/Tethered Forager and Highly Mobile Forager models), the data from Paleoindian occupations in Jakes Valley appear to fit more closely with the latter.

However, it should be noted that this study reveals information from a limited viewpoint, that of lithic tools and landscape use. It is unfortunate that Great Basin archaeologists have so little information on subsistence remains that Paleoindians exploited. It seems likely, given that their lithic technology contained high numbers of projectile points, bifaces, knives, and scrapers, that high-ranked animals were important in their diet, and less emphasis was placed on foods that would have required more work processing, such as seeds and other plant foods (Elston and Zeanah 2002). This does not mean that Paleoindians never ate plant foods, just that seed processing tools are rare to non-existent throughout the Great Basin at this time, suggesting that little effort was made in this activity. Buried deposits containing Paleoindian (especially Western Fluted) subsistence remains are urgently needed to fill this gap in knowledge.

This study also highlighted the fact that Western Fluted and Western Stemmed Tradition Paleoindian groups in the Great Basin did not conform to the same patterns of movement, toolstone procurement sources, or landscape use. The data presented in this study indicate that these were two separate groups living in the same area, possibly at or around the same time (more data are needed to identify an accurate temporal span of Western Fluted groups). Both groups moved long distances in search of toolstone, were residentially mobile, and provisioned individuals with toolstone. But it appears that population densities were much lower among WF groups, they only chose high-quality raw material for their tools, and they preferred to set up camp around wetland patches near the playa. WST groups, on the other hand, appear to have a higher population density (based on number of sites and artifact density), chose high quality raw materials but also made extensive use of more local raw materials of lesser quality, and exploited more environments in and around Jakes Valley. In general, WST sites are more variable than WF sites, which tend to be more homogenous in function. However, this difference may be a factor of sample size. Many more WST sites were available for study than WF sites. If more single-component WF sites were found and analyzed we may find that they were just as variable as those left by WST groups.

Much is unknown regarding Paleoindian prehistory in the Great Basin. Researchers are working hard to uncover those remaining aspects that are needed to visualize the complete picture. Debate will continue about the interpretation of newly discovered sites. It is my hope that this study has revealed some unknown aspects of the relationship between Western Fluted and Western Stemmed Tradition groups in the Great Basin. While it is a relatively small and confined space, Jakes Valley provided an enormous amount of information regarding past lifeways of Paleoindian groups. I am hopeful that future research will illuminate those uncertain aspects of Paleoindian lifeways that could not be addressed in this study.

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Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Nevada Sites

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	$Fe_2O_3^T$	Fe:Mn	Fe:Ti	Geochemical Source
Jake's Depression	1	04-7721-2	68	37	249	52	70	445	46	1636	156	1065	1.71	94.3	35.2	Browns Bench
			± 8	5	4	9	3	7	1	91	27	33	0.11			
Jake's Depression	2	04-7721-5	74	34	243	50	68	454	48	1707	197	1064	2.00	85.9	39.3	Browns Bench
			± 7	4	4	9	3	7	1	92	27	32	0.11			
Jake's Depression	3	04-7721-13	47	25	215	42	65	391	42	1419	311	1081	1.75	47.6	41.4	Browns Bench
			± 8	5	4	9	3	7	1	91	28	32	0.11			
Jake's Depression	4	04-7721-14	41	25	191	73	28	119	19	717	243	471	0.83	30.0	39.5	Modena
			± 7	4	4	9	3	7	1	89	27	32	0.11			
Jake's Depression	5	04-7721-17	59	31	205	50	60	467	47	1896	220	1168	2.27	86.7	40.0	Browns Bench
			± 8	4	4	9	3	7	1	92	28	32	0.11			
Jake's Depression	6	04-7721-35	61	32	213	50	64	466	47	2123	305	1226	2.39	65.3	37.6	Browns Bench
			± 8	4	4	9	3	7	1	93	28	33	0.11			
Jake's Depression	7	04-7721-106	52	39	249	93	29	136	20	NM	NM	480	NM	32.5	37.8	Modena? *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	8	04-7721-107	69	35	215	21	62	338	46	NM	NM	567	NM	65.1	48.7	Browns Bench Area *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	9	04-7721-110	49	30	190	39	22	113	24	NM	NM	152	NM	21.2	31.3	Wild Horse Canyon *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	10	04-7721-142	63	24	184	43	59	386	50	1809	333	1105	2.25	56.4	41.5	Browns Bench
			± 8	5	4	9	3	7	2	92	28	32	0.11			
Jake's Depression	11	04-7721-148	32	28	184	76	32	116	22	784	244	535	0.87	31.4	38.0	Modena
			± 8	4	4	9	3	7	1	89	27	32	0.11			
Jake's Depression	12	04-7721-152	37	31	198	77	28	132	22	NM	NM	470	NM	31.7	38.9	Modena *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	13	04-7721-165	57	26	212	47	65	455	44	2054	245	1135	2.38	81.5	38.7	Browns Bench
			± 7	4	4	9	3	7	1	93	28	32	0.11			
Jake's Depression	14	04-7721-209	36	28	202	79	28	124	20	951	288	453	1.04	31.3	37.2	Modena
			± 7	4	4	9	3	7	1	90	27	32	0.11			
Jake's Depression	15	04-7721-232	50	28	193	76	28	113	19	1047	289	491	1.19	35.5	38.6	Modena
			± 7	4	4	9	3	7	1	90	27	32	0.11			
Jake's Depression	16	04-7721-270	52	31	206	81	27	125	20	NM	NM	517	NM	31.8	40.0	Modena *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Nevada Sites

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	$Fe_2O_3^T$	Fe:Mn	Fe:Ti	Geochemical Source
Jake's Depression	17	04-7721-273	41	25	198	79	30	126	20	NM	NM	404	NM	35.2	40.4	Modena *
			± 8	4	4	9	3	7	1	NM	NM	33	NM			
Jake's Depression	18	04-7721-276	37	29	211	81	31	122	21	NM	NM	451	NM	30.8	42.5	Modena *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	19	04-7721-289	24	22	200	82	29	125	20	814	420	472	0.96	19.8	40.2	Modena
			± 8	4	4	9	3	7	1	89	28	32	0.11			
Jake's Depression	20	04-7721-290	22	29	191	74	32	127	21	NM	NM	437	NM	31.9	41.3	Modena *
			± 9	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	21	04-7721-307	30	23	199	79	27	126	20	NM	NM	451	NM	35.8	40.3	Modena *
			± 8	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	22	04-7721-318	60	35	208	49	64	456	46	NM	NM	1121	NM	91.6	40.8	Browns Bench *
			± 7	4	4	9	3	7	1	NM	NM	33	NM			
Jake's Depression	23	04-7721-323	36	28	201	78	28	137	22	NM	NM	460	NM	30.6	40.1	Modena *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	24	04-7721-325	35	30	202	78	28	119	20	NM	NM	470	NM	32.1	39.4	Modena *
			± 7	4	4	9	3	7	1	NM	NM	33	NM			
Jake's Depression	25	04-7721-329	77	30	185	67	74	553	60	NM	NM	1101	NM	79.0	41.5	Butte Valley Group A? *
			± 7	4	4	9	3	7	2	NM	NM	33	NM			
Jake's Depression	26	04-7721-436	33	32	191	38	20	116	24	947	346	155	0.89	22.4	32.2	Wild Horse Canyon
			± 7	4	4	9	3	7	1	89	28	32	0.11			
Jake's Depression	27	04-7721-498	42	28	202	79	30	117	21	NM	NM	461	NM	33.2	40.6	Modena *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	28	04-7721-506	38	29	240	28	60	353	45	NM	NM	572	NM	69.0	41.7	Browns Bench Area *
			± 8	4	4	9	3	7	1	NM	NM	32	NM			
Jake's Depression	29	04-7721-523	28	27	179	36	22	116	24	921	395	139	0.85	18.9	32.0	Wild Horse Canyon
			± 8	4	4	9	3	7	1	89	28	32	0.11			
Jake's Depression	30	04-7721-529	44	22	150	118	21	159	20	997	385	754	1.17	26.1	39.8	Obsidian Butte, NV, Variety 4
			± 7	4	4	9	3	7	1	90	28	32	0.11			
Jake's Depression	31	04-7721-531	38	31	197	41	26	114	25	893	319	161	0.82	22.6	31.8	Wild Horse Canyon
			± 7	4	4	9	3	7	1	89	27	32	0.11			
Illipah Creek-1	32	04-9630-50	45	28	210	79	29	134	22	1098	300	477	1.19	34.0	36.7	Modena
			± 7	4	4	9	3	7	1	90	27	32	0.11			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Nevada Sites

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	$Fe_2O_3^T$	Fe:Mn	Fe:Ti	Geochemical Source
Illipah Creek-1	33	04-9630-56	57	33	199	94	29	156	24	NM	NM	477	NM	18.2	45.5	Unknown 1 *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Illipah Creek-1	34	04-9630-65	72	30	204	126	31	163	31	649	445	598	1.40	26.6	71.0	Tempiute Mountain
			± 7	4	4	9	3	7	1	89	28	32	0.11			
Illipah Creek-1	35	04-9630-68	37	24	187	74	29	119	21	822	257	499	1.03	35.0	42.6	Modena
			± 8	4	4	9	3	7	1	90	27	32	0.11			
Zandra-1	36	04-9631-6	83	23	208	131	34	167	30	555	507	561	1.23	20.6	73.0	Tempiute Mountain
			± 7	4	4	9	3	7	1	89	28	32	0.11			
Doug-3	37	04-9634-5	86	18	196	512	39	293	21	NM	NM	1593	NM	83.3	29.9	Smith Valley Basalt *
			± 8	5	4	9	3	7	1	NM	NM	33	NM			
Doug-3	38	04-9634-8	91	18	187	496	38	288	23	NM	NM	1481	NM	78.9	31.2	Smith Valley Basalt *
			± 8	5	4	9	3	7	1	NM	NM	33	NM			
Doug-3	39	04-9634-9	36	36	233	88	32	133	21	793	362	492	0.81	19.6	35.0	Modena
			± 7	4	4	9	3	7	1	89	28	32	0.11			
Doug-3	40	04-9634-10	40	40	302	6	70	109	37	243	334	0	0.66	17.8	87.7	Black Rock Area
			± 7	4	4	9	3	7	1	87	27	31	0.11			
Travis-1	41	04-9635-5	34	27	213	44	60	402	46	1967	250	1077	2.17	72.8	36.9	Browns Bench
			± 8	4	4	9	3	7	1	93	28	32	0.11			
Illipah Creek-7	42	04-9643-1	38	34	206	82	32	126	20	834	319	477	0.97	26.4	39.5	Modena
			± 7	4	4	9	3	7	1	90	28	32	0.11			
Illipah Creek-7	43	04-9643-2	78	49	189	505	41	296	23	5811	741	1503	5.50	60.4	31.4	Smith Valley Basalt *
			± 8	5	4	9	3	7	1	100	28	33	0.11			
Illipah Creek-7	44	04-9643-3	65	38	229	24	66	346	46	NM	NM	494	NM	79.0	45.5	Browns Bench Area *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Liz Site-1	45	04-9636-2	81	17	73	567	39	314	24	NM	NM	931	NM	83.6	28.4	Unknown Basalt 1 *
			± 9	5	4	9	3	7	2	NM	NM	33	NM			
Liz Site-1	46	04-9636-6	97	18	80	589	39	321	25	NM	NM	851	NM	85.5	27.9	Unknown Basalt 1 *
			± 9	5	4	9	3	7	1	NM	NM	33	NM			
Liz Site-1	47	04-9636-7	47	28	190	76	27	114	19	NM	NM	461	NM	29.6	40.8	Modena *
			± 7	4	4	9	3	7	1	NM	NM	32	NM			
Liz Site-1	48	04-9636-9	93	17	81	644	41	317	28	NM	NM	949	NM	85.3	26.5	Unknown Basalt 1 *
			± 8	5	4	9	3	7	1	NM	NM	33	NM			
Liz Site-1	49	04-9636-10	71	23	197	127	33	161	29	479	340	553	1.07	27.1	73.4	Tempiute Mountain
			± 7	4	4	9	3	7	1	89	28	32	0.11			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of Obsidian and Basalt XRF Studies: Several Sites in Jakes Valley, White Pine County, Nevada

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe^2O^{3T}	Fe:Mn	Fe:Ti	Geochemical Source
North Illipah Creek 1	1	FS 1	77	33	114	725	35	326	20	4800	598	1224	4.55	62.1	31.5	Unknown Basalt A
			± 12	5	5	10	3	10	2	99	28	32	0.11			
North Illipah Creek 1	2	FS 3	83	29	198	529	43	291	23	5446	560	1397	5.14	74.9	31.3	Smith Valley Basalt
			± 12	5	5	10	3	10	2	100	28	33	0.11			
North Illipah Creek 1	3	FS 5	39	29	177	88	28	151	22	679	295	437	0.99	29.1	49.1	Obsidian Butte, NV, Variety 3 (Obsidian Butte)
			± 10	5	5	9	3	10	2	89	27	32	0.11			
North Illipah Creek 1	4	FS 6	87	21	116	739	36	328	18	4839	556	1297	4.60	67.7	31.6	Unknown Basalt A
			± 12	6	5	10	3	10	2	99	28	33	0.11			
North Illipah Creek 1	5	FS 7	79	24	127	727	35	339	19	4747	544	1326	4.63	69.5	32.4	Unknown Basalt A
			± 12	5	5	10	3	10	2	99	28	33	0.11			
North Illipah Creek 1	6	FS 9	92	29	121	754	36	338	22	4491	750	1287	4.31	46.9	31.9	Unknown Basalt A
			± 11	5	5	10	3	10	2	98	28	33	0.11			
North Illipah Creek 1	7	FS 10	109	12	116	740	38	333	19	4662	529	1350	4.67	72.2	33.3	Unknown Basalt A
			± 12	6	5	10	3	10	2	99	28	33	0.11			
North Illipah Creek 1	8	FS 11	68	27	114	744	37	335	19	5026	551	1297	4.82	71.5	31.9	Unknown Basalt A
			± 12	5	5	10	3	10	2	99	28	33	0.11			
North Illipah Creek 1	9	FS 13	82	26	120	735	36	329	21	4909	624	1325	4.75	62.2	32.2	Unknown Basalt A
			± 11	5	5	10	3	10	2	99	28	33	0.11			
North Illipah Creek 1	10	FS 15	101	24	127	755	38	342	18	4755	521	1314	4.29	67.5	30.0	Unknown Basalt A
			± 11	5	5	10	3	10	2	98	28	33	0.11			
North Illipah Creek 1	11	FS 16a	75	25	115	721	37	332	18	NM	NM	1224	NM	68.2	32.9	Unknown Basalt A *
			± 12	6	5	10	3	10	2	NM	NM	33	NM			
North Illipah Creek 1	12	FS 16b	100	21	117	700	33	326	21	NM	NM	1177	NM	72.1	33.2	Unknown Basalt A *
			± 12	6	5	10	3	11	2	NM	NM	33	NM			
North Illipah Creek 1	13	FS 16c	77	25	110	711	37	333	19	NM	NM	1168	NM	71.2	33.6	Unknown Basalt A *
			± 12	6	5	10	3	11	2	NM	NM	33	NM			
North Illipah Creek 1	14	FS 16d	99	14	120	762	33	338	23	4833	615	1297	4.67	62.0	32.1	Unknown Basalt A
			± 11	6	5	10	3	10	2	99	28	33	0.11			
North Illipah Creek 1	15	FS 16e	93	35	203	531	40	288	24	6044	706	1491	5.63	64.9	30.9	Smith Valley Basalt
			± 12	5	5	10	3	10	2	101	28	33	0.11			
North Illipah Creek 1	16	FS 16f	100	33	118	771	34	347	16	4602	627	1200	4.60	59.9	33.2	Unknown Basalt A
			± 12	6	5	10	3	10	2	99	28	33	0.11			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of Obsidian and Basalt XRF Studies: Several Sites in Jakes Valley, White Pine County, Nevada

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	$Fe^{2}O^{3T}$	Fe:Mn	Fe:Ti	Geochemical Source
North Illipah Creek 1	17	FS 16g	66	31	117	739	37	338	20	4192	479	NM	4.00	68.4	31.7	Unknown Basalt A
			± 12	6	5	10	3	10	2	97	28	NM	0.11			
North Illipah Creek 1	18	FS 16h	95	34	208	543	43	301	20	NM	NM	NM	NM	76.6	31.2	Smith Valley Basalt *
			± 12	6	5	10	3	10	2	NM	NM	NM	NM			
North Illipah Creek 1	19	FS 16i	75	27	121	744	32	347	20	NM	NM	NM	NM	67.2	32.5	Unknown Basalt A *
			+ 12	6	5	10	3	10	2	NM	NM	NM	NM			
North Illipah Creek 1	20	FS 16j	93	29	122	750	35	342	21	4503	502	1246	4.34	70.7	32.1	Unknown Basalt A
			± 12	5	5	10	3	10	2	98	28	32	0.11			
North Illipah Creek 1	21	FS 16k	86	21	115	728	39	333	18	NM	NM	NM	NM	67.3	33.4	Unknown Basalt A *
			± 12	6	5	10	3	10	2	NM	NM	NM	NM			
North Illipah Creek 1	22	FS 16l	79	26	119	728	35	338	21	NM	NM	NM	NM	70.2	31.7	Unknown Basalt A *
			± 12	6	5	10	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	23	FS 2	79	26	199	130	36	163	30	NM	NM	483	NM	25.8	71.5	Tempiute Mountain *
			± 11	5	5	9	3	10	2	NM	NM	32	NM			
North Illipah Creek 3	24	FS 4a	87	29	200	528	43	292	21	NM	NM	NM	NM	81.9	32.3	Smith Valley Basalt *
			± 12	6	5	10	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	25	FS 4b	91	12	94	776	35	304	26	NM	NM	NM	NM	74.2	31.2	Unknown Basalt 1 *
			± 13	7	5	10	3	11	2	NM	NM	NM	NM			
North Illipah Creek 3	26	FS 4c	64	21	170	90	22	147	24	NM	NM	NM	NM	30.2	52.0	Obsidian Butte, NV, Variety 3 (Obsidian Butte) *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	27	FS 4d	55	26	164	137	25	170	20	NM	NM	NM	NM	30.5	46.9	Obsidian Butte, NV, Variety 5 (Unknown C) *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	28	FS 4e	67	29	223	144	34	166	30	NM	NM	NM	NM	26.9	67.3	Tempiute Mountain *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	29	FS 4f	54	28	203	98	28	158	24	NM	NM	NM	NM	30.7	49.1	Obsidian Butte, NV, Variety 3/4 (Obsidian Butte)? *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Waldy Pond 9	30	FS 13	42	28	339	10	45	106	39	NM	NM	10	NM	15.2	28.7	Montezuma Range *
			± 10	5	5	10	3	10	2	NM	NM	31	NM			
Waldy Pond 9	31	FS 15a	54	35	339	10	43	116	40	411	661	16	0.81	10.7	65.3	Montezuma Range
			± 10	5	5	10	3	10	2	88	28	31	0.11			
Waldy Pond 9	32	FS 15b	77	35	242	26	70	374	44	NM	NM	NM	NM	51.5	53.6	Not Basalt
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of Obsidian and Basalt XRF Studies: Several Sites in Jakes Valley, White Pine County, Nevada

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe^{2}O^{3T}	Fe:Mn	Fe:Ti	Geochemical Source
Waldy Pond 9	33	FS 20	28	50	11	68	5	36	2	1745	1430	NM	1.18	0.7	23.3	Not Obsidian
			± 11	4	4	9	3	10	1	100	45	NM	0.11			
Waldy Pond 9	34	FS 21	55	25	176	25	26	130	34	NM	NM	NM	NM	11.5	25.1	Queen *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Waldy Pond 9	35	FS 22	41	27	226	57	65	448	45	NM	NM	NM	NM	85.6	41.0	Browns Bench *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			
Waldy Pond 9	36	FS 24	43	40	189	42	24	120	24	1060	527	140	0.59	10.1	19.9	Wild Horse Canyon
			± 11	5	5	9	3	10	2	89	28	32	0.11			
Illipah 2	37	FS 1	131	29	45	486	42	249	19	7290	1408	622	6.96	40.0	31.7	Unknown Basalt 2
			± 12	6	4	10	3	10	2	102	29	32	0.11			
Illipah 6	38	FS 2	98	22	84	613	43	315	24	7597	717	943	6.36	72.1	27.8	Unknown Basalt B
			± 12	6	5	10	3	10	2	103	28	32	0.11			
Illipah 8	39	FS 1	78	34	149	569	21	226	16	4484	2509	1335	5.28	17.1	39.1	Diamond Mountains Basalt
			± 12	6	5	10	3	10	2	99	31	33	0.11			
Illipah 8	40	FS 3	120	26	183	544	36	286	22	4974	737	1419	4.66	51.5	31.1	Smith Valley Basalt
			± 11	6	5	10	3	10	2	99	28	33	0.11			
Illipah 10	41	FS 1	89	24	143	552	21	224	17	4408	725	1359	5.25	59.0	39.5	Diamond Mountains Basalt
			± 12	6	5	10	3	10	2	98	28	33	0.11			
Illipah 10	42	FS 19	98	33	197	554	40	290	21	5500	484	1457	4.64	78.5	28.1	Smith Valley Basalt
			± 11	5	5	10	3	10	2	100	28	33	0.11			
Illipah 10	43	FS 28	96	16	123	717	35	331	19	4839	521	1295	4.68	73.5	32.1	Unknown Basalt A
			± 12	6	5	10	3	10	2	99	28	32	0.11			
Illipah 10	44	FS 29	93	43	197	539	42	295	17	6260	556	1451	5.07	74.4	26.9	Smith Valley Basalt
			± 12	5	5	10	3	10	2	101	28	33	0.11			
Illipah 11	45	FS 8	80	27	118	712	36	326	22	4355	634	1240	4.20	54.2	32.1	Unknown Basalt A
			± 12	6	5	10	3	10	2	98	28	33	0.11			
Isolated Artifact 7	46	Isolate 7	47	33	199	45	22	116	22	812	395	140	0.78	17.3	33.1	Wild Horse Canyon
			± 10	5	5	9	3	10	2	89	28	32	0.11			
NA	RGM-1	RGM-1	42	27	155	113	26	218	8	1639	389	776	1.86	40.1	38.1	RGM-1 Reference Standard
			± 11	5	5	9	3	10	2	92	28	32	0.11			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Sites in the Jakes Valley, Lake Tonopah, and Mud Lake Areas, Nevada

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe^2O^{3T}	Fe:Mn	Fe:Ti	Geochemical Source
Illipah Creek 1	1	FS 57	109	27	84	600	41	324	25	6993	1767	794	6.21	28.4	29.5	Unknown B FGV?
			± 13	7	5	10	3	10	2	103	30	32	0.11			
Illipah Creek 1	2	FS 58	92	25	169	667	34	245	19	6121	1560	1354	5.93	30.8	32.2	Unknown FGV
			± 13	6	5	10	3	10	2	102	30	33	0.11			
Illipah Creek 8	3	FS 5	34	21	193	82	28	120	21	753	280	464	0.92	28.8	41.7	Modena
			± 12	5	5	9	3	10	2	90	27	32	0.11			
Jakes Pond 3	4	FS 4	82	28	81	612	41	332	23	7347	728	885	5.86	65.4	26.5	Unknown B FGV
			± 12	6	5	10	3	10	2	103	28	32	0.11			
Jakes Pond 3	5	FS 9	99	25	178	717	33	242	20	6174	714	1341	5.65	64.4	30.4	Unknown FGV
			± 12	6	5	10	3	10	2	102	28	33	0.11			
Jakes Pond 3	6	FS 10	73	38	197	551	44	289	19	6141	846	1405	5.42	52.1	29.3	Smith Valley FGV
			± 12	6	5	10	3	10	2	102	29	33	0.11			
Jakes Pond 3	7	FS 13	40	25	204	81	30	122	16	783	415	434	0.88	18.6	38.5	Modena
			± 11	5	5	9	3	10	2	90	28	32	0.11			
Meghan 1	8	FS 8	83	30	204	539	41	306	22	4676	474	1417	4.21	72.7	29.9	Smith Valley FGV
			± 12	6	5	10	3	10	2	99	28	33	0.11			
Travis 1	9	FS 3	107	26	231	567	48	308	26	5053	575	1463	4.30	61.1	28.3	Smith Valley FGV
			± 11	6	5	10	3	10	2	99	28	33	0.11			
Travis 1	10	FS 6	83	28	123	770	37	350	22	5005	536	1259	4.34	66.2	28.8	Unknown A FGV
			± 12	5	5	10	3	10	2	99	28	33	0.11			
Travis 1	11	FS 7	92	16	84	773	37	301	25	7229	768	1508	6.74	71.2	30.9	Unknown FGV
			± 13	6	5	10	3	11	2	104	29	33	0.11			
Zandra 1	12	FS 11	97	17	142	533	22	208	13	2503	401	1372	3.53	72.5	46.7	Diamond Mountains FGV
			± 12	6	5	10	3	10	2	93	28	33	0.11			
Zandra 3	13	FS 1	110	16	85	613	39	324	29	6937	659	867	6.01	74.2	28.8	Unknown B FGV
			± 12	6	5	10	3	10	2	103	28	32	0.11			
Zandra 3	14	FS 2	95	37	106	692	37	322	20	2941	372	1340	2.99	66.6	34.0	Unknown A FGV
			± 12	6	5	10	3	11	2	94	28	33	0.11			
Zandra 3	15	FS 3	90	19	114	730	38	340	19	4384	548	1273	4.07	60.9	30.9	Unknown A FGV
			± 12	6	5	10	3	10	2	98	28	33	0.11			
Zandra 3	16	FS 6	87	27	130	736	33	358	20	4947	569	1203	4.53	65.1	30.5	Unknown A FGV
			± 11	5	5	10	3	10	2	99	28	33	0.11			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample; FGV = Fine-grained volcanic material.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Sites in the Jakes Valley, Lake Tonopah, and Mud Lake Areas, Nevada

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	$Fe^{2}O^{3T}$	Fe:Mn	Fe:Ti	Geochemical Source
Jakes Depression	24	FS 3	127	24	220	570	46	316	22	4469	617	1427	4.26	56.5	31.7	Smith Valley FGV
			± 11	5	5	10	3	10	2	98	28	33	0.11			
Jakes Depression	25	FS 147	97	29	220	555	44	315	24	4419	730	1537	3.87	43.4	29.2	Smith Valley FGV
			± 12	5	5	10	3	10	2	97	28	33	0.11			
Jakes Depression	26	FS 432	92	25	120	749	32	351	20	4769	513	1269	4.41	70.3	30.8	Unknown A FGV
			± 12	6	5	10	3	10	2	98	28	33	0.11			
Jakes Depression	27	FS 458	105	19	159	691	33	239	14	6617	721	1364	5.91	66.7	29.6	Unknown FGV
			± 12	6	5	10	3	10	2	101	28	33	0.11			
Jakes Depression	28	FS 459	95	17	87	611	42	335	28	7224	605	903	5.82	78.3	26.8	Unknown B FGV
			± 12	6	5	10	3	10	2	102	28	32	0.11			
Jakes Depression	29	FS 482	101	13	83	603	41	333	24	6720	602	908	5.53	74.8	27.3	Unknown B FGV
			± 12	6	5	10	3	10	2	101	28	32	0.11			
Jakes Depression	30	FS 499	131	23	103	650	30	307	20	6601	506	920	5.02	81.0	25.3	Unknown FGV
			± 11	5	4	10	3	10	2	100	28	33	0.11			
Jakes Depression	31	FS 516	90	28	167	608	24	252	22	4218	556	1425	4.92	72.1	38.7	Unknown FGV
			± 12	5	5	10	3	10	2	97	28	33	0.11			
Jakes Depression	32	FS 518	102	28	186	704	34	271	19	5758	597	1466	4.99	68.2	28.8	Unknown FGV
			± 11	6	5	10	3	10	2	100	28	33	0.11			
Jakes Depression	33	FS 549	85	40	203	517	40	296	20	6019	532	1436	5.24	80.4	28.9	Smith Valley FGV
			± 12	6	5	10	3	10	2	100	28	33	0.11			
Jakes Depression	39	FS 541	65	27	212	56	65	474	46	1753	203	1110	2.09	87.2	40.0	Browns Bench
			± 11	5	5	9	3	10	2	92	27	33	0.11			
Jakes Depression	40	FS 179	65	23	129	743	33	349	23	4433	459	1295	4.16	74.2	31.2	Unknown A FGV
			± 12	5	5	10	3	10	2	98	28	33	0.11			
Jakes Depression	41	FS 519	89	35	223	314	29	229	19	3224	549	1109	3.83	57.3	39.5	Unknown FGV
			± 11	5	5	10	3	10	2	95	28	32	0.11			
Jakes Depression	42	FS 150	119	34	176	625	25	260	17	3598	840	1434	4.23	41.2	39.1	Unknown FGV
			± 11	5	5	10	3	10	2	96	28	33	0.11			
Jakes Depression	43	FS 480	74	28	207	504	43	304	27	4236	588	1290	3.83	53.4	30.1	Smith Valley FGV
			± 13	7	5	10	3	10	2	98	28	33	0.11			
Jakes Depression	44	FS 525	88	43	218	566	42	310	25	5185	560	1301	4.65	67.9	29.8	Smith Valley FGV
			± 12	5	5	10	3	10	2	100	28	33	0.11			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample; FGV = Fine-grained volcanic material.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Sites in the Jakes Valley, Lake Tonopah, and Mud Lake Areas, Nevada

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe^{2}O^{3T}	Fe:Mn	Fe:Ti	Geochemical Source
Jakes Depression	45	FS 509	136	31	241	585	42	320	22	4115	480	1223	3.66	62.6	29.6	Smith Valley FGV
			± 11	5	5	10	3	10	2	98	28	33	0.11			
Jakes Depression	46	FS 474	70	41	226	331	29	239	23	2975	692	1045	3.49	41.3	39.0	Unknown FGV
			± 11	5	5	10	3	10	2	95	28	32	0.11			
Jakes Depression	47	FS 494	73	43	172	588	23	204	11	3101	518	1371	3.60	57.1	38.7	Diamond Mountains FGV?
			± 12	5	5	10	3	10	2	96	28	33	0.11			
Jakes Depression	48	FS 256	83	26	215	554	42	309	23	5354	737	1369	4.92	54.4	30.5	Smith Valley FGV
			± 12	6	5	10	3	10	2	101	28	33	0.11			
Jakes Depression	49	FS 134	67	27	181	513	40	295	22	5490	892	1442	5.07	46.2	30.7	Smith Valley FGV
			± 14	6	5	10	3	10	2	101	29	33	0.11			
Jakes Depression	50	FS 175	92	37	207	343	29	281	19	3534	578	1205	4.29	60.7	40.3	Unknown FGV
			± 12	6	5	10	3	10	2	97	28	32	0.11			
Jakes Depression	51	FS 190	85	21	128	763	36	349	22	4262	628	1222	4.10	53.3	32.0	Unknown A FGV
			± 11	5	5	10	3	10	2	98	28	33	0.11			
Jakes Depression	52	FS 8	93	25	126	759	34	349	20	4507	535	1184	4.21	64.4	31.1	Unknown A FGV
			± 11	5	5	10	3	10	2	98	28	33	0.11			
Jakes Depression	53	FS 16	67	24	112	727	33	335	26	4472	566	1193	4.42	63.9	32.9	Unknown A FGV
			± 12	6	5	10	3	10	2	98	28	32	0.11			
Jakes Depression	54	FS 29	129	45	173	690	38	251	21	4760	1168	1399	5.03	35.0	35.1	Unknown FGV
			± 12	6	5	10	3	10	2	99	29	33	0.11			
Jakes Depression	55	FS 30	116	15	113	764	37	339	20	4540	699	1182	4.63	54.0	33.9	Unknown A FGV
			± 12	6	5	10	3	11	2	99	28	33	0.11			
Jakes Depression	56	FS 41	119	21	129	797	36	346	21	3377	528	1274	3.30	51.4	32.6	Unknown A FGV
			± 11	5	5	10	3	10	2	96	28	33	0.11			
Jakes Depression	57	FS 42	106	35	118	753	39	340	23	4250	597	1265	4.20	57.5	32.8	Unknown A FGV
			± 11	5	5	10	3	10	2	98	28	33	0.11			
Jakes Depression	58	FS 57	81	30	109	710	32	316	20	2726	390	1223	3.20	67.8	39.1	Unknown A FGV
			± 12	6	5	10	3	10	2	94	28	33	0.11			
Jakes Depression	59	FS 84	74	28	159	607	25	188	9	3008	613	1605	3.73	49.8	41.2	Unknown FGV
			± 12	6	5	10	3	10	2	95	28	33	0.11			
Jakes Depression	60	FS 87	84	25	200	533	39	291	21	4034	667	1392	4.15	50.8	34.2	Smith Valley FGV
			± 12	6	5	10	3	10	2	97	28	33	0.11			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample; FGV = Fine-grained volcanic material.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Sites in White Pine County, Nevada

			Trace Element Concentrations											Ratios		
Site	Specimen No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe^2O^{3T}	Fe:Mn	Fe:Ti	Geochemical Source
North Illipah Creek 1	1	16dd	73	25	201	48	68	410	50	NM	NM	NM	NM	66.4	46.2	Browns Bench *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 1	2	16ee	42	30	197	60	29	130	24	NM	NM	NM	NM	26.4	54.4	Obsidian Butte, Variety 2 (Airfield Canyon) *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 1	3	16ff	46	30	165	132	21	171	21	NM	NM	NM	NM	29.8	42.2	Obsidian Butte, Variety 5 (Unknown C) *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	4	4.1	32	21	170	131	19	171	21	NM	NM	NM	NM	31.4	47.8	Obsidian Butte, Variety 5 (Unknown C) *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	5	4.2	45	20	161	114	24	163	18	NM	NM	482	NM	28.4	42.3	Obsidian Butte, Variety 4 (Obsidian Butte) *
			± 10	5	5	9	3	10	2	NM	NM	33	NM			
North Illipah Creek 3	6	4.3	35	31	175	143	21	170	19	NM	NM	NM	NM	28.1	39.3	Obsidian Butte, Variety 5 (Unknown C) *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	7	4.4	20	22	160	128	19	161	20	NM	NM	NM	NM	28.3	42.7	Obsidian Butte, Variety 5 (Unknown C) *
			± 13	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	8	4.5	34	27	161	132	23	167	19	NM	NM	NM	NM	29.3	42.9	Obsidian Butte, Variety 5 (Unknown C) *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	9	4.6	60	35	169	134	21	163	18	NM	NM	NM	NM	28.4	44.7	Obsidian Butte, Variety 5 (Unknown C) *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
North Illipah Creek 3	10	3	44	24	179	94	28	150	21	NM	NM	NM	NM	28.0	45.6	Obsidian Butte, Variety 3 (Obsidian Butte) *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	11	1	32	27	199	79	29	122	19	850	258	429	0.84	28.6	33.9	Modena
			± 11	5	5	9	3	10	2	90	27	32	0.11			
Doug 3	12	14	62	33	218	139	38	172	31	568	404	558	1.16	24.6	67.5	Obsidian Butte, Variety 5 (Unknown C) *
			± 10	4	5	9	3	10	2	89	28	32	0.11			
Doug 3	13	18	49	30	210	92	29	122	18	NM	NM	NM	NM	29.7	42.0	Modena *
			± 10	4	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	14	20	28	25	187	74	28	114	17	NM	NM	NM	NM	31.7	40.5	Modena *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	15	24.1	44	22	212	82	32	124	17	708	275	454	0.85	27.1	40.8	Modena
			± 10	5	5	9	3	10	2	89	27	32	0.11			
Doug 3	16	24.2	50	39	204	81	32	125	18	NM	NM	NM	NM	29.3	40.7	Modena *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Sites in White Pine County, Nevada

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	$Fe^2 O^{3T}$	Fe:Mn	Fe:Ti	Geochemical Source
Doug 3	17	24.3	41	27	206	84	32	129	23	NM	NM	NM	NM	29.5	42.7	Modena *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	18	24.4	72	33	213	132	34	168	32	NM	NM	NM	NM	26.0	68.1	Tempiute Mountain *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	19	24.5	26	36	205	83	32	128	21	NM	NM	NM	NM	28.5	44.0	Modena *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	20	24.6	36	32	215	86	32	122	20	NM	NM	NM	NM	27.9	38.6	Modena *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	21	24.7	37	34	205	46	19	118	25	NM	NM	NM	NM	21.0	34.3	Wild Horse Canyon *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	22	24.8	30	33	208	82	30	125	22	NM	NM	NM	NM	29.9	41.9	Modena *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	23	24.9	79	34	219	141	39	172	29	NM	NM	NM	NM	23.6	78.2	Obsidian Butte, Variety 5 (Unknown C) *
			± 10	4	5	9	3	10	2	NM	NM	NM	NM			
Doug 3	24	24.10	34	32	197	77	29	123	21	NM	NM	430	NM	30.9	42.5	Modena *
			± 11	5	5	9	3	10	2	NM	NM	32	NM			
Illipah Creek 1	25	44	45	31	206	84	29	118	20	NM	NM	NM	NM	28.5	34.5	Modena *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Pond 3	26	15.1	48	21	188	123	31	158	27	NM	NM	NM	NM	24.7	56.7	Tempiute Mountain *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Pond 3	27	15.2	68	24	204	84	29	124	19	NM	NM	NM	NM	29.3	39.4	Modena *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Pond 3	28	15.3	30	34	221	87	31	126	18	NM	NM	NM	NM	29.1	44.8	Modena *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Pond 3	29	7	70	28	199	124	32	159	28	NM	NM	NM	NM	23.7	49.6	Tempiute Mountain *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Liz 1	30	8.1	15	17	178	59	27	126	23	656	381	249	0.94	21.5	48.5	Obsidian Butte, Variety 2 (Airfield Canyon)
			± 16	5	5	9	3	10	2	89	28	32	0.11			
Liz 1	31	8.2	43	25	185	66	31	131	20	822	278	260	0.84	26.6	35.1	Obsidian Butte, Variety 2 (Airfield Canyon)
			± 10	5	5	9	3	10	2	89	27	32	0.11			
Liz 1	32	8.3	30	20	162	59	28	118	22	NM	NM	NM	NM	19.4	37.8	Obsidian Butte, Variety 2 (Airfield Canyon) *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Sites in White Pine County, Nevada

Site	Specimen No.	Catalog No.	Trace Element Concentrations Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe^{2}O^{3T}	Ratios Fe:Mn	Fe:Ti	Geochemical Source
Liz 1	33	8.6	52	27	179	59	30	129	27	NM	NM	NM	NM	25.3	49.1	Obsidian Butte, Variety 2
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			(Airfield Canyon) *
Liz 1	34	8.7	46	24	200	46	64	406	49	NM	NM	NM	NM	69.0	38.3	Browns Bench *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Liz 1	35	8.9	55	47	472	13	52	142	64	928	406	0	1.03	21.9	37.8	Topaz Mountain
			± 10	5	5	9	3	10	2	89	28	31	0.11			
Liz 1	36	8.10	43	28	202	81	27	114	18	NM	NM	NM	NM	30.5	34.5	Modena *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Liz 1	37	8.11	28	30	193	97	29	150	23	NM	NM	NM	NM	29.2	50.1	Obsidian Butte, Variety 3
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			(Obsidian Butte) *
Liz 1	38	8.12	40	26	171	90	27	148	22	NM	NM	NM	NM	30.7	39.5	Obsidian Butte, Variety 3
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			(Obsidian Butte) *
Liz 1	39	8.13	49	32	221	86	31	121	18	NM	NM	NM	NM	31.8	40.6	Modena *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Liz 1	40	8.14	44	32	203	65	31	132	24	NM	NM	NM	NM	26.4	43.2	Obsidian Butte, Variety 2
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			(Airfield Canyon) *
Liz 1	41	8.19	39	31	184	63	28	128	23	592	296	248	0.93	27.5	53.0	Obsidian Butte, Variety 2
			± 11	5	5	9	3	10	2	89	27	32	0.11			(Airfield Canyon)
Liz 1	42	8.22	37	23	179	64	28	127	22	640	325	280	0.99	26.4	51.8	Obsidian Butte, Variety 2
			± 10	5	5	9	3	10	2	89	28	32	0.11			(Airfield Canyon)
Liz 1	43	8.23	55	23	222	53	64	458	45	NM	NM	NM	NM	73.1	34.7	Browns Bench *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Liz 1	44	8.24	79	30	236	59	66	536	44	NM	NM	NM	NM	81.3	37.6	Browns Bench? *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Liz 1	45	8.26	35	23	174	88	25	147	24	821	315	389	1.09	30.0	45.0	Obsidian Butte, Variety 3
			± 11	5	5	9	3	10	2	90	28	32	0.11			(Obsidian Butte) *
Liz 1	46	8.27	37	26	157	85	25	141	24	684	284	414	0.92	28.4	45.7	Obsidian Butte, Variety 3
			± 12	5	5	9	3	10	2	89	27	32	0.11			(Obsidian Butte)
Liz 1	47	8.29	32	34	177	89	26	146	21	NM	NM	NM	NM	29.2	46.9	Obsidian Butte, Variety 3
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			(Obsidian Butte) *
Liz 1	48	8.34	44	26	174	61	28	123	25	NM	NM	NM	NM	29.1	46.1	Obsidian Butte, Variety 2
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			(Airfield Canyon) *

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Sites in White Pine County, Nevada

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	$Fe^{2}O^{3T}$	Fe:Mn	Fe:Ti	Geochemical Source
Liz 1	49	15	39	35	151	126	21	162	19	965	484	703	1.03	18.3	36.4	Obsidian Butte, Variety 5 (Unknown C)
			± 11	5	4	9	3	10	2	90	28	32	0.11			
Megan 1	50	5	40	37	277	64	19	82	23	NM	NM	NM	NM	14.6	29.5	Unknown 1 *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	51	272	66	31	223	54	66	436	40	NM	NM	NM	NM	91.9	38.6	Browns Bench *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	52	277	66	34	224	47	63	419	44	NM	NM	NM	NM	79.6	37.9	Browns Bench *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	53	278	67	31	193	46	23	111	22	NM	NM	NM	NM	18.1	14.1	Wild Horse Canyon *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	54	280.1	42	28	230	57	67	459	49	NM	NM	NM	NM	85.2	40.7	Browns Bench *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	55	281	27	33	214	45	22	114	25	NM	NM	NM	NM	22.0	32.3	Wild Horse Canyon *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	56	282.1	27	31	202	83	31	116	20	NM	NM	NM	NM	30.1	40.9	Modena *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	57	282.2	27	25	191	44	23	114	23	NM	NM	NM	NM	20.6	20.3	Wild Horse Canyon *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	59	292	24	37	213	86	30	125	20	NM	NM	NM	NM	31.3	34.9	Modena *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	60	313	39	29	207	83	27	118	20	NM	NM	NM	NM	32.4	40.6	Modena *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	61	316	72	32	216	54	65	419	42	NM	NM	NM	NM	77.6	31.9	Browns Bench *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	62	327	35	33	209	84	29	126	20	NM	NM	NM	NM	27.2	40.1	Modena *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	63	328.1	38	27	212	84	31	120	20	NM	NM	NM	NM	31.1	40.2	Modena *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	64	328.2	28	30	211	80	30	131	18	NM	NM	NM	NM	28.3	31.0	Modena *
			± 12	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	65	340	71	24	215	57	62	445	42	NM	NM	NM	NM	98.9	39.4	Browns Bench *
			± 11	5	5	9	3	10	2	NM	NM	NM	NM			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix A: X-Ray Fluorescence Data

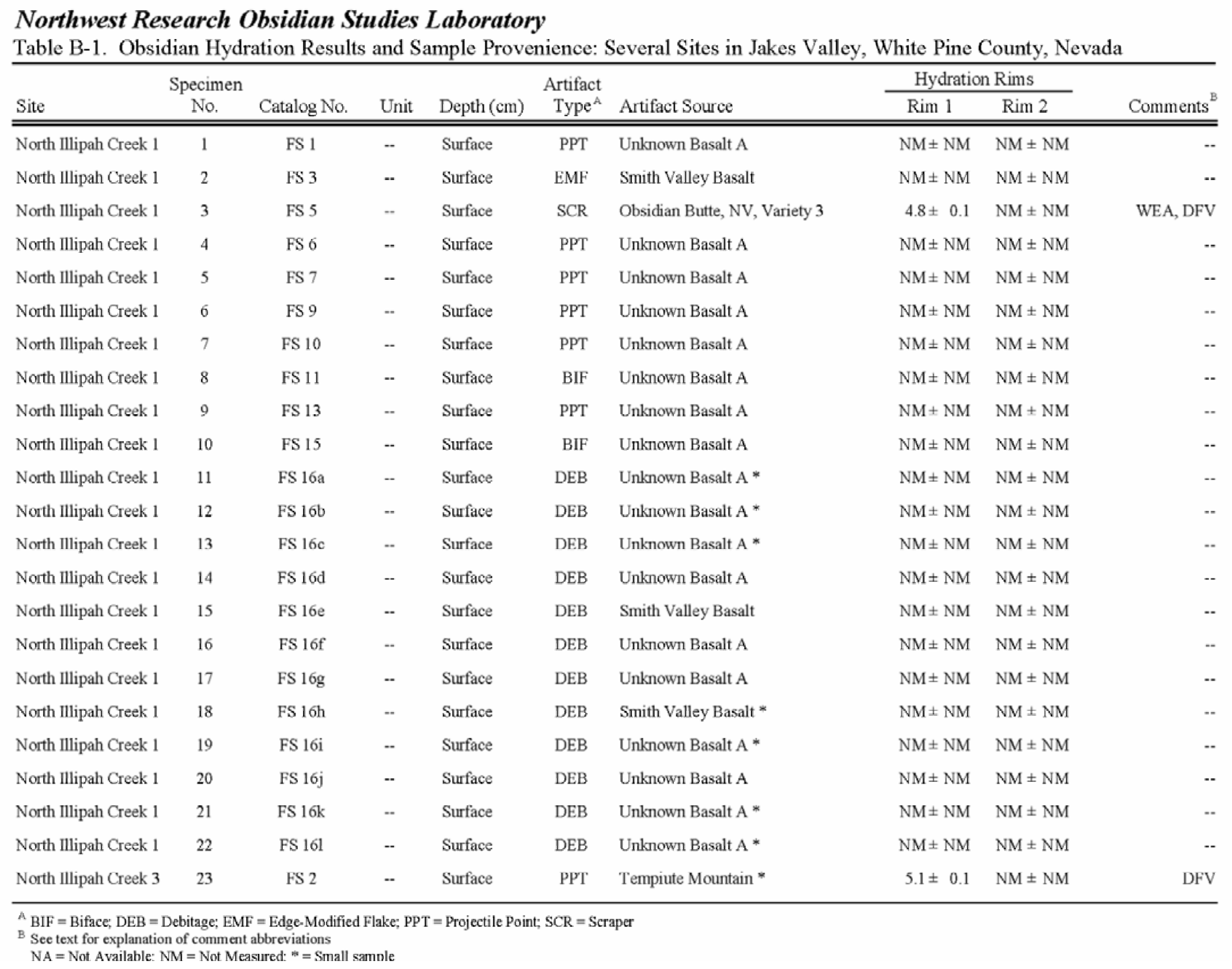
Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: Several Sites in White Pine County, Nevada

	Specimen		Trace Element Concentrations											Ratios		
Site	No.	Catalog No.	Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe^2O^{3T}	Fe:Mn	Fe:Ti	Geochemical Source
Jakes Depression	66	384	83	33	212	54	66	460	44	NM	NM	NM	NM	83.6	39.5	Browns Bench *
			± 10	5	5	9	3	10	2	NM	NM	NM	NM			
Jakes Depression	67	170	85	35	179	72	72	557	51	2188	499	1116	2.88	47.7	43.8	Butte Valley Group A
			± 10	5	5	9	3	10	2	94	28	32	0.11			
Jakes Depression	68	475	72	35	235	25	62	344	40	1076	203	477	1.52	64.1	47.3	Browns Bench Area
			± 10	5	5	9	3	10	2	90	27	32	0.11			
NA	RGM-1	RGM-1	36	26	153	105	24	220	10	1671	380	799	1.86	41.1	37.3	RGM-1 Reference Standard
			± 10	5	5	9	3	10	2	92	28	32	0.11			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.
NA = Not available; ND = Not detected; NM = Not measured.; * = Small sample.

Appendix B: Obsidian Hydration Measurements



Northwest Research Obsidian Studies Laboratory

Table B-1. Obsidian Hydration Results and Sample Provenience: Several Sites in Jakes Valley, White Pine County, Nevada

Site	Specimen No.	Catalog No.	Unit	Depth (cm)	Artifact Type^A	Artifact Source	Hydration Rims		Comments^B
							Rim 1	Rim 2	
North Illipah Creek 1	1	FS 1	--	Surface	PPT	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	2	FS 3	--	Surface	EMF	Smith Valley Basalt	NM ± NM	NM ± NM	--
North Illipah Creek 1	3	FS 5	--	Surface	SCR	Obsidian Butte, NV, Variety 3	4.8 ± 0.1	NM ± NM	WEA, DFV
North Illipah Creek 1	4	FS 6	--	Surface	PPT	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	5	FS 7	--	Surface	PPT	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	6	FS 9	--	Surface	PPT	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	7	FS 10	--	Surface	PPT	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	8	FS 11	--	Surface	BIF	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	9	FS 13	--	Surface	PPT	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	10	FS 15	--	Surface	BIF	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	11	FS 16a	--	Surface	DEB	Unknown Basalt A *	NM ± NM	NM ± NM	--
North Illipah Creek 1	12	FS 16b	--	Surface	DEB	Unknown Basalt A *	NM ± NM	NM ± NM	--
North Illipah Creek 1	13	FS 16c	--	Surface	DEB	Unknown Basalt A *	NM ± NM	NM ± NM	--
North Illipah Creek 1	14	FS 16d	--	Surface	DEB	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	15	FS 16e	--	Surface	DEB	Smith Valley Basalt	NM ± NM	NM ± NM	--
North Illipah Creek 1	16	FS 16f	--	Surface	DEB	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	17	FS 16g	--	Surface	DEB	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	18	FS 16h	--	Surface	DEB	Smith Valley Basalt *	NM ± NM	NM ± NM	--
North Illipah Creek 1	19	FS 16i	--	Surface	DEB	Unknown Basalt A *	NM ± NM	NM ± NM	--
North Illipah Creek 1	20	FS 16j	--	Surface	DEB	Unknown Basalt A	NM ± NM	NM ± NM	--
North Illipah Creek 1	21	FS 16k	--	Surface	DEB	Unknown Basalt A *	NM ± NM	NM ± NM	--
North Illipah Creek 1	22	FS 16l	--	Surface	DEB	Unknown Basalt A *	NM ± NM	NM ± NM	--
North Illipah Creek 3	23	FS 2	--	Surface	PPT	Tempiute Mountain *	5.1 ± 0.1	NM ± NM	DFV

[A] BIF = Biface; DEB = Debitage; EMF = Edge-Modified Flake; PPT = Projectile Point; SCR = Scraper

[B] See text for explanation of comment abbreviations

NA = Not Available; NM = Not Measured; * = Small sample

Appendix B: Obsidian Hydration Measurements

Northwest Research Obsidian Studies Laboratory

Table B-1. Obsidian Hydration Results and Sample Provenience: Several Sites in Jakes Valley, White Pine County, Nevada

Site	Specimen No.	Catalog No.	Unit	Depth (cm)	Artifact Type[A]	Artifact Source	Hydration Rims Rim 1	Hydration Rims Rim 2	Comments[B]
North Illipah Creek 3	24	FS 4a	--	Surface	DEB	Smith Valley Basalt *	NM ± NM	NM ± NM	--
North Illipah Creek 3	25	FS 4b	--	Surface	DEB	Unknown Basalt 1 *	NM ± NM	NM ± NM	--
North Illipah Creek 3	26	FS 4c	--	Surface	DEB	Obsidian Butte, NV, Variety 3 *	6.9 ± 0.1	NM ± NM	DFV
North Illipah Creek 3	27	FS 4d	--	Surface	DEB	Obsidian Butte, NV, Variety 5 *	6.6 ± 0.1	NM ± NM	--
North Illipah Creek 3	28	FS 4e	--	Surface	DEB	Tempiute Mountain *	8.3 ± 0.1	NM ± NM	--
North Illipah Creek 3	29	FS 4f	--	Surface	DEB	Obsidian Butte, NV, Variety 3/4? *	11.9 ± 0.1	NM ± NM	REC; WEA, DFV
Waldy Pond 9	30	FS 13	--	Surface	DEB	Montezuma Range *	7.5 ± 0.1	NM ± NM	REC; WEA, DFV
Waldy Pond 9	31	FS 15a	--	Surface	DEB	Montezuma Range	4.4 ± 0.1	NM ± NM	--
Waldy Pond 9	32	FS 15b	--	Surface	DEB	Not Basalt	NM ± NM	NM ± NM	--
Waldy Pond 9	33	FS 20	--	Surface	DEB	Not Obsidian	NM ± NM	NM ± NM	--
Waldy Pond 9	34	FS 21	--	Surface	DEB	Queen *	5.3 ± 0.1	NM ± NM	--
Waldy Pond 9	35	FS 22	--	Surface	DEB	Browns Bench *	12.6 ± 0.1	NM ± NM	--
Waldy Pond 9	36	FS 24	--	Surface	BIF	Wild Horse Canyon	8.5 ± 0.1	NM ± NM	--
Illipah 2	37	FS 1	--	Surface	BIF	Unknown Basalt 2	NM ± NM	NM ± NM	--
Illipah 6	38	FS 2	--	Surface	PPT	Unknown Basalt B	NM ± NM	NM ± NM	--
Illipah 8	39	FS 1	--	Surface	BIF	Diamond Mountains Basalt	NM ± NM	NM ± NM	--
Illipah 8	40	FS 3	--	Surface	PPT	Smith Valley Basalt	NM ± NM	NM ± NM	--
Illipah 10	41	FS 1	--	Surface	PPT	Diamond Mountains Basalt	NM ± NM	NM ± NM	--
Illipah 10	42	FS 19	--	Surface	PPT	Smith Valley Basalt	NM ± NM	NM ± NM	--
Illipah 10	43	FS 28	--	Surface	PPT	Unknown Basalt A	NM ± NM	NM ± NM	--
Illipah 10	44	FS 29	--	Surface	PPT	Smith Valley Basalt	NM ± NM	NM ± NM	--
Illipah 11	45	FS 8	--	Surface	PPT	Unknown Basalt A	NM ± NM	NM ± NM	--
Isolated Artifact 7	46	Isolate 7	--	Surface	PPT	Wild Horse Canyon	8.7 ± 0.1	NM ± NM	DFV

[A] BIF = Biface; DEB = Debitage; EMF = Edge-Modified Flake; PPT = Projectile Point; SCR = Scraper
[B] See text for explanation of comment abbreviations
NA = Not Available; NM = Not Measured; * = Small sample

Appendix B: Obsidian Hydration Measurements

Northwest Research Obsidian Studies Laboratory

Table B-1. Obsidian Hydration Results and Sample Provenience: Sites in the Jakes Valley, Lake Tonopah, and Mud Lake Areas

Site	Specimen No.	Catalog No.	Unit	Depth	Artifact Type[A]	Artifact Source	Hydration Rims Rim 1	Hydration Rims Rim 2	Comments[B]
Illipah Creek 1	1	FS 57	--	--	PPT	Unknown B FGV?	NM ± NM	NM ± NM	--
Illipah Creek 1	2	FS 58	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Illipah Creek 8	3	FS 5	--	--	PPT	Modena	6.1 ± 0.1	NM ± NM	--
Jakes Pond 3	4	FS 4	--	--	PPT	Unknown B FGV	NM ± NM	NM ± NM	--
Jakes Pond 3	5	FS 9	--	--	BIF	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Pond 3	6	FS 10	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--
Jakes Pond 3	7	FS 13	--	--	COR	Modena	8.1 ± 0.1	NM ± NM	--
Meghan 1	8	FS 8	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--
Travis 1	9	FS 3	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--
Travis 1	10	FS 6	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Travis 1	11	FS 7	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Zandra 1	12	FS 11	--	--	PPT	Diamond Mountains FGV	NM ± NM	NM ± NM	--
Zandra 3	13	FS 1	--	--	PPT	Unknown B FGV	NM ± NM	NM ± NM	--
Zandra 3	14	FS 2	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Zandra 3	15	FS 3	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Zandra 3	16	FS 6	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	17	FS 142	--	--	PPT	Browns Bench (NWR)	NA ± NA	NM ± NM	UNR
Jakes Depression	18	FS 2	--	--	PPT	Browns Bench (NWR)	NA ± NA	NM ± NM	UNR
Jakes Depression	19	FS 5	--	--	PPT	Browns Bench (NWR)	NA ± NA	NM ± NM	UNR
Jakes Depression	20	FS 13	--	--	PPT	Browns Bench (NWR)	NA ± NA	NM ± NM	UNR
Jakes Depression	21	FS 35	--	--	PPT	Browns Bench (NWR)	NA ± NA	NM ± NM	UNR
Jakes Depression	22	FS 148	--	--	PPT	Modena (NWR)	5.5 ± 0.1	NM ± NM	--
Jakes Depression	23	FS 232	--	--	PPT	Modena (NWR)	7.1 ± 0.1	NM ± NM	--
Jakes Depression	24	FS 3	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--

[A] BIF = Biface; COR = Core; DEB = Debitage; PPT = Projectile Point

[B] See text for explanation of comment abbreviations

NA = Not Available; NM = Not Measured; * = Small sample; FGV = Fine-grained volcanic material; (NWR) = Source previously determined by Northwest Research Obsidian Studies Laboratory

Appendix B: Obsidian Hydration Measurements

Northwest Research Obsidian Studies Laboratory

Table B-1. Obsidian Hydration Results and Sample Provenience: Sites in the Jakes Valley, Lake Tonopah, and Mud Lake Areas

Site	Specimen No.	Catalog No.	Unit	Depth	Artifact Type^A	Artifact Source	Hydration Rims Rim 1	Hydration Rims Rim 2	Comments^B
Jakes Depression	25	FS 147	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--
Jakes Depression	26	FS 432	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	27	FS 458	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	28	FS 459	--	--	PPT	Unknown B FGV	NM ± NM	NM ± NM	--
Jakes Depression	29	FS 482	--	--	PPT	Unknown B FGV	NM ± NM	NM ± NM	--
Jakes Depression	30	FS 499	--	--	BIF	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	31	FS 516	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	32	FS 518	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	33	FS 549	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--
Jakes Depression	34	FS 529	--	--	BIF	Obsidian Butte, Variety 4 (Unknown C)	6.1 ± 0.1	NM ± NM	WEA, DFV
Jakes Depression	35	FS 506	--	--	BIF	Browns Bench Area (NWR)	NA ± NA	NM ± NM	UNR
Jakes Depression	36	FS 107	--	--	PPT	Browns Bench Area (NWR)	NA ± NA	NM ± NM	UNR
Jakes Depression	37	FS 17	--	--	PPT	Browns Bench (NWR)	NA ± NA	NM ± NM	UNR
Jakes Depression	38	FS 498	--	--	BIF	Modena (NWR)	6.0 ± 0.1	NM ± NM	WEA, DFV
Jakes Depression	39	FS 541	--	--	PPT	Browns Bench	NA ± NA	NM ± NM	UNR
Jakes Depression	40	FS 179	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	41	FS 519	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	42	FS 150	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	43	FS 480	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--
Jakes Depression	44	FS 525	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--
Jakes Depression	45	FS 509	--	--	COR	Smith Valley FGV	NM ± NM	NM ± NM	--
Jakes Depression	46	FS 474	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	47	FS 494	--	--	PPT	Diamond Mountains FGV?	NM ± NM	NM ± NM	--
Jakes Depression	48	FS 256	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--

[A] BIF = Biface; COR = Core; DEB = Debitage; PPT = Projectile Point

[B] See text for explanation of comment abbreviations

NA = Not Available; NM = Not Measured; * = Small sample; FGV = Fine-grained volcanic material; (NWR) = Source previously determined by Northwest Research Obsidian Studies Laboratory

Appendix B: Obsidian Hydration Measurements

Northwest Research Obsidian Studies Laboratory

Table B-1. Obsidian Hydration Results and Sample Provenience: Sites in the Jakes Valley, Lake Tonopah, and Mud Lake Areas

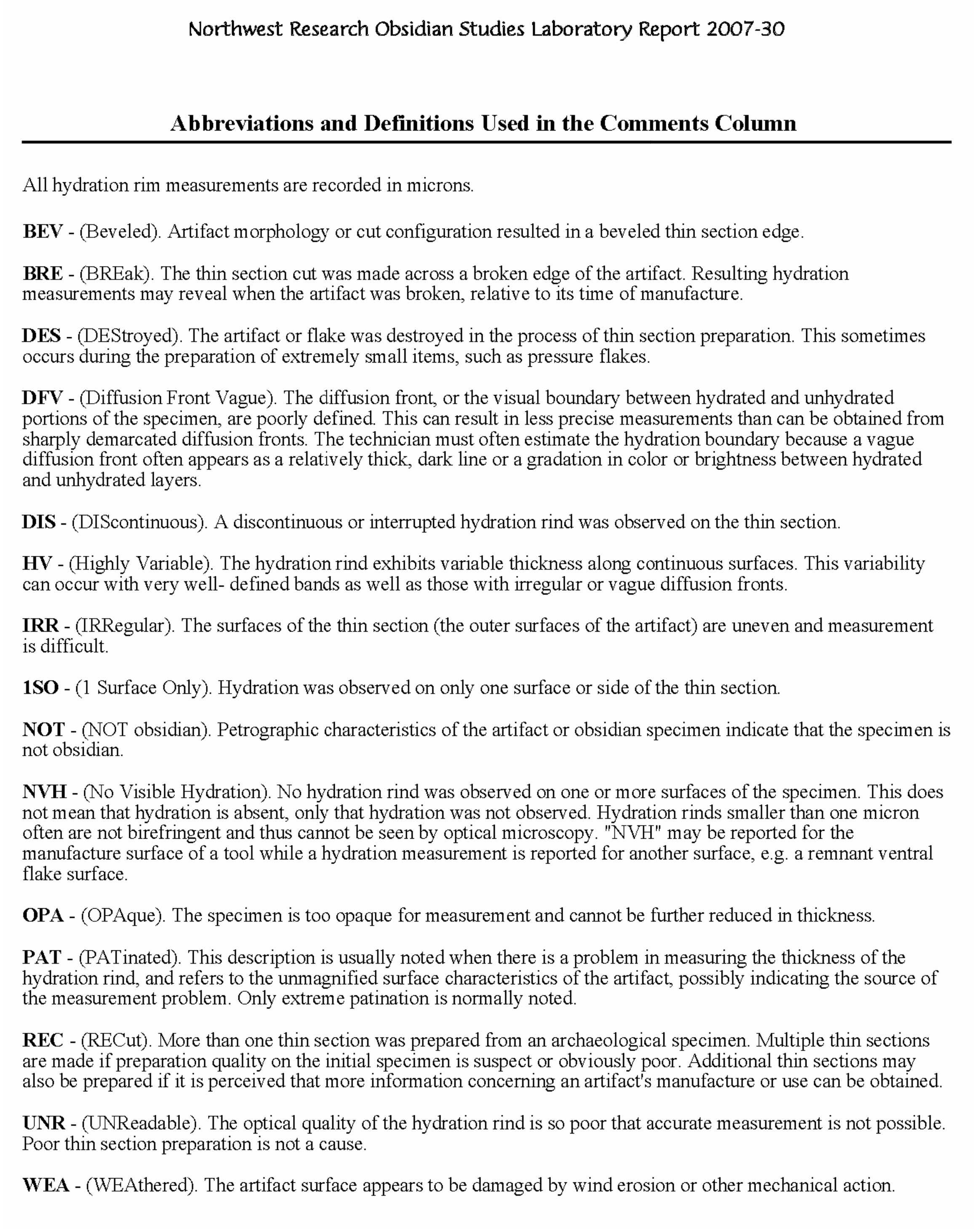
Site	Specimen No.	Catalog No.	Unit	Depth	Artifact Type[A]	Artifact Source	Hydration Rims Rim 1	Hydration Rims Rim 2	Comments[B]
Jakes Depression	49	FS 134	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--
Jakes Depression	50	FS 175	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	51	FS 190	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	52	FS 8	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	53	FS 16	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	54	FS 29	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	55	FS 30	--	--	BIF	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	56	FS 41	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	57	FS 42	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	58	FS 57	--	--	PPT	Unknown A FGV	NM ± NM	NM ± NM	--
Jakes Depression	59	FS 84	--	--	PPT	Unknown FGV	NM ± NM	NM ± NM	--
Jakes Depression	60	FS 87	--	--	PPT	Smith Valley FGV	NM ± NM	NM ± NM	--

[A] BIF = Biface; COR = Core; DEB = Debitage; PPT = Projectile Point

[B] See text for explanation of comment abbreviations

NA = Not Available; NM = Not Measured; * = Small sample; FGV = Fine-grained volcanic material; (NWR) = Source previously determined by Northwest Research Obsidian Studies Laboratory

Appendix B: Obsidian Hydration Measurements



Northwest Research Obsidian Studies Laboratory Report 2007-30

Abbreviations and Definitions Used in the Comments Column

All hydration rim measurements are recorded in microns.

BEV - (Beveled). Artifact morphology or cut configuration resulted in a beveled thin section edge.

BRE - (BREak). The thin section cut was made across a broken edge of the artifact. Resulting hydration measurements may reveal when the artifact was broken, relative to its time of manufacture.

DES - (DEStroyed). The artifact or flake was destroyed in the process of thin section preparation. This sometimes occurs during the preparation of extremely small items, such as pressure flakes.

DFV - (Diffusion Front Vague). The diffusion front, or the visual boundary between hydrated and unhydrated portions of the specimen, are poorly defined. This can result in less precise measurements than can be obtained from sharply demarcated diffusion fronts. The technician must often estimate the hydration boundary because a vague diffusion front often appears as a relatively thick, dark line or a gradation in color or brightness between hydrated and unhydrated layers.

DIS - (DIScontinuous). A discontinuous or interrupted hydration rind was observed on the thin section.

HV - (Highly Variable). The hydration rind exhibits variable thickness along continuous surfaces. This variability can occur with very well- defined bands as well as those with irregular or vague diffusion fronts.

IRR - (IRRegular). The surfaces of the thin section (the outer surfaces of the artifact) are uneven and measurement is difficult.

1SO - (1 Surface Only). Hydration was observed on only one surface or side of the thin section.

NOT - (NOT obsidian). Petrographic characteristics of the artifact or obsidian specimen indicate that the specimen is not obsidian.

NVH - (No Visible Hydration). No hydration rind was observed on one or more surfaces of the specimen. This does not mean that hydration is absent, only that hydration was not observed. Hydration rinds smaller than one micron often are not birefringent and thus cannot be seen by optical microscopy. "NVH" may be reported for the manufacture surface of a tool while a hydration measurement is reported for another surface, e.g. a remnant ventral flake surface.

OPA - (OPAque). The specimen is too opaque for measurement and cannot be further reduced in thickness.

PAT - (PATinated). This description is usually noted when there is a problem in measuring the thickness of the hydration rind, and refers to the unmagnified surface characteristics of the artifact, possibly indicating the source of the measurement problem. Only extreme patination is normally noted.

REC - (RECut). More than one thin section was prepared from an archaeological specimen. Multiple thin sections are made if preparation quality on the initial specimen is suspect or obviously poor. Additional thin sections may also be prepared if it is perceived that more information concerning an artifact's manufacture or use can be obtained.

UNR - (UNReadable). The optical quality of the hydration rind is so poor that accurate measurement is not possible. Poor thin section preparation is not a cause.

WEA - (WEAthered). The artifact surface appears to be damaged by wind erosion or other mechanical action.

Appendix B: Obsidian Hydration Measurements

Archaeometrics

Site #	Cat #	Locus	Descrip.	um 1	um 2	um 3	um 4	um 5	um 6	um 7	um 8	um 9	um 10	Mean	St.Dev	Quality	Hyd Com	Hyd Com2	XRF
Jakes Depression	384	Stemmed Conc.	flake	10.71	10.59	10.62	10.60	10.66	10.66	10.68	10.65	10.65	10.63	10.64	0.04	W++	v;d	s	Browns Bench
Jakes Depression	340	Stemmed Conc.	flake	12.03	11.91	12.01	12.03	12.01	11.99	12.07				12.01	0.05		v	sf	Browns Bench
Jakes Depression	35†		Unknown stemmed	13.06	13.04	13.02	13.18							13.08	0.07	RC		sf	Browns Bench
Jakes Depression	17†		Unknown stemmed	14.63	14.57	14.60	14.56							14.59	0.03	RC	RB surface 5.8	sfx2	Browns Bench
Jakes Depression	142†		Unknown stemmed	13.67	13.67	13.80	13.72	13.69	13.74	13.80				13.73	0.06	RC		sf	Browns Bench
Jakes Depression	2†		Unknown stemmed	14.03	14.13	14.04	14.07	14.05	14.07	14.04				14.06	0.03	DFV		sf	Browns Bench
Jakes Depression	5†		Unknown stemmed	15.25	15.19	15.21	15.20	15.34	15.31	15.25	15.38	15.29	15.29	15.27	0.06	RC;DFV	S1/S2	sfx5	Browns Bench
Jakes Depression	506		Unknown stemmed	14.16	14.17	14.15	14.13	14.16						14.16	0.02	RC;DFV		sfx3	Browns Bench
Jakes Depression	318	Clovis Conc.	flake	13.61	13.63	13.60	13.58	13.68						13.62	0.04	RC	RB?	sf	Browns Bench
Jakes Depression	316	Clovis Conc.	flake	11.63	11.69	11.65								11.65	0.03	W+	RB?	s;sf	Browns Bench
Jakes Depression	280	Clovis Conc.	flake													RC; UNR; W+++			Browns Bench
Jakes Depression	272	Clovis Conc.	flake	11.77	11.88	12.03	11.90							11.89	0.11			s;sf	Browns Bench
Jakes Depression	277	Clovis Conc.	flake													RC; UNR; W+++			Browns Bench
Jakes Depression	107†	Clovis Conc.	biface	8.95	8.99	8.99	8.96	8.96	8.93	8.97				8.96	0.02	RC		sfx2	Browns Bench
Jakes Depression	165		crescent	11.33	11.49	11.39	11.41	11.44						11.41	0.06			s	Browns Bench

Appendix B: Obsidian Hydration Measurements

Archaeometrics

Site #	Cat #	Locus	Descrip.	um 1	um 2	um 3	um 4	um 5	um 6	um 7	um 8	um 9	um 10	Mean	St.Dev	Quality	Hyd Com	Hyd Com2	XRF
Jakes Depression	541		crescent													RC; UNR; W+++			Browns Bench
Jakes Depression	13†		crescent	14.65	14.62	14.68	14.75	14.78	14.73					14.70	0.06		S1 medial	sfx2	Browns Bench
Liz 1	8.7		flake	14.23	14.11	14.24	14.17	14.28						14.21	0.07	RC	S1 interior	sf	Browns Bench
Liz 1	8.7		flake	16.10	16.11	16.05	16.02	16.03	16.07					16.07	0.04	RC		sfx3	Browns Bench
Liz 1	8.23		flake													RC; UNR; W+++			Browns Bench
Liz 1	8.24		flake	12.62	12.66	12.68	12.70	12.67	12.61					12.66	0.03	RC		c;sf	Browns Bench
Illipah Creek 7	3		Unknown stemmed	13.38	13.25	13.26	13.39							13.32	0.07	RC		sfx2	Browns Bench
North Illipah Creek 1	16.dd		flake	13.81	13.80									13.80	0.01	RC;DFV		sf	Browns Bench
Liz 1	10		Unknown stemmed	8.13	8.16	8.11	8.12	8.21	8.12	8.19	8.13	8.19		8.15	0.04			sfx3	Tempiute
Illipah Creek 1	65		Parman point	7.18	7.25	7.20	7.15	7.15	7.20					7.19	0.04			sf	Tempiute
Zandra 1	6		Cougar Mtn point	5.81	5.73	5.87	5.82	5.73	5.72	5.81	5.75	5.89		5.79	0.06	RC		sfx5	Tempiute
Jakes Depression	329	Clovis Conc.	flake	11.91	11.87	11.88	11.95	11.96						11.91	0.04			sf	Butte Valley Group A
Jakes Depression	434		stemmed point	12.07	12.08	12.02								12.06	0.03	dfv		sf	Butte Valley Group A
Jakes Depression	323	Clovis Conc.	flake	7.32	7.28	7.34	7.25	7.27	7.27	7.31	7.34	7.31	7.39	7.31	0.04	RC		sfx3	Modena
Jakes Depression	325	Clovis Conc.	flake	7.76	7.84	7.75	7.70	7.70						7.75	0.06			sf	Modena
Jakes Depression	270	Clovis Conc.	biface	8.05	7.98	8.01	8.08	8.04	7.99	8.03				8.03	0.03			sfx3	Modena

Appendix B: Obsidian Hydration Measurements

Archaeometrics

Site #	Cat #	Locus	Descrip.	um 1	um 2	um 3	um 4	um 5	um 6	um 7	um 8	um 9	um 10	Mean	St.Dev	Quality	Hyd Com	Hyd Com2	XRF
Jakes Depression	290	Clovis Conc.	retouched flake	7.99	7.91	7.85	7.82	7.93	7.96					7.91	0.07		v;d	sfx2	Modena
Jakes Depression	273	Clovis Conc.	retouched flake	8.08	8.09	7.93	7.94							8.01	0.09	RC;W+++	d	sfx2	Modena
Jakes Depression	307	Clovis Conc.	biface	9.01	9.01	9.07	9.03	9.02	9.04					9.03	0.02			sfx2	Modena
Jakes Depression	313	Clovis Conc.	flake	8.36	8.32	8.27	8.35	8.32						8.33	0.04	RC; W+		sfx3	Modena
Jakes Depression	328	Clovis Conc.	retouched flake													UNR;W+++			Modena
Jakes Depression	328	Clovis Conc.	flake	9.05	9.00	9.02	8.94	8.99	9.08	8.91				9.00	0.06	RC		sf	Modena
Jakes Depression	327	Clovis Conc.	flake	7.09	7.02	7.10	7.13	7.18	7.06	7.10				7.10	0.05	RC		sf	Modena
Jakes Depression	276	Clovis Conc.	flake	7.75	7.83	7.80	7.89	7.74	7.79					7.80	0.05			sfx3	Modena
Jakes Depression	292	Clovis Conc.	flake	7.75	7.51	7.68	7.65	7.60						7.64	0.09	RC		sf	Modena
Jakes Depression	282	Clovis Conc.	flake	8.59	8.70	8.68	8.67	8.63	8.72	8.75	8.66	8.67	8.79	8.68	0.06	RC		sfx3	Modena
Jakes Pond 3	15.2		flake	9.00	8.98	8.97	9.01	8.99	9.00	9.07	9.03			9.01	0.03		p	sf	Modena
Jakes Pond 3	15.3		flake	10.10	10.12	10.00	9.88							10.03	0.11		p	sfx2	Modena
Liz 1	7		point fragment	8.27	8.29	8.19	8.33	8.31	8.35					8.29	0.06		p	sf	Modena
Liz 1	8.10		flake	9.22	9.28	9.32	9.38	9.34						9.31	0.06		Margin reading	sf	Modena
Liz 1	8.13		flake	9.96	9.86	9.97	9.88	9.88	9.86	9.85				9.89	0.05		v;d;p	sfx3	Modena
Doug 3	9		Windust point	9.71	9.76	9.77	9.82	9.71						9.75	0.04		d	sf	Modena
Doug 3	18		fluted point	9.77	9.82									9.80	0.04	DRV	RB?	sf	Modena

Appendix B: Obsidian Hydration Measurements

Archaeometrics

Site #	Cat #	Locus	Descrip.	um 1	um 2	um 3	um 4	um 5	um 6	um 7	um 8	um 9	um 10	Mean	St.Dev	Quality	Hyd Com	Hyd Com2	XRF
Illipah Creek 7	1		Windust point	8.87	8.91	8.81	8.99	8.90	8.88	8.97				8.90	0.06			sfx2	Modena
Jakes Depression	278	Clovis Conc.	flake	2.05	2.04	2.08								2.06	0.02		RB	s;sf	Wild Horse Canyon
Jakes Depression	281	Clovis Conc.	flake	10.01	10.11	10.10	10.16	10.19	10.00	10.00				10.08	0.08		d	sf	Wild Horse Canyon
Jakes Depression	282	Clovis Conc.	flake	10.79	10.81	10.82	10.88							10.82	0.04		p	sfx2	Wild Horse Canyon

Note: † = previously cut, but unreadable.

Appendix B: Obsidian Hydration Measurements

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28 September 2008

Jakes Depression (AM-08-13)

In all, 56 artifacts were submitted for analysis. Seven of them were previously cut by Northwest Research Obsidian Lab. All seven yield viable step fracture readings. Six others had unreadable hydration rims. Given that the artifacts showed signs of extreme to moderate weathering, areas with fractures and step fractures (that occurred during manufacture or resharpening) were targeted. Ventral and dorsal sides of the specimens were also examined. In all, 52 obsidian hydration rim values were obtained from the 50 artifacts. Of these, 48 artifacts yielded a single rim value and two artifacts yielded two rim values. The multiple readings per artifact suggest that older tools were re-sharpened, retooled, or damaged during use. While the outer surface almost certainly reflects the weathered remnant readings or recent damage, the interior fracture reflects the older age of the artifact (when it was initially made). Due to fact Browns Bench is the most difficult obsidian from which to obtain hydration readings, multiple grindings were essential. In several instances, portions of the bands were removed during the grinding process. In addition, specimens with only one step facture may in fact be less reliable that those specimens with multiple stem factures. In sum, weathered hydration step fracture readings have only been used in the past five years for weathered specimens, thus hydration readings should be considered provisional units of measurement until a larger sample is acquired for this age of artifacts.

Table 1. Hydration Readings

Hydration results were accomplished at the ArchaeoMetrics Obsidian Hydration Laboratory. Initially, the best area in which to cut a portion of an obsidian specimen was determined. Two parallel cuts were then made on the appropriate portion of the specimen using a lapidary saw mounted with two four inch diameter diamond-impregnated .004” blades. For projectile point the base or notches are cut. For debitage the platform is cut to determine if there is difference in dorsal, ventral or in some cases the platform readings. Weathered specimens are addressed in the same manner but step fractures are usually targeted for un-weathered hydration readings. On average the majority of cuts yielded samples average 0.35 millimeters in thickness. Samples were then mounted with Lakeside thermoplastic cement onto sequentially numbered microscope slides. Generally, five specimens were mounted on each slide.

The samples were then manually ground to reduce thickness allowing for specimens to be read under the microscope. First, a slurry of water and 600 silicon abrasive grit was mixed on a glass plate. Grinding was accomplished in two steps. The initial grinding rendered the surface flat and removed the saw cut marks from one side of the specimen. The specimen was then flipped, remounted and the second side was ground to proper thickness for viewing under the microscope. Final thickness of the specimens was between 30-50 microns depending on opacity or unique source specific quantities such as hardness of obsidian vs. softer obsidians.

The prepared slides were then measured using a Meiji petrographic microscope fitted with a Lasico digital filar eyepiece. Once a defined hydration rim was observed on a color monitor screen, the hydration rim was centered in the middle of the monitor, to reduce parallax, and measured using the micrometer. Typically ten measurements are taken from each specimen. However, due to imperfections in the stone, weathering, or damage to the surface from the saw or grinding as few as three measurements were recorded. Surfaces exhibiting cortex were also recorded and identified as such. Hydration values are recorded to the 0.01 um and both the mean and standard deviation for each specimen were computed (Table attached).

Additional information on unique qualities is recorded in the "quality" column. These include:

BEV- (Beveled). Artifact cut or morphology has resulted in a beveling of the thin section.

BRE- (Break) The thin section was purposely cut across a broken edge of the artifact. Hydration measurements may reveal when the artifact was broken, relative to its time of manufacture.

BUR- (Burning). The characteristics of the specimen noted under the microscope are indicative of burning. Although the effects of burning are poorly understood, such occurrence may be identified as the complete absence of hydration or an obscured diffusion front.

C1 or C2- (Additional cut made). More than one thin section was prepared from an archaeological specimen and is sequentially numbered. Multiple cuts (c1 or c2) may be made if the artifact is very large (e.g. Quarry reduction) In addition multiple cut may be made if there is some question that readings may not be consist across the artifact due to aberrant weathering (fluvial rolled artifacts). They are noted in sequential order and a diagram may be provided.

DES- (Destroyed). The specimen was destroyed in the process of thin section preparation. This may occur when mounting and grinding extremely small flakes (e.g. shark fins).

DFV- (Diffusion front vague) the diffusion front, or the visual boundary between hydrated and unhydrated portions of the specimen, is poorly defined. This can result in less precise measurements that can be obtained from sharper demarcated diffusion fronts. The technician must often estimate the hydration boundary because a vague diffusion front appears as a relatively thick, dark line or a gradation in color or brightness between hydrated and unhydrated layers.

DIS- (Discontinuous). A discontinuous or interrupted hydration rind was observed on the thin section.

HV- (Highly Variable). The hydration rind exhibits variable thickness along continuous surfaces.

IRR- (Irregular). The outer surface of the thin section is uneven and measurements are difficult.

ISO- (One surface only). Hydration was observed on one surface or side of the thin section (artifact).

ED- (Edge damaged). Reflects an isolated area damaged along the margin of the artifact.

NHV- (No visible hydration). No visible hydration rind was observed. This does not imply that hydration is absent, only that hydration was not observed. Hydration rinds smaller than one micron are often too small to be seen via optical microscopy.

RC- (Recut). More than one thin section was prepared from an archaeological specimen. Multiple thin sections are made if preparation quality on the initial specimen is suspect or obviously poor. More than one recut is number sequentially (e.g. RC, RC2, etc.)

RC-RB- (Recut along recent break**).** Recent hydration recut is made along a broken edge of an artifact of antiquity. Usually the lithic analysis is interested when the artifact was broken.

SKF- (Shark fin). Due to the small size of the specimen, the flake was snapped in half and mounted buy itself onto a slide.

UNR- (Unreadable). The measurement optical property of the hydration rind is so poor that accurate measurements are not possible. Poor thin section preparation is not the cause.

W-(Weathered). Visual surface characteristics and microscopically observed characteristics are noted to asses the reliability of the hydration rim value. Mild sandblasting is noted as W; moderate sand blasting is noted by **W+**. Generally, those noted as W or W+ retain enough integrity to assume a correct rim value. Excessive sand blasting (manifest as eroded flake scars) is noted as **W++**; while extreme weathering, pitting and severe weathering (manifest as rounding of all external edges) is noted as **W+++**. These later two notations indicate extremely weathered surfaces with less reliable or indeterminate rim values. For these specimens, we targeted areas that have unexposed hydration, such as hinge and step fractures or internal cracks.

NOT OBSIDIAN- Macro-visual or petrographic characteristics of the artifact indicate that it is not obsidian.

Additional information is recorded about unique qualities in the “hydration comments” column that pertain to technological comments. These include:

1 of 2- One of two distinctly different hydration rinds identified on one specimen. Occasionally one specimen will have one, two, or possibly three distinct hydration rinds. Generally, older (larger) rim values located near the midsection (interior) of the artifact and younger or smaller rim values near the “margin”. This notation is used to easily distinguish the different hydration rinds in the comments column used by the analyst.

S1-(Side 1).- Occasionally, one of possibly two distinctly different hydration rinds identified occur on different faces of an obsidian tool. Occasionally one specimen will have one (S1), two (S2), or possibly three distinct hydration rinds on various faces of the artifact. This notation is used to easily distinguish the different hydration rinds in the comments column used by the analyst.

V- (Side one - ventral)**.** Reading was taken on the ventral side surface of the artifact.

D- (Side two - dorsal)**.** Reading was taken on the dorsal surface of the artifact.

ED- (Edge damage)**.** Reading was taken on the margin of the artifact; ED indicated that edge damage is present.

P- (Platform)**.** Reading was taken on the platform or platform remnant.

RH- (Remnant hydration)**.** Reading was taken on a weather surface of the approximate thickness of the remaining or remnant hydration.

RB- (Recent break hydration)**.** Reading appears in a crack of a weather surface and its thickness and locating suggest this it is a recent phenomenon. Recent hydration can also include reworking and this notation is made after viewing the hydration location and looking at the artifact.

RB Margin- (Recently broken margin hydration)**.** Recent broken edges on debitage lacking platforms can be cut to determine if the dorsal and ventral surfaces differ from the broken edge. In this case the notation is used to note the artifact was cut along as surface that appears recently broken but may have readings consistent with the dorsal and ventral surfaces

Additional information regarding the type of feature selected and where hydration is reading are taken on the artifact is recorded in the “Hydration comments 2” column. These include:

CRACKS (C) - Rim measurement originated from an unweathered internal crack. This measurement may not be associated with artifact's modification. Discretion should be used for assigning age of the artifact.

STEP FRACTURE REMOVED AND CRACK (SF) - Rim measurement originated from an unweathered step fracture and internal crack associated with artifact modification. Step fractures art tabulated as they are found. Sfx2; notes that two independent step fractures were measured).

SURFACE (S) - Rim measurement originated from an unweathered, moderate or severely weather surface. Because some of the hydration rim has weathered away, these measurements are not accurate for assessing when the artifact was last modified (See SW in Comments2 column).

Additional information is recorded about unique surface qualities of weathered specimen or general comments are located in "Comments2".

Artifact Size (AS) – Larger artifacts of extreme size may yield multiple hydration values. Unless instructed by the client, one thin section is taken and general comment regarding multiple surface are only noted. This generally applies to specimens from quarries.

Surface Weathered (SW) - Rim measurement originated from an unweathered internal crack. But the surface is estimated and should not be used other than to show that the artifact has lost a certain amount of hydration.

Appendix C: Core Data

Site	FS #	Core Type	Raw Material	Max Linear Dimension (cm)	Wgt (g)	Size Value (MLD*Wgt)	No. of Detachment Scars	No. of Platforms	No. of Fronts (faces)	Surface Platform Prep*	Percent Cortex	Surface Abrasion
CRNV-04-7721	123	Multidirectional	CCS	5.4	63.2	341	6	4	3	1, 4, 3	1-50%	P
CRNV-04-7721	172	Multidirectional	CCS	4.7	20.9	98	6	4	3	3	0%	A
CRNV-04-7721	202	Multidirectional	CCS	4.7	36.0	169	10	4	3	2	1-50%	A
CRNV-04-7721	203	Multidirectional	CCS	3.5	15.3	54	4	2	2	0, 1, 3	1-50%	A
CRNV-04-7721	366	Unidirectional	CCS	3.5	11.5	40	6	1	2	3	1-50%	A
CRNV-04-7721	451	Multidirectional	CCS	7.7	96.1	740	7	4	3	2, 3	1-50%	A
CRNV-04-7721	509	Multidirectional	FGV	9.8	338.9	3321	5	4	3	3	0%	A
CRNV-04-7721	511	Multidirectional	CCS	4.6	21.2	98	4	4	4	2	1-50%	A
26Wp1173	55	Multidirectional	CCS	8.7	135.9	1182	7	5	4	1, 2	1-50%	A
26Wp1177	17	Multidirectional	CCS	3.6	18.4	66	4	4	3	2	1-50%	A
26Wp7316	6	Multidirectional	CCS	6.2	42.0	260	8	6	4	1, 2	1-50%	A
26Wp7316	13	Multidirectional	OBS	3.9	13.4	52	18	7	3	0, 2, 3	1-50%	A
26WP7317	9	Multidirectional	FGV	3.8	24.8	94	5	3	3	2	1-50%	A
26WP7321	1	Multidirectional	FGV	5.5	39.0	215	6	4	3	2	1-50%	A
26WP7321	2	Multidirectional	CCS	4.7	30.6	144	6	3	4	0, 1, 2	1-50%	A
26Wp7729	7	Multidirectional	CCS	3.5	12.6	44	3	3	3	1, 2	1-50%	A
26Wp7729	25	Tested Cobble	CCS	8.3	96.8	803	6	3	3	1	51-100%	A

Note: **Surface Platform Prep:** 0=Indeterminate/Broken; 1=Cortical; 2=Smooth; 3=Complex; 4=Abraded. **Surface Abrasion:** P=Present; A=Absent

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
CRNV-04-7721	36	Flake Frag	FGV	Medium	5.1	Unidentifiable	Absent	0%
CRNV-04-7721	110	Flake Frag	OBS	Small	0.7	Unidentifiable	Absent	0%
CRNV-04-7721	171	BTF	FGV	Medium	7.2	Complex	Absent	0%
CRNV-04-7721	215	Cortical Spall Frag	CCS	Small	3.5	Unidentifiable	Absent	51-100%
CRNV-04-7721	228	Overshot Flake	CCS	Medium	5.3	Complex	Absent	0%
CRNV-04-7721	239	Secondary Cortical Spall	CCS	Medium	5.9	Complex	Absent	1-50%
CRNV-04-7721	240	Flake	CCS	Small	1.8	Smooth	Absent	0%
CRNV-04-7721	241	Flake	FGV	Small	0.2	Smooth	Absent	0%
CRNV-04-7721	242	BTF	FGV	Small	1.1	Complex	Absent	0%
CRNV-04-7721	243	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
CRNV-04-7721	244	Flake Frag	FGV	Medium	5.1	Unidentifiable	Absent	0%
CRNV-04-7721	245	Flake Frag	CCS	Medium	5.9	Unidentifiable	Absent	0%
CRNV-04-7721	246	BTF	CCS	Small	2.0	Complex	Absent	0%
CRNV-04-7721	247	BTF	CCS	Small	0.5	Complex	Absent	0%
CRNV-04-7721	248	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
CRNV-04-7721	249	Secondary Cortical Spall	CCS	Medium	20.6	Complex	Absent	1-50%
CRNV-04-7721	251	BTF	FGV	Small	1.3	Complex	Present	0%
CRNV-04-7721	252	Flake Frag	FGV	Medium	7.1	Unidentifiable	Absent	0%
CRNV-04-7721	253	BTF	FGV	Medium	7.0	Complex	Absent	0%
CRNV-04-7721	254	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
CRNV-04-7721	259	BTF	FGV	Small	1.5	Complex	Absent	0%
CRNV-04-7721	260	Flake Frag	CCS	Small	2.7	Unidentifiable	Present	0%
CRNV-04-7721	261	Flake Frag	FGV	Medium	4.0	Unidentifiable	Absent	0%
CRNV-04-7721	263	Cortical Spall Frag	CCS	Medium	5.5	Unidentifiable	Absent	1-50%
CRNV-04-7721	264	Flake	CCS	Small	1.1	Smooth	Absent	0%
CRNV-04-7721	266	Flake Frag	CCS	Large	19.3	Unidentifiable	Absent	0%
CRNV-04-7721	267	Flake	CCS	Small	1.3	Unidentifiable	Absent	0%
CRNV-04-7721	268	Flake	CCS	Small	0.4	Smooth	Absent	0%
CRNV-04-7721	269	Flake Frag	CCS	Small	3.0	Unidentifiable	Absent	0%
CRNV-04-7721	271	Flake	CCS	Large	20.7	Smooth	Absent	0%
CRNV-04-7721	272	BTF	OBS	Small	0.4	Complex	Absent	0%
CRNV-04-7721	275	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
CRNV-04-7721	276	Flake Frag	OBS	Small	0.7	Unidentifiable	Absent	0%
CRNV-04-7721	277	Flake Frag	OBS	Small	0.2	Unidentifiable	Absent	0%
CRNV-04-7721	278	Retouch Chip Frag	OBS	Very Small	0.1	Unidentifiable	Absent	0%
CRNV-04-7721	279	Retouch Chip	CCS	Very Small	0.2	Smooth	Absent	0%
CRNV-04-7721	281	Flake	OBS	Small	0.4	Smooth	Absent	0%
CRNV-04-7721	283	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
CRNV-04-7721	285	Cortical Spall Frag	CCS	Small	1.6	Unidentifiable	Absent	1-50%
CRNV-04-7721	287	Secondary Cortical Spall	CCS	Medium	6.4	Cortical	Absent	1-50%
CRNV-04-7721	291	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
CRNV-04-7721	292	BTF	OBS	Small	0.3	Complex	Absent	0%
CRNV-04-7721	293	Flake Frag	CCS	Medium	4.8	Unidentifiable	Absent	0%
CRNV-04-7721	295	BTF	CCS	Medium	4.7	Complex	Present	0%
CRNV-04-7721	296	BTF	CCS	Small	0.3	Complex	Absent	0%
CRNV-04-7721	297	Flake Frag	CCS	Small	1.7	Unidentifiable	Absent	0%
CRNV-04-7721	298	Secondary Cortical Spall	CCS	Medium	12.7	Cortical	Absent	1-50%
CRNV-04-7721	299	BTF	CCS	Small	0.5	Complex	Absent	0%
CRNV-04-7721	300	Secondary Cortical Spall	CCS	Small	1.6	Complex	Absent	1-50%
CRNV-04-7721	302	Flake Frag	CCS	Medium	3.6	Unidentifiable	Absent	0%
CRNV-04-7721	304	BTF	CCS	Small	0.3	Complex	Absent	0%
CRNV-04-7721	305	BTF	CCS	Small	0.3	Complex	Absent	0%
CRNV-04-7721	306	BTF	CCS	Medium	4.8	Complex	Absent	0%
CRNV-04-7721	308	Flake	CCS	Medium	23.6	Smooth	Absent	0%
CRNV-04-7721	309	BTF	FGV	Small	3.1	Complex	Absent	0%
CRNV-04-7721	310	Cortical Spall Frag	FGV	Small	1.2	Unidentifiable	Absent	1-50%
CRNV-04-7721	311	Flake Frag	CCS	Small	1.1	Unidentifiable	Absent	0%
CRNV-04-7721	312	BTF	FGV	Small	0.4	Complex	Absent	0%
CRNV-04-7721	313	Flake Frag	OBS	Small	0.4	Unidentifiable	Present	0%
CRNV-04-7721	314	Secondary Cortical Spall	FGV	Small	1.0	Cortical	Absent	1-50%
CRNV-04-7721	315	Secondary Cortical Spall	CCS	Small	2.4	Cortical	Absent	1-50%
CRNV-04-7721	316	Retouch Chip Frag	OBS	Very Small	0.1	Unidentifiable	Absent	0%
CRNV-04-7721	318	Flake Frag	OBS	Small	0.8	Unidentifiable	Present	0%
CRNV-04-7721	320	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
CRNV-04-7721	323	Flake Frag	OBS	Small	1.0	Unidentifiable	Absent	0%
CRNV-04-7721	324	BTF	FGV	Small	0.8	Complex	Absent	0%
CRNV-04-7721	325	Flake Frag	OBS	Small	0.8	Unidentifiable	Absent	0%
CRNV-04-7721	326	Flake Frag	CCS	Medium	5.3	Unidentifiable	Absent	0%
CRNV-04-7721	327	Flake Frag	OBS	Small	0.4	Unidentifiable	Absent	0%
CRNV-04-7721	329	Flake Frag	OBS	Small	1.2	Unidentifiable	Absent	0%
CRNV-04-7721	329	Flake Frag	FGV	Small	2.2	Unidentifiable	Present	0%
CRNV-04-7721	330	Flake	FGV	Medium	7.3	Smooth	Absent	0%
CRNV-04-7721	331	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
CRNV-04-7721	332	Flake Frag	FGV	Medium	7.0	Unidentifiable	Absent	0%
CRNV-04-7721	333	Flake Frag	FGV	Medium	14.4	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
CRNV-04-7721	334	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
CRNV-04-7721	335	Flake	CCS	Small	2.0	Smooth	Absent	0%
CRNV-04-7721	336	BTF	FGV	Medium	5.9	Complex	Present	0%
CRNV-04-7721	338	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
CRNV-04-7721	339	Primary Cortical Spall	FGV	Medium	5.0	Complex	Absent	51-100%
CRNV-04-7721	340	Flake Frag	OBS	Small	0.5	Unidentifiable	Absent	0%
CRNV-04-7721	341	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
CRNV-04-7721	342	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
CRNV-04-7721	343	Flake Frag	FGV	Small	1.9	Unidentifiable	Absent	0%
CRNV-04-7721	344	Flake Frag	FGV	Small	1.7	Unidentifiable	Absent	0%
CRNV-04-7721	345	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
CRNV-04-7721	347	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
CRNV-04-7721	348	Primary Cortical Spall	FGV	Small	6.4	Smooth	Absent	51-100%
CRNV-04-7721	350	BTF	FGV	Small	0.4	Complex	Absent	0%
CRNV-04-7721	351	BTF	FGV	Small	3.1	Complex	Absent	0%
CRNV-04-7721	353	BTF	FGV	Small	0.6	Complex	Absent	0%
CRNV-04-7721	354	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
CRNV-04-7721	355	BTF	CCS	Small	4.4	Complex	Absent	0%
CRNV-04-7721	356	Flake Frag	FGV	Small	1.9	Unidentifiable	Absent	0%
CRNV-04-7721	357	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
CRNV-04-7721	358	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
CRNV-04-7721	359	Flake	FGV	Small	0.6	Smooth	Absent	0%
CRNV-04-7721	360	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
CRNV-04-7721	361	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
CRNV-04-7721	362	BTF	FGV	Small	1.0	Complex	Absent	0%
CRNV-04-7721	363	BTF	FGV	Small	0.2	Complex	Absent	0%
CRNV-04-7721	364	Flake Frag	FGV	Small	2.2	Unidentifiable	Absent	0%
CRNV-04-7721	367	Cortical Spall Frag	FGV	Medium	6.6	Unidentifiable	Absent	1-50%
CRNV-04-7721	368	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
CRNV-04-7721	369	Flake Frag	FGV	Small	3.2	Unidentifiable	Absent	0%
CRNV-04-7721	371	Flake Frag	FGV	Medium	4.1	Unidentifiable	Absent	0%
CRNV-04-7721	372	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
CRNV-04-7721	373	Cortical Spall Frag	FGV	Medium	4.8	Unidentifiable	Absent	1-50%
CRNV-04-7721	374	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
CRNV-04-7721	375	Flake Frag	FGV	Small	2.7	Unidentifiable	Absent	0%
CRNV-04-7721	376	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
CRNV-04-7721	378	BTF	CCS	Small	0.3	Complex	Absent	0%
CRNV-04-7721	380	Flake Frag	FGV	Small	1.9	Unidentifiable	Absent	0%
CRNV-04-7721	381	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
CRNV-04-7721	383	Flake Frag	CCS	Small	2.2	Unidentifiable	Present	0%
CRNV-04-7721	384	Flake Frag	OBS	Small	0.3	Unidentifiable	Absent	0%
CRNV-04-7721	385	Flake Frag	FGV	Medium	3.1	Unidentifiable	Absent	0%
CRNV-04-7721	386	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
CRNV-04-7721	387	Flake Frag	OBS	Small	1.3	Unidentifiable	Present	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
CRNV-04-7721	389	BTF	OBS	Small	3.2	Complex	Absent	0%
CRNV-04-7721	391	BTF	CCS	Small	0.3	Complex	Absent	0%
CRNV-04-7721	392	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
CRNV-04-7721	393	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
CRNV-04-7721	396	Retouch Chip	CCS	Very Small	0.1	Smooth	Absent	0%
CRNV-04-7721	399	Flake Frag	CCS	Small	2.4	Unidentifiable	Absent	0%
CRNV-04-7721	402	BTF	FGV	Small	1.3	Complex	Absent	0%
CRNV-04-7721	403	BTF	CCS	Medium	5.0	Unidentifiable	Absent	0%
CRNV-04-7721	405	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
CRNV-04-7721	407	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%
CRNV-04-7721	408	Flake Frag	FGV	Small	3.5	Unidentifiable	Absent	0%
CRNV-04-7721	411	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
CRNV-04-7721	413	Primary Cortical Spall	FGV	Small	3.3	Complex	Absent	51-100%
CRNV-04-7721	414	Flake Frag	FGV	Small	2.1	Unidentifiable	Absent	0%
CRNV-04-7721	417	Secondary Cortical Spall	FGV	Small	3.1	Complex	Absent	1-50%
CRNV-04-7721	419	BTF	FGV	Small	1.1	Complex	Absent	0%
CRNV-04-7721	422	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
CRNV-04-7721	423	BTF	FGV	Small	0.8	Complex	Absent	0%
CRNV-04-7721	424	BTF	FGV	Medium	8.4	Complex	Absent	0%
CRNV-04-7721	425	BTF	FGV	Small	1.4	Complex	Absent	0%
CRNV-04-7721	428	BTF	CCS	Medium	3.7	Complex	Present	0%
CRNV-04-7721	429	Flake Frag	FGV	Small	3.5	Smooth	Absent	0%
CRNV-04-7721	452	Flake	CCS	Large	15.6	Smooth	Absent	0%
CRNV-04-7721	274a	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%
CRNV-04-7721	274b	Flake	CCS	Very Small	0.2	Smooth	Absent	0%
CRNV-04-7721	280a	Flake Frag	OBS	Small	0.3	Unidentifiable	Present	0%
CRNV-04-7721	280b	Flake Frag	CCS	Small	0.2	Unidentifiable	Absent	0%
CRNV-04-7721	282a	BTF	OBS	Small	0.9	Complex	Absent	0%
CRNV-04-7721	282b	BTF	OBS	Very Small	0.1	Complex	Absent	0%
CRNV-04-7721	328b	Flake Frag	OBS	Small	0.2	Unidentifiable	Absent	0%
CRNV-04-7721	349a	Cortical Spall Frag	FGV	Large	26.3	Unidentifiable	Absent	51-100%
CRNV-04-7721	349b	Cortical Spall Frag	FGV	Small	2.1	Unidentifiable	Absent	1-50%
CRNV-04-7721	412a	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
CRNV-04-7721	412b	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
CRNV-04-7721	415a	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
CRNV-04-7721	415b	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%
CRNV-04-7721	416a	BTF	FGV	Medium	4.1	Complex	Absent	0%
CRNV-04-7721	416b	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
CRNV-04-7721	420a	BTF	FGV	Small	1.2	Complex	Absent	0%
CRNV-04-7721	420b	BTF	FGV	Small	1.1	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1173	1.1	Secondary Cortical Spall	CCS	Small	0.3	Complex	Present	1-50%
26Wp1173	1.2	BTF	CCS	Small	0.1	Complex	Absent	0%
26Wp1173	2.1	BTF	FGV	Small	1.1	Complex	Absent	0%
26Wp1173	2.2	BTF	FGV	Small	0.4	Complex	Absent	0%
26Wp1173	2.3	BTF	FGV	Small	0.1	Complex	Absent	0%
26Wp1173	2.4	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	3.1	Flake Frag	CCS	Small	1.8	Unidentifiable	Absent	0%
26Wp1173	3.2	Secondary Cortical Spall	CCS	Small	1.0	Complex	Absent	0%
26Wp1173	3.3	Secondary Cortical Spall	CCS	Small	0.4	Cortical	Absent	0%
26Wp1173	3.4	Flake	FGV	Medium	3.5	Smooth	Absent	0%
26Wp1173	3.5	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp1173	3.6	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	4	Flake	CCS	Small	4.6	Smooth	Absent	0%
26Wp1173	5	Primary Cortical Spall	CCS	Small	3.4	Cortical	Absent	51-100%
26Wp1173	6	BTF	CCS	Small	0.7	Complex	Present	0%
26Wp1173	7.1	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	7.2	Cortical Spall Frag	FGV	Small	0.7	Unidentifiable	Absent	51-100%
26Wp1173	8	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp1173	9	BTF	FGV	Small	0.2	Complex	Absent	0%
26Wp1173	12	BTF	FGV	Medium	5.9	Complex	Absent	0%
26Wp1173	13	Cortical Spall Frag	CCS	Small	2.4	Unidentifiable	Absent	1-50%
26Wp1173	14	BTF	CCS	Medium	9.2	Complex	Absent	0%
26Wp1173	15.1	Cortical Spall Frag	CCS	Medium	6.1	Unidentifiable	Absent	1-50%
26Wp1173	15.2	Primary Cortical Spall	CCS	Small	0.6	Complex	Absent	1-50%
26Wp1173	15.3	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	16.01	Cortical Spall Frag	CCS	Medium	10.2	Unidentifiable	Absent	51-100%
26Wp1173	16.02	Cortical Spall Frag	CCS	Medium	5.4	Unidentifiable	Absent	1-50%
26Wp1173	16.03	Flake Frag	CCS	Medium	1.8	Unidentifiable	Absent	0%
26Wp1173	16.04	Flake Frag	CCS	Small	2.7	Unidentifiable	Absent	0%
26Wp1173	16.05	Cortical Spall Frag	CCS	Small	2.0	Unidentifiable	Absent	51-100%
26Wp1173	16.06	BTF	CCS	Small	1.1	Complex	Present	0%
26Wp1173	16.07	Flake Frag	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp1173	16.08	BTF	CCS	Small	0.5	Complex	Absent	0%
26Wp1173	16.09	BTF	CCS	Small	0.2	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1173	16.10	Cortical Spall Frag	CCS	Small	0.3	Unidentifiable	Absent	51-100%
26Wp1173	16.11	Cortical Spall Frag	CCS	Small	0.1	Unidentifiable	Absent	1-50%
26Wp1173	18	Flake Frag	CCS	Medium	5.1	Unidentifiable	Absent	0%
26Wp1173	19.1	Flake	CCS	Small	0.8	Smooth	Absent	0%
26Wp1173	19.2	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	21.1	Cortical Spall Frag	FGV	Medium	4.0	Unidentifiable	Absent	51-100%
26Wp1173	21.2	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp1173	22.2	BTF	CCS	Small	1.6	Complex	Absent	0%
26Wp1173	22.3	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	22.4	Flake Frag	FGV	Medium	2.7	Unidentifiable	Absent	0%
26Wp1173	22.5	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	22.6	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp1173	24	Flake Frag	CCS	Medium	4.0	Unidentifiable	Absent	0%
26Wp1173	25.2	Cortical Spall Frag	CCS	Medium	4.8	Unidentifiable	Absent	1-50%
26Wp1173	25.3	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp1173	25.4	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp1173	26	Secondary Cortical Spall	CCS	Small	1.3	Complex	Absent	1-50%
26Wp1173	27.1	Primary Cortical Spall	CCS	Small	2.7	Complex	Present	51-100%
26Wp1173	27.2	BTF	CCS	Small	0.5	Complex	Absent	0%
26Wp1173	28	BTF	CCS	Small	1.1	Complex	Absent	0%
26Wp1173	30.1	BTF	CCS	Medium	6.3	Complex	Absent	0%
26Wp1173	30.2	BTF	CCS	Small	1.8	Complex	Absent	0%
26Wp1173	31	Flake	CCS	Small	1.0	Smooth	Absent	0%
26Wp1173	33	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp1173	46	BTF	CCS	Small	1.0	Complex	Absent	0%
26Wp1173	47	Flake Frag	CCS	Small	1.4	Unidentifiable	Absent	0%
26Wp1173	48	Secondary Cortical Spall	CCS	Medium	4.7	Smooth	Absent	1-50%
26Wp1173	49.1	Angular Shatter	CCS	Small	2.7	Unidentifiable	Absent	0%
26Wp1173	49.2	BTF	CCS	Small	1.9	Complex	Present	0%
26Wp1173	49.3	Flake	CCS	Small	0.3	Smooth	Absent	0%
26Wp1173	49.4	BTF	CCS	Small	0.4	Complex	Absent	0%
26Wp1173	49.5	Flake	FGV	Medium	3.5	Smooth	Absent	0%
26Wp1173	49.6	Flake Frag	FGV	Small	2.5	Unidentifiable	Absent	0%
26Wp1173	51.01	BTF	FGV	Small	3.1	Complex	Absent	0%
26Wp1173	51.02	Flake Frag	FGV	Small	2.4	Unidentifiable	Absent	0%
26Wp1173	51.03	BTF	FGV	Small	1.4	Complex	Absent	0%
26Wp1173	51.04	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
26Wp1173	51.05	BTF	FGV	Small	1.0	Complex	Absent	0%
26Wp1173	51.06	BTF	FGV	Small	1.4	Complex	Absent	0%
26Wp1173	51.07	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1173	51.08	BTF	FGV	Small	1.0	Complex	Absent	0%
26Wp1173	51.09	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp1173	51.10	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp1173	51.11	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
26Wp1173	51.12	BTF	FGV	Small	0.9	Complex	Present	0%
26Wp1173	51.13	Cortical Spall Frag	FGV	Small	0.9	Unidentifiable	Absent	51-100%
26Wp1173	51.14	Cortical Spall Frag	FGV	Small	0.8	Unidentifiable	Absent	1-50%
26Wp1173	51.15	Flake	FGV	Small	0.9	Smooth	Absent	0%
26Wp1173	51.16	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp1173	51.17	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	51.18	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	51.19	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	51.20	Cortical Spall Frag	FGV	Small	0.7	Unidentifiable	Absent	1-50%
26Wp1173	51.21	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp1173	51.22	BTF	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp1173	51.23	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp1173	51.24	Flake	FGV	Small	0.7	Smooth	Absent	0%
26Wp1173	51.25	BTF	FGV	Small	0.7	Complex	Absent	0%
26Wp1173	51.26	Angular Shatter	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	51.27	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	51.28	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	51.29	BTF	FGV	Small	0.5	Complex	Absent	0%
26Wp1173	51.30	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	51.31	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp1173	51.32	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	51.33	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp1173	51.34	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp1173	51.35	BTF	FGV	Small	0.4	Complex	Present	0%
26Wp1173	51.36	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp1173	51.37	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp1173	51.38	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	51.39	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	51.40	Flake	FGV	Small	0.1	Smooth	Absent	0%
26Wp1173	51.41	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp1173	51.42	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp1173	51.43	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp1173	51.44	Retouch Chip	FGV	Very Small	0.1	Smooth	Absent	0%
26Wp1173	51.45	Flake	FGV	Small	0.1	Smooth	Absent	0%
26Wp1173	51.46	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp1173	51.47	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	51.48	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	51.49	Retouch Chip	FGV	Very Small	0.1	Smooth	Absent	0%
26Wp1173	53.1	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp1173	53.2	Flake	FGV	Small	0.3	Smooth	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1173	53.3	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	53.4	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	59	BTF	FGV	Medium	6.2	Complex	Absent	0%
26Wp1173	60.01	Flake Frag	FGV	Large	9.3	Unidentifiable	Absent	0%
26Wp1173	60.02	BTF	FGV	Medium	3.7	Complex	Present	0%
26Wp1173	60.03	Flake Frag	FGV	Medium	6.2	Unidentifiable	Absent	0%
26Wp1173	60.04	Flake Frag	FGV	Small	4.7	Unidentifiable	Absent	0%
26Wp1173	60.05	Cortical Spall Frag	FGV	Medium	4.3	Unidentifiable	Absent	1-50%
26Wp1173	60.06	Flake Frag	FGV	Small	3.4	Unidentifiable	Absent	0%
26Wp1173	60.07	BTF	FGV	Small	1.2	Complex	Present	0%
26Wp1173	60.08	BTF	FGV	Small	1.5	Complex	Absent	0%
26Wp1173	60.09	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp1173	60.10	BTF	FGV	Small	1.0	Complex	Present	0%
26Wp1173	60.11	Secondary Cortical Spall	FGV	Small	1.1	Complex	Present	1-50%
26Wp1173	60.12	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp1173	60.13	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
26Wp1173	60.14	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp1173	60.15	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp1173	60.16	BTF	FGV	Small	0.7	Complex	Present	0%
26Wp1173	60.17	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp1173	60.18	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp1173	60.19	BTF	FGV	Small	0.7	Complex	Absent	0%
26Wp1173	60.20	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp1173	60.21	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	60.22	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	60.23	BTF	FGV	Small	0.9	Complex	Present	0%
26Wp1173	60.24	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp1173	60.25	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	60.26	Flake	FGV	Small	0.7	Smooth	Absent	0%
26Wp1173	60.27	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	60.28	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	60.29	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp1173	60.30	Angular Shatter	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp1173	60.31	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp1173	60.32	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp1173	60.33	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	60.34	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp1173	60.35	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	60.36	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	60.37	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	60.38	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	60.39	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	60.40	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp1173	60.41	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp1173	60.42	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	60.43	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1173	60.44	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp1173	60.45	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp1173	60.46	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp1173	60.47	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp1173	60.48	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp1173	60.49	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.50	Flake	FGV	Small	0.1	Smooth	Absent	0%
26Wp1173	60.51	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp1173	60.52	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp1173	60.53	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.54	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.55	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp1173	60.56	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.57	BTF	FGV	Very Small	0.1	Complex	Present	0%
26Wp1173	60.58	Retouch Chip	FGV	Very Small	0.1	Smooth	Absent	0%
26Wp1173	60.59	BTF	FGV	Very Small	0.1	Complex	Present	0%
26Wp1173	60.60	BTF	FGV	Very Small	0.1	Complex	Present	0%
26Wp1173	60.61	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.62	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.63	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.64	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.65	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.66	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.67	Flake Frag	OBS	Medium	3.0	Unidentifiable	Absent	0%
26Wp1173	60.68	Flake Frag	OBS	Small	1.8	Unidentifiable	Absent	0%
26Wp1173	60.69	Flake Frag	OBS	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	60.70	BTF	OBS	Small	1.2	Complex	Present	0%
26Wp1173	60.71	Flake Frag	OBS	Small	0.8	Unidentifiable	Absent	0%
26Wp1173	60.72	Flake Frag	OBS	Small	0.6	Unidentifiable	Absent	0%
26Wp1173	60.73	BTF	OBS	Small	0.6	Complex	Present	0%
26Wp1173	60.74	BTF	OBS	Small	0.6	Complex	Present	0%
26Wp1173	60.75	Flake Frag	OBS	Small	0.3	Unidentifiable	Absent	0%
26Wp1173	60.76	BTF	OBS	Small	0.2	Complex	Present	0%
26Wp1173	60.77	Flake Frag	OBS	Small	0.2	Unidentifiable	Absent	0%
26Wp1173	60.78	BTF	OBS	Small	0.1	Complex	Absent	0%
26Wp1173	60.79	BTF	OBS	Small	0.1	Complex	Absent	0%
26Wp1173	60.80	Retouch Chip Frag	OBS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.81	BTF	OBS	Very Small	0.1	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1173	60.82	Retouch Chip Frag	OBS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.83	Secondary Cortical Spall	CCS	Medium	6.9	Cortical	Absent	1-50%
26Wp1173	60.84	Cortical Spall Frag	CCS	Medium	3.5	Unidentifiable	Absent	1-50%
26Wp1173	60.85	Flake Frag	CCS	Small	1.7	Unidentifiable	Absent	0%
26Wp1173	60.86	Flake	CCS	Small	1.1	Smooth	Absent	0%
26Wp1173	60.87	Flake Frag	CCS	Small	1.0	Unidentifiable	Absent	0%
26Wp1173	60.88	BTF	CCS	Small	0.3	Complex	Present	0%
26Wp1173	60.89	Flake Frag	CCS	Small	0.2	Unidentifiable	Absent	0%
26Wp1173	60.90	BTF	CCS	Small	0.1	Complex	Absent	0%
26Wp1173	60.91	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp1173	60.92	Retouch Chip	CCS	Very Small	0.1	Smooth	Absent	0%
26Wp1173	69.1	Cortical Spall Frag	CCS	Medium	13.0	Unidentifiable	Absent	1-50%
26Wp1173	69.2	Primary Cortical Spall	CCS	Medium	6.0	Complex	Absent	51-100%
26Wp1173	70	BTF	CCS	Small	1.1	Complex	Absent	0%
26Wp1173	71	Flake	CCS	Small	0.6	Smooth	Absent	0%
26Wp1173	72.02	Flake Frag	CCS	Medium	10.2	Unidentifiable	Absent	0%
26Wp1173	72.03	Flake	CCS	Medium	3.3	Smooth	Absent	0%
26Wp1173	72.04	Flake	CCS	Small	1.5	Smooth	Absent	0%
26Wp1173	72.05	BTF	CCS	Small	1.8	Complex	Present	0%
26Wp1173	72.06	BTF	CCS	Small	0.6	Complex	Present	0%
26Wp1173	72.07	BTF	CCS	Small	0.9	Complex	Present	0%
26Wp1173	72.08	Cortical Spall Frag	CCS	Small	0.7	Unidentifiable	Absent	1-50%
26Wp1173	72.09	Angular Shatter	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	72.10	BTF	CCS	Small	0.5	Complex	Present	0%
26Wp1173	72.11	Flake Frag	CCS	Small	0.4	Unidentifiable	Absent	0%
26Wp1173	72.12	BTF	CCS	Small	0.2	Complex	Present	0%
26Wp1173	72.13	Flake	CCS	Small	0.2	Smooth	Absent	0%
26Wp1173	72.14	Flake Frag	CCS	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	73.01	BTF	OBS	Small	0.9	Complex	Present	0%
26Wp1173	73.02	Flake Frag	OBS	Small	0.7	Unidentifiable	Absent	0%
26Wp1173	73.03	BTF	OBS	Small	0.6	Complex	Present	0%
26Wp1173	73.04	BTF	OBS	Small	0.5	Complex	Present	0%
26Wp1173	73.05	Flake Frag	OBS	Small	0.5	Unidentifiable	Absent	0%
26Wp1173	73.06	BTF	OBS	Small	0.5	Complex	Present	0%
26Wp1173	73.07	Flake Frag	OBS	Small	0.2	Unidentifiable	Absent	0%
26Wp1173	73.08	BTF	OBS	Small	0.3	Complex	Present	0%
26Wp1173	73.09	Flake Frag	OBS	Small	0.1	Unidentifiable	Absent	0%
26Wp1173	73.10	BTF	OBS	Small	0.1	Complex	Present	0%
26Wp1177	20	BTF	OBS	Small	1.4	Complex	Present	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1177	21	Cortical Spall Frag	CCS	Medium	12.3	Unidentifiable	Absent	51-100%
26Wp1177	22.001	Secondary Cortical Spall	CCS	Medium	11.1	Smooth	Absent	1-50%
26Wp1177	22.002	Flake Frag	CCS	Medium	9.2	Unidentifiable	Absent	0%
26Wp1177	22.003	Cortical Spall Frag	CCS	Medium	9.9	Unidentifiable	Absent	1-50%
26Wp1177	22.004	BTF	CCS	Medium	5.4	Complex	Present	0%
26Wp1177	22.005	Cortical Spall Frag	CCS	Medium	7.9	Unidentifiable	Absent	1-50%
26Wp1177	22.006	BTF	CCS	Medium	5.4	Complex	Present	0%
26Wp1177	22.007	Cortical Spall Frag	CCS	Medium	5.7	Unidentifiable	Absent	1-50%
26Wp1177	22.008	Secondary Cortical Spall	CCS	Medium	5.0	Smooth	Absent	1-50%
26Wp1177	22.009	Flake	CCS	Medium	3.8	Smooth	Absent	0%
26Wp1177	22.010	Secondary Cortical Spall	CCS	Medium	4.5	Cortical	Absent	1-50%
26Wp1177	22.011	Flake	CCS	Medium	3.1	Smooth	Absent	0%
26Wp1177	22.012	Cortical Spall Frag	CCS	Small	3.8	Unidentifiable	Absent	1-50%
26Wp1177	22.013	Flake	CCS	Medium	4.4	Smooth	Absent	0%
26Wp1177	22.014	Flake Frag	CCS	Medium	5.3	Unidentifiable	Absent	0%
26Wp1177	22.015	Flake Frag	CCS	Medium	2.3	Unidentifiable	Absent	0%
26Wp1177	22.016	Flake	CCS	Small	2.4	Smooth	Absent	0%
26Wp1177	22.017	Flake Frag	CCS	Small	2.3	Unidentifiable	Absent	0%
26Wp1177	22.018	Flake Frag	CCS	Small	1.8	Unidentifiable	Absent	0%
26Wp1177	22.019	Flake Frag	CCS	Small	2.4	Unidentifiable	Absent	0%
26Wp1177	22.020	Flake Frag	CCS	Small	2.6	Unidentifiable	Absent	0%
26Wp1177	22.021	BTF	CCS	Small	2.2	Complex	Present	0%
26Wp1177	22.022	Angular Shatter	CCS	Small	1.7	Unidentifiable	Absent	0%
26Wp1177	22.023	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp1177	22.024	Flake	CCS	Small	1.3	Smooth	Absent	0%
26Wp1177	22.025	BTF	CCS	Small	1.1	Complex	Present	0%
26Wp1177	22.026	Flake Frag	CCS	Small	1.5	Unidentifiable	Absent	0%
26Wp1177	22.027	Flake Frag	CCS	Small	1.4	Unidentifiable	Absent	0%
26Wp1177	22.028	Flake	CCS	Small	0.8	Smooth	Present	0%
26Wp1177	22.029	Flake Frag	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp1177	22.030	Angular Shatter	CCS	Small	1.0	Unidentifiable	Absent	0%
26Wp1177	22.031	Secondary Cortical Spall	CCS	Small	0.8	Smooth	Absent	1-50%
26Wp1177	22.032	Angular Shatter	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp1177	22.033	Flake Frag	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp1177	22.034	BTF	CCS	Small	0.4	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1177	22.035	Flake Frag	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp1177	22.036	BTF	CCS	Small	0.4	Complex	Absent	0%
26Wp1177	22.037	Flake Frag	CCS	Small	0.1	Unidentifiable	Absent	0%
26Wp1177	22.038	Cortical Spall Frag	FGV	Medium	17.1	Unidentifiable	Absent	1-50%
26Wp1177	22.039	Flake Frag	FGV	Medium	8.6	Unidentifiable	Absent	0%
26Wp1177	22.040	Secondary Cortical Spall	FGV	Medium	10.0	Complex	Present	1-50%
26Wp1177	22.041	Flake Frag	FGV	Medium	5.7	Unidentifiable	Absent	0%
26Wp1177	22.042	Secondary Cortical Spall	FGV	Medium	7.2	Cortical	Absent	1-50%
26Wp1177	22.043	Cortical Spall Frag	FGV	Medium	6.0	Unidentifiable	Absent	51-100%
26Wp1177	22.044	Secondary Cortical Spall	FGV	Medium	6.3	Cortical	Absent	1-50%
26Wp1177	22.045	BTF	FGV	Medium	5.4	Complex	Absent	0%
26Wp1177	22.046	Secondary Cortical Spall	FGV	Medium	3.8	Complex	Present	1-50%
26Wp1177	22.047	BTF	FGV	Medium	4.2	Complex	Absent	0%
26Wp1177	22.048	Primary Cortical Spall	FGV	Medium	6.1	Smooth	Absent	51-100%
26Wp1177	22.049	BTF	FGV	Medium	3.1	Complex	Present	0%
26Wp1177	22.050	Cortical Spall Frag	FGV	Medium	2.1	Unidentifiable	Absent	1-50%
26Wp1177	22.051	Cortical Spall Frag	FGV	Medium	3.0	Unidentifiable	Absent	1-50%
26Wp1177	22.052	Cortical Spall Frag	FGV	Small	3.2	Unidentifiable	Absent	1-50%
26Wp1177	22.053	Flake Frag	FGV	Small	2.7	Unidentifiable	Absent	0%
26Wp1177	22.054	Flake	FGV	Small	2.9	Smooth	Absent	0%
26Wp1177	22.055	Secondary Cortical Spall	FGV	Small	3.9	Complex	Present	1-50%
26Wp1177	22.056	Cortical Spall Frag	FGV	Small	3.9	Unidentifiable	Absent	51-100%
26Wp1177	22.057	Secondary Cortical Spall	FGV	Small	2.2	Complex	Present	1-50%
26Wp1177	22.058	BTF	FGV	Medium	3.8	Complex	Absent	0%
26Wp1177	22.059	BTF	FGV	Small	2.2	Complex	Present	0%
26Wp1177	22.060	Flake Frag	FGV	Medium	2.5	Unidentifiable	Absent	0%
26Wp1177	22.061	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
26Wp1177	22.062	BTF	FGV	Small	3.5	Complex	Present	0%
26Wp1177	22.063	Cortical Spall Frag	FGV	Medium	2.3	Unidentifiable	Absent	1-50%
26Wp1177	22.064	Flake Frag	FGV	Small	2.2	Unidentifiable	Absent	0%
26Wp1177	22.065	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1177	22.066	Flake	FGV	Small	2.0	Smooth	Absent	0%
26Wp1177	22.067	BTF	FGV	Small	1.5	Complex	Present	0%
26Wp1177	22.068	Flake Frag	FGV	Small	2.0	Unidentifiable	Absent	0%
26Wp1177	22.069	Flake Frag	FGV	Small	1.6	Unidentifiable	Absent	0%
26Wp1177	22.070	BTF	FGV	Small	1.3	Complex	Present	0%
26Wp1177	22.071	Flake Frag	FGV	Small	2.0	Unidentifiable	Absent	0%
26Wp1177	22.072	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
26Wp1177	22.073	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
26Wp1177	22.074	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp1177	22.075	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp1177	22.076	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp1177	22.077	Flake Frag	FGV	Small	1.8	Unidentifiable	Absent	0%
26Wp1177	22.078	Flake	FGV	Small	0.9	Smooth	Absent	0%
26Wp1177	22.079	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
26Wp1177	22.080	Cortical Spall Frag	FGV	Small	0.9	Unidentifiable	Absent	1-50%
26Wp1177	22.081	BTF	FGV	Small	0.9	Complex	Absent	0%
26Wp1177	22.082	Flake	FGV	Small	1.2	Smooth	Absent	0%
26Wp1177	22.083	Secondary Cortical Spall	FGV	Small	1.2	Cortical	Absent	1-50%
26Wp1177	22.084	BTF	FGV	Small	1.0	Complex	Present	0%
26Wp1177	22.085	BTF	FGV	Small	0.9	Complex	Present	0%
26Wp1177	22.086	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1177	22.087	Secondary Cortical Spall	FGV	Small	1.0	Cortical	Absent	1-50%
26Wp1177	22.088	Cortical Spall Frag	FGV	Small	1.1	Unidentifiable	Absent	1-50%
26Wp1177	22.089	Cortical Spall Frag	FGV	Small	1.1	Unidentifiable	Absent	1-50%
26Wp1177	22.090	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp1177	22.091	BTF	FGV	Small	0.6	Complex	Present	0%
26Wp1177	22.092	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp1177	22.093	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp1177	22.094	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp1177	22.095	BTF	FGV	Small	0.4	Complex	Absent	0%
26Wp1177	22.096	BTF	FGV	Small	0.8	Complex	Absent	0%
26Wp1177	22.097	Cortical Spall Frag	FGV	Small	0.7	Unidentifiable	Absent	1-50%
26Wp1177	22.098	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp1177	22.099	Flake	FGV	Small	0.5	Smooth	Absent	0%
26Wp1177	22.100	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp1177	22.101	BTF	FGV	Small	0.5	Complex	Absent	0%
26Wp1177	22.102	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp1177	22.103	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp1177	24.01	Flake Frag	OBS	Small	1.8	Unidentifiable	Present	0%
26Wp1177	24.02	Flake Frag	OBS	Small	0.6	Unidentifiable	Present	0%
26Wp1177	24.03	Flake Frag	OBS	Small	0.6	Unidentifiable	Present	0%
26Wp1177	24.04	Flake Frag	OBS	Small	0.5	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp1177	24.05	Flake Frag	OBS	Small	0.2	Unidentifiable	Absent	0%
26Wp1177	24.06	Flake Frag	OBS	Small	0.5	Unidentifiable	Present	0%
26Wp1177	24.07	BTF	OBS	Small	0.9	Complex	Present	0%
26Wp1177	24.08	BTF	OBS	Small	0.9	Complex	Present	0%
26Wp1177	24.09	BTF	OBS	Small	0.8	Complex	Absent	0%
26Wp1177	24.10	BTF	OBS	Small	1.2	Complex	Present	0%
26Wp7316	12.1	BTF	FGV	Small	2.0	Complex	Absent	0%
26Wp7316	12.2	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp7316	12.3	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7316	12.4	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7316	12.5	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7316	12.6	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7316	12.7	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7316	12.8	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7316	12.9	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7316	14.01	Flake Frag	CCS	Medium	4.6	Unidentifiable	Absent	0%
26Wp7316	14.02	Flake Frag	CCS	Small	2.6	Unidentifiable	Absent	0%
26Wp7316	14.03	Cortical Spall Frag	CCS	Small	2.0	Unidentifiable	Absent	1-50%
26Wp7316	14.04	Flake Frag	CCS	Small	1.3	Unidentifiable	Absent	0%
26Wp7316	14.05	Flake Frag	CCS	Small	0.9	Unidentifiable	Absent	0%
26Wp7316	14.06	Flake Frag	CCS	Small	1.2	Unidentifiable	Absent	0%
26Wp7316	14.07	Flake Frag	CCS	Small	1.2	Unidentifiable	Absent	0%
26Wp7316	14.08	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7316	14.09	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7316	14.10	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7316	14.11	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7316	14.12	Flake	CCS	Small	0.7	Smooth	Absent	0%
26Wp7316	14.13	Flake Frag	CCS	Small	0.4	Unidentifiable	Absent	0%
26Wp7316	14.14	Flake	CCS	Small	0.3	Smooth	Absent	0%
26Wp7316	14.15	Flake Frag	CCS	Small	0.2	Unidentifiable	Absent	0%
26Wp7316	14.16	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7316	15.1	Flake Frag	OBS	Small	0.2	Unidentifiable	Absent	0%
26Wp7316	15.2	BTF	OBS	Small	0.5	Complex	Present	0%
26Wp7316	15.3	BTF	OBS	Small	0.4	Complex	Absent	0%
26Wp7318	8.01	Primary Cortical Spall	CCS	Medium	4.3	Smooth	Absent	51-100%
26Wp7318	8.02	Primary Cortical Spall	CCS	Small	2.4	Cortical	Absent	51-100%
26Wp7318	8.03	Secondary Cortical Spall	CCS	Small	2.6	Cortical	Absent	1-50%
26Wp7318	8.04	Flake Frag	CCS	Small	1.7	Unidentifiable	Absent	0%
26Wp7318	8.05	Flake	CCS	Small	3.2	Smooth	Absent	0%
26Wp7318	8.06	Flake	CCS	Medium	3.6	Smooth	Absent	0%
26Wp7318	8.07	Flake Frag	CCS	Small	2.9	Unidentifiable	Absent	0%
26Wp7318	8.08	Flake	CCS	Small	1.6	Smooth	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7318	8.09	Cortical Spall Frag	CCS	Small	1.9	Unidentifiable	Absent	1-50%
26Wp7318	8.10	BTF	CCS	Small	0.6	Complex	Absent	0%
26Wp7318	8.11	BTF	CCS	Small	0.9	Complex	Absent	0%
26Wp7318	8.12	BTF	CCS	Small	0.6	Complex	Present	0%
26Wp7318	8.13	Flake Frag	CCS	Small	0.4	Unidentifiable	Absent	0%
26Wp7318	8.14	Flake	CCS	Small	0.1	Smooth	Absent	0%
26Wp7318	8.15	Flake	CCS	Small	0.2	Smooth	Absent	0%
26Wp7318	8.16	BTF	CCS	Very Small	0.1	Complex	Present	0%
26Wp7318	8.17	Flake Frag	CCS	Small	0.1	Unidentifiable	Absent	0%
26Wp7318	8.18	BTF	CCS	Small	0.1	Complex	Present	0%
26Wp7318	9.002	Secondary Cortical Spall	FGV	Large	20.6	Smooth	Absent	1-50%
26Wp7318	9.003	Flake Frag	FGV	Large	13.0	Unidentifiable	Absent	0%
26Wp7318	9.004	Flake	FGV	Large	21.4	Smooth	Absent	0%
26Wp7318	9.005	Flake	FGV	Large	14.1	Smooth	Absent	0%
26Wp7318	9.006	BTF	FGV	Medium	11.9	Complex	Present	0%
26Wp7318	9.007	BTF	FGV	Medium	10.3	Complex	Absent	0%
26Wp7318	9.008	BTF	FGV	Medium	7.4	Complex	Absent	0%
26Wp7318	9.009	Flake Frag	FGV	Medium	9.0	Unidentifiable	Absent	0%
26Wp7318	9.010	BTF	FGV	Medium	6.8	Complex	Present	0%
26Wp7318	9.011	Flake	FGV	Medium	6.4	Smooth	Absent	0%
26Wp7318	9.012	BTF	FGV	Medium	8.5	Complex	Absent	0%
26Wp7318	9.013	Cortical Spall Frag	FGV	Medium	7.3	Unidentifiable	Absent	51-100%
26Wp7318	9.014	BTF	FGV	Medium	6.5	Complex	Present	0%
26Wp7318	9.015	Cortical Spall Frag	FGV	Medium	6.6	Unidentifiable	Absent	1-50%
26Wp7318	9.016	BTF	FGV	Medium	6.5	Complex	Absent	0%
26Wp7318	9.017	BTF	FGV	Medium	9.8	Complex	Absent	0%
26Wp7318	9.018	Secondary Cortical Spall	FGV	Medium	6.4	Cortical	Absent	1-50%
26Wp7318	9.019	Flake Frag	FGV	Medium	6.2	Unidentifiable	Absent	0%
26Wp7318	9.020	Flake Frag	FGV	Medium	5.3	Unidentifiable	Absent	0%
26Wp7318	9.021	Blade-like Flake	FGV	Medium	4.7	Complex	Present	0%
26Wp7318	9.022	Flake Frag	FGV	Medium	5.8	Unidentifiable	Absent	0%
26Wp7318	9.023	BTF	FGV	Medium	4.0	Complex	Present	0%
26Wp7318	9.024	Flake Frag	FGV	Medium	5.1	Unidentifiable	Absent	0%
26Wp7318	9.025	BTF	FGV	Medium	4.1	Complex	Present	0%
26Wp7318	9.026	Secondary Cortical Spall	FGV	Medium	10.8	Smooth	Absent	1-50%
26Wp7318	9.027	Secondary Cortical Spall	FGV	Medium	5.5	Complex	Present	1-50%
26Wp7318	9.028	Flake Frag	FGV	Medium	3.8	Unidentifiable	Absent	0%
26Wp7318	9.029	Flake Frag	FGV	Medium	4.5	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7318	9.030	BTF	FGV	Medium	3.4	Complex	Absent	0%
26Wp7318	9.031	BTF	FGV	Medium	4.9	Complex	Present	0%
26Wp7318	9.032	Flake Frag	FGV	Medium	5.9	Unidentifiable	Absent	0%
26Wp7318	9.033	Flake Frag	FGV	Medium	3.8	Unidentifiable	Absent	0%
26Wp7318	9.034	Flake Frag	FGV	Medium	8.8	Unidentifiable	Absent	0%
26Wp7318	9.035	Flake	FGV	Medium	4.0	Smooth	Absent	0%
26Wp7318	9.036	Secondary Cortical Spall	FGV	Medium	3.2	Complex	Present	1-50%
26Wp7318	9.037	Cortical Spall Frag	FGV	Medium	6.1	Unidentifiable	Absent	1-50%
26Wp7318	9.038	BTF	FGV	Medium	5.8	Complex	Present	0%
26Wp7318	9.039	BTF	FGV	Medium	4.5	Complex	Present	0%
26Wp7318	9.040	BTF	FGV	Medium	4.7	Complex	Present	0%
26Wp7318	9.041	Cortical Spall Frag	FGV	Medium	4.6	Unidentifiable	Absent	1-50%
26Wp7318	9.042	Flake	FGV	Medium	3.7	Smooth	Absent	0%
26Wp7318	9.043	Flake Frag	FGV	Medium	4.1	Unidentifiable	Absent	0%
26Wp7318	9.044	Flake Frag	FGV	Medium	4.0	Unidentifiable	Absent	0%
26Wp7318	9.045	Cortical Spall Frag	FGV	Small	3.4	Unidentifiable	Absent	1-50%
26Wp7318	9.046	Flake Frag	FGV	Medium	5.6	Unidentifiable	Absent	0%
26Wp7318	9.047	BTF	FGV	Medium	3.9	Complex	Present	0%
26Wp7318	9.048	Flake Frag	FGV	Medium	3.5	Unidentifiable	Absent	0%
26Wp7318	9.049	BTF	FGV	Small	4.1	Complex	Present	0%
26Wp7318	9.050	Flake Frag	FGV	Small	4.3	Unidentifiable	Absent	0%
26Wp7318	9.051	BTF	FGV	Medium	3.3	Complex	Absent	0%
26Wp7318	9.052	Flake	FGV	Medium	2.8	Smooth	Absent	0%
26Wp7318	9.053	Flake	FGV	Medium	3.1	Smooth	Absent	0%
26Wp7318	9.054	Flake	FGV	Small	2.7	Smooth	Absent	0%
26Wp7318	9.055	Flake Frag	FGV	Small	4.1	Unidentifiable	Absent	0%
26Wp7318	9.056	BTF	FGV	Small	3.9	Complex	Present	0%
26Wp7318	9.057	BTF	FGV	Medium	3.7	Complex	Present	0%
26Wp7318	9.058	Flake	FGV	Medium	3.2	Smooth	Absent	0%
26Wp7318	9.059	Flake Frag	FGV	Medium	2.9	Unidentifiable	Absent	0%
26Wp7318	9.060	Flake Frag	FGV	Small	3.0	Unidentifiable	Absent	0%
26Wp7318	9.061	Flake	FGV	Medium	3.0	Smooth	Absent	0%
26Wp7318	9.062	BTF	FGV	Medium	2.5	Complex	Present	0%
26Wp7318	9.063	BTF	FGV	Small	2.4	Complex	Absent	0%
26Wp7318	9.064	BTF	FGV	Medium	2.1	Complex	Present	0%
26Wp7318	9.065	Flake Frag	FGV	Small	1.6	Unidentifiable	Absent	0%
26Wp7318	9.066	Flake Frag	FGV	Small	2.2	Unidentifiable	Absent	0%
26Wp7318	9.067	BTF	FGV	Small	2.0	Complex	Present	0%
26Wp7318	9.068	BTF	FGV	Medium	2.8	Complex	Present	0%
26Wp7318	9.069	Flake	FGV	Small	2.0	Smooth	Absent	0%
26Wp7318	9.070	Flake Frag	FGV	Small	1.7	Unidentifiable	Absent	0%
26Wp7318	9.071	Flake Frag	FGV	Medium	2.6	Unidentifiable	Absent	0%
26Wp7318	9.072	BTF	FGV	Medium	2.1	Complex	Present	0%
26Wp7318	9.073	Flake	FGV	Small	2.2	Smooth	Present	0%
26Wp7318	9.074	Flake	FGV	Medium	2.8	Smooth	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7318	9.075	Flake Frag	FGV	Medium	2.5	Unidentifiable	Absent	0%
26Wp7318	9.076	BTF	FGV	Small	3.0	Complex	Present	0%
26Wp7318	9.077	Flake	FGV	Medium	2.8	Smooth	Absent	0%
26Wp7318	9.078	Flake Frag	FGV	Small	3.0	Unidentifiable	Absent	0%
26Wp7318	9.079	Flake	FGV	Small	3.1	Smooth	Absent	0%
26Wp7318	9.080	Flake	FGV	Small	3.0	Smooth	Absent	0%
26Wp7318	9.081	Secondary Cortical Spall	FGV	Small	1.6	Complex	Absent	1-50%
26Wp7318	9.082	Flake Frag	FGV	Medium	2.9	Unidentifiable	Absent	0%
26Wp7318	9.083	BTF	FGV	Small	1.9	Complex	Present	0%
26Wp7318	9.084	BTF	FGV	Medium	2.5	Complex	Absent	0%
26Wp7318	9.085	BTF	FGV	Small	2.3	Complex	Present	0%
26Wp7318	9.086	Flake Frag	FGV	Medium	2.9	Unidentifiable	Absent	0%
26Wp7318	9.087	BTF	FGV	Small	2.2	Complex	Present	0%
26Wp7318	9.088	Flake Frag	FGV	Small	2.7	Unidentifiable	Absent	0%
26Wp7318	9.089	Cortical Spall Frag	FGV	Small	2.2	Unidentifiable	Absent	1-50%
26Wp7318	9.090	Flake Frag	FGV	Small	2.3	Unidentifiable	Absent	0%
26Wp7318	9.091	Secondary Cortical Spall	FGV	Small	1.7	Cortical	Absent	1-50%
26Wp7318	9.092	Flake Frag	FGV	Small	2.7	Unidentifiable	Absent	0%
26Wp7318	9.093	Flake	FGV	Medium	3.0	Smooth	Absent	0%
26Wp7318	9.094	Flake Frag	FGV	Small	3.4	Unidentifiable	Absent	0%
26Wp7318	9.095	BTF	FGV	Medium	2.1	Complex	Absent	0%
26Wp7318	9.096	Flake	FGV	Small	2.5	Smooth	Absent	0%
26Wp7318	9.097	Flake Frag	FGV	Small	1.8	Unidentifiable	Absent	0%
26Wp7318	9.098	BTF	FGV	Small	1.8	Complex	Absent	0%
26Wp7318	9.099	Cortical Spall Frag	FGV	Small	2.7	Unidentifiable	Absent	1-50%
26Wp7318	9.100	BTF	FGV	Small	1.9	Complex	Absent	0%
26Wp7318	9.101	Flake	FGV	Medium	2.3	Smooth	Absent	0%
26Wp7318	9.102	Cortical Spall Frag	FGV	Small	3.0	Unidentifiable	Absent	1-50%
26Wp7318	9.103	Secondary Cortical Spall	FGV	Small	2.0	Cortical	Absent	1-50%
26Wp7318	9.104	Flake	FGV	Medium	2.1	Smooth	Absent	0%
26Wp7318	9.105	BTF	FGV	Small	2.1	Complex	Present	0%
26Wp7318	9.106	Flake Frag	FGV	Small	2.3	Unidentifiable	Absent	0%
26Wp7318	9.107	Cortical Spall Frag	FGV	Small	2.3	Unidentifiable	Absent	1-50%
26Wp7318	9.108	BTF	FGV	Small	1.7	Complex	Absent	0%
26Wp7318	9.109	BTF	FGV	Small	1.6	Complex	Present	0%
26Wp7318	9.110	BTF	FGV	Medium	2.3	Complex	Present	0%
26Wp7318	9.111	Flake Frag	FGV	Small	2.4	Unidentifiable	Absent	0%
26Wp7318	9.112	Flake Frag	FGV	Medium	1.8	Unidentifiable	Absent	0%
26Wp7318	9.113	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
26Wp7318	9.114	BTF	FGV	Small	2.4	Complex	Absent	0%
26Wp7318	9.115	Flake Frag	FGV	Small	2.0	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7318	9.116	Cortical Spall Frag	FGV	Small	1.7	Unidentifiable	Absent	1-50%
26Wp7318	9.117	BTF	FGV	Small	1.1	Complex	Present	0%
26Wp7318	9.118	BTF	FGV	Medium	1.3	Complex	Present	0%
26Wp7318	9.119	BTF	FGV	Small	1.3	Complex	Present	0%
26Wp7318	9.120	Flake	FGV	Small	1.2	Smooth	Absent	0%
26Wp7318	9.121	Flake Frag	FGV	Small	1.8	Unidentifiable	Absent	0%
26Wp7318	9.122	BTF	FGV	Small	1.6	Complex	Present	0%
26Wp7318	9.123	BTF	FGV	Small	1.1	Complex	Absent	0%
26Wp7318	9.124	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7318	9.125	Angular Shatter	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7318	9.126	Flake Frag	FGV	Medium	2.5	Unidentifiable	Absent	0%
26Wp7318	9.127	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%
26Wp7318	9.128	Flake	FGV	Small	1.9	Smooth	Absent	0%
26Wp7318	9.129	BTF	FGV	Small	0.8	Complex	Present	0%
26Wp7318	9.130	BTF	FGV	Small	1.0	Complex	Present	0%
26Wp7318	9.131	BTF	FGV	Small	0.6	Complex	Present	0%
26Wp7318	9.132	Flake Frag	FGV	Small	1.6	Unidentifiable	Absent	0%
26Wp7318	9.133	BTF	FGV	Small	1.1	Complex	Present	0%
26Wp7318	9.134	BTF	FGV	Small	1.1	Complex	Present	0%
26Wp7318	9.135	BTF	FGV	Small	1.7	Complex	Absent	0%
26Wp7318	9.136	BTF	FGV	Small	1.7	Complex	Absent	0%
26Wp7318	9.137	BTF	FGV	Small	1.4	Complex	Present	0%
26Wp7318	9.138	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7318	9.139	Cortical Spall Frag	FGV	Small	0.9	Unidentifiable	Absent	51-100%
26Wp7318	9.140	BTF	FGV	Small	1.6	Complex	Present	0%
26Wp7318	9.141	Flake	FGV	Small	1.5	Smooth	Present	0%
26Wp7318	9.142	Flake	FGV	Small	1.3	Smooth	Present	0%
26Wp7318	9.143	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
26Wp7318	9.144	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
26Wp7318	9.145	BTF	FGV	Small	1.2	Complex	Present	0%
26Wp7318	9.146	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp7318	9.147	Cortical Spall Frag	FGV	Small	1.3	Unidentifiable	Absent	51-100%
26Wp7318	9.148	BTF	FGV	Small	1.6	Complex	Present	0%
26Wp7318	9.149	BTF	FGV	Small	1.1	Complex	Present	0%
26Wp7318	9.150	BTF	FGV	Small	1.5	Complex	Present	0%
26Wp7318	9.151	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
26Wp7318	9.152	Cortical Spall Frag	FGV	Small	1.7	Unidentifiable	Absent	51-100%
26Wp7318	9.153	Flake Frag	FGV	Small	2.3	Unidentifiable	Absent	0%
26Wp7318	9.154	BTF	FGV	Small	1.4	Complex	Present	0%
26Wp7318	9.155	BTF	FGV	Small	1.3	Complex	Present	0%
26Wp7318	9.156	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7318	9.157	BTF	FGV	Small	1.1	Complex	Present	0%
26Wp7318	9.158	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
26Wp7318	9.159	BTF	FGV	Small	1.1	Complex	Present	0%
26Wp7318	9.160	BTF	FGV	Small	1.2	Complex	Present	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7318	9.161	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
26Wp7318	9.162	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp7318	9.163	BTF	FGV	Small	1.2	Complex	Present	0%
26Wp7318	9.164	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
26Wp7318	9.165	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7318	9.166	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
26Wp7318	9.167	Angular Shatter	FGV	Small	1.8	Unidentifiable	Absent	0%
26Wp7318	9.168	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7318	9.169	BTF	FGV	Small	0.8	Complex	Present	0%
26Wp7318	9.170	BTF	FGV	Small	0.9	Complex	Present	0%
26Wp7318	9.171	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
26Wp7318	9.172	Flake	FGV	Small	0.4	Smooth	Absent	0%
26Wp7318	9.173	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7318	9.174	BTF	FGV	Small	0.8	Complex	Present	0%
26Wp7318	9.175	Cortical Spall Frag	FGV	Small	1.0	Unidentifiable	Absent	1-50%
26Wp7318	9.176	BTF	FGV	Small	0.8	Complex	Present	0%
26Wp7318	9.177	BTF	FGV	Small	1.0	Complex	Present	0%
26Wp7318	9.178	BTF	FGV	Small	0.9	Complex	Present	0%
26Wp7318	9.179	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7318	9.180	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp7318	9.181	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp7318	9.182	BTF	FGV	Small	0.7	Complex	Present	0%
26Wp7318	9.183	BTF	FGV	Small	0.6	Complex	Present	0%
26Wp7318	9.184	BTF	FGV	Small	1.4	Complex	Present	0%
26Wp7318	9.185	Flake	FGV	Small	0.8	Smooth	Absent	0%
26Wp7318	9.186	BTF	FGV	Small	1.1	Complex	Present	0%
26Wp7318	9.187	BTF	FGV	Small	0.7	Complex	Present	0%
26Wp7318	9.188	BTF	FGV	Small	1.1	Complex	Present	0%
26Wp7318	9.189	BTF	FGV	Small	0.8	Complex	Present	0%
26Wp7318	9.190	BTF	FGV	Small	0.8	Complex	Present	0%
26Wp7318	9.191	BTF	FGV	Small	1.4	Complex	Present	0%
26Wp7318	9.192	Flake	FGV	Small	1.3	Smooth	Absent	0%
26Wp7318	9.193	BTF	FGV	Small	1.2	Complex	Present	0%
26Wp7318	9.194	BTF	FGV	Small	0.9	Complex	Present	0%
26Wp7318	9.195	BTF	FGV	Small	0.9	Complex	Absent	0%
26Wp7318	9.196	BTF	FGV	Small	0.9	Complex	Present	0%
26Wp7318	9.197	BTF	FGV	Small	0.8	Complex	Absent	0%
26Wp7318	9.198	BTF	FGV	Small	0.8	Complex	Present	0%
26Wp7318	9.199	BTF	FGV	Small	0.9	Complex	Present	0%
26Wp7318	9.200	Flake	FGV	Small	1.0	Smooth	Absent	0%
26Wp7318	9.201	BTF	FGV	Small	0.8	Complex	Present	0%
26Wp7318	9.202	BTF	FGV	Small	0.7	Complex	Absent	0%
26Wp7318	9.203	BTF	FGV	Small	0.7	Complex	Present	0%
26Wp7318	9.204	BTF	FGV	Small	1.0	Complex	Present	0%
26Wp7318	9.205	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp7318	9.206	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp7318	9.207	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7318	9.208	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7318	9.209	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp7318	9.210	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.211	Flake	FGV	Small	0.3	Smooth	Absent	0%
26Wp7318	9.212	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7318	9.213	BTF	FGV	Small	0.7	Complex	Present	0%
26Wp7318	9.214	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7318	9.215	BTF	FGV	Small	0.6	Complex	Present	0%
26Wp7318	9.216	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7318	9.217	Flake	FGV	Small	0.3	Smooth	Absent	0%
26Wp7318	9.218	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7318	9.219	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7318	9.220	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp7318	9.221	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp7318	9.222	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.223	Flake	FGV	Small	0.7	Smooth	Absent	0%
26Wp7318	9.224	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7318	9.225	Flake	FGV	Small	0.5	Smooth	Absent	0%
26Wp7318	9.226	Flake	FGV	Small	0.3	Smooth	Absent	0%
26Wp7318	9.227	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7318	9.228	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp7318	9.229	Flake	FGV	Small	0.5	Smooth	Absent	0%
26Wp7318	9.230	BTF	FGV	Small	0.4	Complex	Present	0%
26Wp7318	9.231	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp7318	9.232	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.233	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7318	9.234	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp7318	9.235	BTF	FGV	Small	0.6	Complex	Absent	0%
26Wp7318	9.236	Angular Shatter	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7318	9.237	Flake	FGV	Small	0.3	Smooth	Absent	0%
26Wp7318	9.238	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7318	9.239	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7318	9.240	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7318	9.241	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp7318	9.242	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.243	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.244	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.245	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7318	9.246	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.247	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.248	BTF	FGV	Small	0.3	Complex	Absent	0%
26Wp7318	9.249	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7318	9.250	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.251	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp7318	9.252	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7318	9.253	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7318	9.254	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp7318	9.255	BTF	FGV	Small	0.5	Complex	Absent	0%
26Wp7318	9.256	BTF	FGV	Small	0.3	Complex	Absent	0%
26Wp7318	9.257	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7318	9.258	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7318	9.259	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7318	9.260	BTF	FGV	Small	0.2	Complex	Absent	0%
26Wp7318	9.261	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7318	9.262	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp7318	9.263	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7318	9.264	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp7318	9.265	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp7318	9.266	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp7318	9.267	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7318	9.268	Flake	FGV	Small	0.2	Smooth	Absent	0%
26Wp7318	9.269	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp7318	9.270	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7318	9.271	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7318	9.272	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7318	9.273	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7318	9.274	Retouch Chip	FGV	Very Small	0.1	Smooth	Absent	0%
26Wp7318	9.275	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7318	9.276	Retouch Chip	FGV	Very Small	0.1	Smooth	Absent	0%
26Wp7318	9.277	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7318	9.278	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7318	9.279	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7318	10.1	BTF	OBS	Small	0.7	Complex	Present	0%
26Wp7318	10.2	Flake Frag	OBS	Very Small	0.3	Unidentifiable	Absent	0%
26Wp7318	10.3	BTF	OBS	Small	0.1	Complex	Absent	0%
26Wp7318	10.4	BTF	OBS	Small	0.1	Complex	Present	0%
26Wp7318	10.5	BTF	OBS	Small	0.1	Complex	Present	0%
26Wp7318	10.6	BTF	OBS	Small	0.1	Complex	Absent	0%
26Wp7321	5	Cortical Spall Frag	CCS	Small	0.2	Unidentifiable	Absent	1-50%
26Wp7321	7	Retouch Chip	OBS	Very Small	0.1	Smooth	Absent	0%
26Wp7321	8.01	BTF	FGV	Medium	4.6	Complex	Present	0%
26Wp7321	8.02	BTF	FGV	Medium	7.6	Complex	Absent	0%
26Wp7321	8.03	Flake Frag	FGV	Medium	7.1	Unidentifiable	Absent	0%
26Wp7321	8.04	BTF	FGV	Medium	3.2	Complex	Absent	0%
26Wp7321	8.05	Flake Frag	FGV	Medium	2.0	Unidentifiable	Absent	0%
26Wp7321	8.06	Flake Frag	FGV	Small	2.0	Unidentifiable	Absent	0%
26Wp7321	8.07	Secondary Cortical Spall	FGV	Small	2.3	Complex	Absent	1-50%
26Wp7321	8.08	Flake Frag	FGV	Small	2.3	Unidentifiable	Absent	0%
26Wp7321	8.09	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7321	8.10	Flake Frag	FGV	Small	2.1	Unidentifiable	Absent	0%
26Wp7321	8.11	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
26Wp7321	8.12	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7321	8.13	Flake	FGV	Small	1.1	Smooth	Absent	0%
26Wp7321	8.14	BTF	FGV	Small	0.8	Complex	Absent	0%
26Wp7321	8.15	BTF	FGV	Small	0.8	Complex	Absent	0%
26Wp7321	8.16	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7321	8.17	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7321	8.18	BTF	FGV	Small	0.6	Complex	Absent	0%
26Wp7321	8.19	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp7321	8.20	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7321	8.21	BTF	FGV	Small	0.3	Complex	Absent	0%
26Wp7321	8.22	BTF	FGV	Small	0.4	Complex	Absent	0%
26Wp7321	8.23	BTF	FGV	Small	0.5	Complex	Absent	0%
26Wp7321	8.24	BTF	FGV	Small	0.5	Complex	Absent	0%
26Wp7321	8.25	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7321	8.26	BTF	FGV	Small	0.4	Complex	Absent	0%
26Wp7321	8.27	BTF	FGV	Small	0.2	Complex	Absent	0%
26Wp7321	8.28	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp7321	8.29	BTF	FGV	Small	0.3	Complex	Absent	0%
26Wp7321	8.30	BTF	FGV	Small	0.3	Complex	Absent	0%
26Wp7321	8.31	Angular Shatter	FGV	Very Small	0.3	Unidentifiable	Absent	0%
26Wp7321	8.32	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7321	8.33	BTF	FGV	Small	0.3	Complex	Absent	0%
26Wp7321	8.34	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7321	8.35	BTF	FGV	Small	0.2	Complex	Absent	0%
26Wp7321	8.36	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7321	8.37	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7321	8.38	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7321	8.39	BTF	FGV	Small	0.2	Complex	Absent	0%
26Wp7321	8.40	Cortical Spall Frag	FGV	Small	0.2	Unidentifiable	Absent	1-50%
26Wp7321	8.41	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7321	8.42	BTF	FGV	Very Small	0.1	Complex	Present	0%
26Wp7321	9.01	Cortical Spall Frag	CCS	Medium	12.3	Unidentifiable	Absent	51-100%
26Wp7321	9.02	Primary Cortical Spall	CCS	Medium	6.0	Smooth	Absent	51-100%
26Wp7321	9.03	Cortical Spall Frag	CCS	Small	3.3	Unidentifiable	Absent	51-100%
26Wp7321	9.04	Cortical Spall Frag	CCS	Medium	5.4	Unidentifiable	Absent	51-100%
26Wp7321	9.05	Cortical Spall Frag	CCS	Medium	3.7	Unidentifiable	Absent	51-100%
26Wp7321	9.06	Cortical Spall Frag	CCS	Small	6.3	Unidentifiable	Absent	51-100%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7321	9.07	Cortical Spall Frag	CCS	Medium	5.8	Unidentifiable	Absent	51-100%
26Wp7321	9.08	Cortical Spall Frag	CCS	Small	2.1	Unidentifiable	Absent	1-50%
26Wp7321	9.09	Cortical Spall Frag	CCS	Small	1.3	Unidentifiable	Absent	1-50%
26Wp7321	9.10	Cortical Spall Frag	CCS	Small	1.3	Unidentifiable	Absent	51-100%
26Wp7321	9.11	Cortical Spall Frag	CCS	Medium	1.6	Unidentifiable	Absent	51-100%
26Wp7321	9.12	Cortical Spall Frag	CCS	Small	0.9	Unidentifiable	Absent	51-100%
26Wp7321	9.13	Angular Shatter	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp7321	9.14	Flake	CCS	Small	1.1	Smooth	Absent	0%
26Wp7321	9.15	Secondary Cortical Spall	CCS	Small	1.0	Smooth	Absent	1-50%
26Wp7321	9.16	Flake Frag	SND	Small	1.8	Unidentifiable	Absent	0%
26Wp7321	9.17	Secondary Cortical Spall	CCS	Small	1.2	Cortical	Absent	1-50%
26Wp7321	9.18	Flake Frag	CCS	Medium	4.4	Unidentifiable	Absent	0%
26Wp7321	9.19	Flake Frag	CCS	Medium	3.1	Unidentifiable	Absent	0%
26Wp7321	9.20	Flake Frag	CCS	Medium	2.9	Unidentifiable	Absent	0%
26Wp7321	9.21	Flake Frag	CCS	Medium	1.2	Unidentifiable	Absent	0%
26Wp7321	9.22	BTF	SND	Small	0.4	Complex	Absent	0%
26Wp7321	9.23	BTF	CCS	Small	0.6	Complex	Absent	0%
26Wp7321	9.24	Angular Shatter	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7321	9.25	Angular Shatter	CCS	Small	0.4	Unidentifiable	Absent	0%
26Wp7321	9.26	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7321	9.27	Flake Frag	CCS	Small	1.0	Unidentifiable	Absent	0%
26Wp7321	9.28	BTF	CCS	Small	0.7	Complex	Absent	0%
26Wp7321	9.29	Flake Frag	CCS	Small	1.5	Unidentifiable	Absent	0%
26Wp7321	9.30	Flake Frag	CCS	Small	3.0	Unidentifiable	Absent	0%
26Wp7321	9.31	Flake	CCS	Medium	4.0	Smooth	Absent	0%
26Wp7321	9.32	BTF	CCS	Medium	6.1	Complex	Present	0%
26Wp7321	9.33	BTF	CCS	Small	1.5	Complex	Absent	0%
26Wp7321	9.34	BTF	CCS	Small	0.6	Complex	Present	0%
26Wp7321	10.1	BTF	RHY	Medium	10.4	Complex	Present	0%
26Wp7321	10.2	Flake Frag	RHY	Small	1.6	Unidentifiable	Absent	0%
26Wp7321	10.3	Flake Frag	RHY	Small	0.4	Unidentifiable	Absent	0%
26Wp7321	10.4	Flake Frag	RHY	Small	0.3	Unidentifiable	Absent	0%
26Wp7323	4.001	Secondary Cortical Spall	FGV	Small	1.6	Cortical	Absent	1-50%
26Wp7323	4.002	BTF	FGV	Small	2.0	Complex	Present	0%
26Wp7323	4.003	Flake Frag	FGV	Small	3.0	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7323	4.004	BTF	FGV	Small	2.6	Complex	Absent	0%
26Wp7323	4.005	Flake Frag	FGV	Small	2.0	Unidentifiable	Absent	0%
26Wp7323	4.006	Flake Frag	FGV	Small	1.7	Unidentifiable	Absent	0%
26Wp7323	4.007	Secondary Cortical Spall	FGV	Small	2.3	Cortical	Absent	1-50%
26Wp7323	4.008	Flake Frag	FGV	Small	2.0	Unidentifiable	Absent	0%
26Wp7323	4.009	BTF	FGV	Small	2.0	Complex	Absent	0%
26Wp7323	4.010	Flake Frag	FGV	Small	1.8	Unidentifiable	Absent	0%
26Wp7323	4.011	Flake Frag	FGV	Small	2.4	Unidentifiable	Absent	0%
26Wp7323	4.012	BTF	FGV	Small	1.3	Complex	Present	0%
26Wp7323	4.013	BTF	FGV	Small	1.7	Complex	Absent	0%
26Wp7323	4.014	Flake Frag	FGV	Small	1.7	Unidentifiable	Absent	0%
26Wp7323	4.015	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7323	4.016	BTF	FGV	Small	1.3	Complex	Absent	0%
26Wp7323	4.017	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
26Wp7323	4.018	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%
26Wp7323	4.019	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
26Wp7323	4.020	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp7323	4.021	BTF	FGV	Small	1.2	Complex	Present	0%
26Wp7323	4.022	BTF	FGV	Small	1.8	Complex	Absent	0%
26Wp7323	4.023	BTF	FGV	Small	1.8	Complex	Absent	0%
26Wp7323	4.024	BTF	FGV	Small	1.1	Complex	Absent	0%
26Wp7323	4.025	BTF	FGV	Small	0.9	Complex	Absent	0%
26Wp7323	4.026	BTF	FGV	Small	1.5	Complex	Absent	0%
26Wp7323	4.027	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%
26Wp7323	4.028	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	4.029	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7323	4.030	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	4.031	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp7323	4.032	Flake Frag	FGV	Small	1.5	Unidentifiable	Absent	0%
26Wp7323	4.033	BTF	FGV	Small	1.2	Complex	Present	0%
26Wp7323	4.034	BTF	FGV	Small	1.0	Complex	Present	0%
26Wp7323	4.035	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7323	4.036	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7323	4.037	BTF	FGV	Small	0.9	Complex	Absent	0%
26Wp7323	4.038	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	4.039	Flake	FGV	Small	1.1	Smooth	Absent	0%
26Wp7323	4.040	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	4.041	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp7323	4.042	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7323	4.043	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	4.044	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	4.045	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7323	4.046	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp7323	4.047	BTF	FGV	Small	0.6	Complex	Present	0%
26Wp7323	4.048	Flake	FGV	Small	0.8	Smooth	Absent	0%
26Wp7323	4.049	BTF	FGV	Small	0.8	Complex	Present	0%
26Wp7323	4.050	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp7323	4.051	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7323	4.052	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7323	4.053	Flake	FGV	Small	0.7	Smooth	Absent	0%
26Wp7323	4.054	BTF	FGV	Small	0.4	Complex	Absent	0%
26Wp7323	4.055	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7323	4.056	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7323	4.057	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp7323	4.058	Cortical Spall Frag	FGV	Small	0.8	Unidentifiable	Absent	1-50%
26Wp7323	4.059	Flake	FGV	Small	0.7	Smooth	Absent	0%
26Wp7323	4.060	BTF	FGV	Small	0.5	Complex	Absent	0%
26Wp7323	4.061	BTF	FGV	Small	0.7	Complex	Absent	0%
26Wp7323	4.062	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7323	4.063	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp7323	4.064	Flake	FGV	Small	0.3	Smooth	Absent	0%
26Wp7323	4.065	BTF	FGV	Small	0.5	Complex	Present	0%
26Wp7323	4.066	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7323	4.067	Flake	FGV	Small	0.4	Smooth	Absent	0%
26Wp7323	4.068	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.069	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.070	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7323	4.071	BTF	FGV	Small	0.4	Complex	Present	0%
26Wp7323	4.072	Angular Shatter	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7323	4.073	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.074	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.075	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.076	Flake	FGV	Small	0.2	Smooth	Absent	0%
26Wp7323	4.077	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.078	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.079	BTF	FGV	Small	0.4	Complex	Present	0%
26Wp7323	4.080	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.081	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7323	4.082	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.083	Flake	FGV	Small	0.5	Smooth	Absent	0%
26Wp7323	4.084	Cortical Spall Frag	FGV	Small	0.4	Unidentifiable	Absent	1-50%
26Wp7323	4.085	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7323	4.086	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.087	Angular Shatter	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.088	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.089	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.090	BTF	FGV	Small	0.2	Complex	Present	0%
26Wp7323	4.091	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.092	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7323	4.093	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.094	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7323	4.095	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7323	4.096	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	4.097	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7323	4.098	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp7323	4.099	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7323	4.100	BTF	FGV	Small	0.4	Complex	Present	0%
26Wp7323	4.101	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7323	4.102	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7323	4.103	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7323	4.104	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.105	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7323	4.106	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.107	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.108	Cortical Spall Frag	FGV	Small	0.2	Unidentifiable	Absent	1-50%
26Wp7323	4.109	Cortical Spall Frag	FGV	Small	0.2	Unidentifiable	Absent	51-100%
26Wp7323	4.110	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.111	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.112	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.113	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.114	BTF	FGV	Small	0.2	Complex	Absent	0%
26Wp7323	4.115	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.116	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.117	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.118	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.119	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.120	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.121	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.122	Retouch Chip	FGV	Very Small	0.2	Smooth	Absent	0%
26Wp7323	4.123	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	4.124	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7323	4.125	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.126	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.127	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.128	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.129	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7323	4.130	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7323	5.01	Cortical Spall Frag	CCS	Large	30.4	Unidentifiable	Absent	1-50%
26Wp7323	5.02	Flake	CCS	Large	15.8	Smooth	Absent	0%
26Wp7323	5.03	Flake	CCS	Large	16.2	Smooth	Absent	0%
26Wp7323	5.04	Secondary Cortical Spall	CCS	Large	14.6	Cortical	Absent	1-50%
26Wp7323	5.05	Secondary Cortical Spall	CCS	Medium	7.1	Cortical	Absent	1-50%
26Wp7323	5.06	Flake Frag	CCS	Medium	3.2	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7323	5.07	Flake Frag	CCS	Small	3.8	Unidentifiable	Absent	0%
26Wp7323	5.08	Flake	CCS	Small	2.5	Smooth	Absent	0%
26Wp7323	5.09	Flake Frag	CCS	Small	2.3	Unidentifiable	Absent	0%
26Wp7323	5.10	Flake	CCS	Medium	3.0	Smooth	Absent	0%
26Wp7323	5.11	Flake Frag	CCS	Small	2.0	Unidentifiable	Absent	0%
26Wp7323	5.12	Flake	CCS	Small	1.9	Smooth	Absent	0%
26Wp7323	5.13	Flake Frag	CCS	Small	2.1	Unidentifiable	Absent	0%
26Wp7323	5.14	Flake Frag	CCS	Small	1.0	Unidentifiable	Absent	0%
26Wp7323	5.15	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7323	5.16	Angular Shatter	CCS	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	5.17	Flake	CCS	Small	0.9	Smooth	Absent	0%
26Wp7323	5.18	Flake Frag	CCS	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	7.01	Flake	FGV	Medium	16.6	Smooth	Absent	0%
26Wp7323	7.02	Flake	FGV	Medium	17.0	Smooth	Absent	0%
26Wp7323	7.03	Flake Frag	FGV	Medium	11.7	Unidentifiable	Absent	0%
26Wp7323	7.04	Flake Frag	FGV	Large	18.4	Unidentifiable	Absent	0%
26Wp7323	7.05	Flake Frag	FGV	Medium	11.5	Unidentifiable	Absent	0%
26Wp7323	7.06	Flake Frag	FGV	Medium	10.3	Unidentifiable	Absent	0%
26Wp7323	7.07	Flake Frag	FGV	Medium	8.4	Unidentifiable	Absent	0%
26Wp7323	7.08	Flake	FGV	Medium	10.1	Smooth	Absent	0%
26Wp7323	7.09	Flake	FGV	Medium	9.2	Smooth	Absent	0%
26Wp7323	7.10	Cortical Spall Frag	FGV	Medium	10.1	Unidentifiable	Absent	1-50%
26Wp7323	7.11	Flake Frag	FGV	Medium	5.6	Unidentifiable	Absent	0%
26Wp7323	7.12	BTF	FGV	Medium	4.4	Complex	Absent	0%
26Wp7323	7.13	BTF	FGV	Medium	7.9	Complex	Absent	0%
26Wp7323	7.14	Flake	FGV	Medium	5.7	Smooth	Absent	0%
26Wp7323	7.15	Flake Frag	FGV	Medium	6.5	Unidentifiable	Absent	0%
26Wp7323	7.16	Flake Frag	FGV	Medium	6.7	Unidentifiable	Absent	0%
26Wp7323	7.17	Flake	FGV	Medium	8.7	Smooth	Absent	0%
26Wp7323	7.18	Flake Frag	FGV	Medium	5.3	Unidentifiable	Absent	0%
26Wp7323	7.19	Flake Frag	FGV	Medium	5.9	Unidentifiable	Absent	0%
26Wp7323	7.20	Cortical Spall Frag	FGV	Medium	9.9	Unidentifiable	Absent	1-50%
26Wp7323	7.21	Flake Frag	FGV	Medium	5.4	Unidentifiable	Absent	0%
26Wp7323	7.22	BTF	FGV	Medium	8.6	Complex	Absent	0%
26Wp7323	7.23	Flake Frag	FGV	Medium	5.6	Unidentifiable	Absent	0%
26Wp7323	7.24	Flake Frag	FGV	Medium	4.5	Unidentifiable	Absent	0%
26Wp7323	7.25	Flake	FGV	Medium	5.5	Smooth	Absent	0%
26Wp7323	7.26	Flake	FGV	Small	7.3	Smooth	Absent	0%
26Wp7323	7.27	Flake Frag	FGV	Medium	5.8	Unidentifiable	Absent	0%
26Wp7323	7.28	Flake	FGV	Small	7.3	Smooth	Absent	0%
26Wp7323	7.29	BTF	FGV	Medium	3.7	Complex	Absent	0%
26Wp7323	7.30	Flake Frag	FGV	Medium	4.6	Unidentifiable	Absent	0%
26Wp7323	7.31	Flake Frag	FGV	Medium	4.5	Unidentifiable	Absent	0%
26Wp7323	7.32	Secondary Cortical Spall	FGV	Medium	5.9	Smooth	Absent	1-50%
26Wp7323	7.33	BTF	FGV	Medium	4.3	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7323	7.34	BTF	FGV	Medium	4.5	Complex	Present	0%
26Wp7323	7.35	Flake Frag	FGV	Medium	3.5	Unidentifiable	Absent	0%
26Wp7323	7.36	Cortical Spall Frag	FGV	Medium	5.6	Unidentifiable	Absent	1-50%
26Wp7323	7.37	Cortical Spall Frag	FGV	Medium	5.2	Unidentifiable	Absent	51-100%
26Wp7323	7.38	Flake Frag	FGV	Medium	4.0	Unidentifiable	Absent	0%
26Wp7323	7.39	Flake Frag	FGV	Medium	2.9	Unidentifiable	Absent	0%
26Wp7323	7.40	Flake Frag	FGV	Small	2.5	Unidentifiable	Absent	0%
26Wp7323	7.41	BTF	FGV	Small	2.1	Complex	Absent	0%
26Wp7323	7.42	Flake Frag	FGV	Medium	3.2	Unidentifiable	Absent	0%
26Wp7323	7.43	BTF	FGV	Small	2.3	Complex	Present	0%
26Wp7323	7.44	BTF	FGV	Small	2.1	Complex	Absent	0%
26Wp7323	7.45	Flake Frag	FGV	Medium	3.3	Unidentifiable	Absent	0%
26Wp7323	7.46	BTF	FGV	Small	2.3	Complex	Present	0%
26Wp7323	7.47	BTF	FGV	Small	2.3	Complex	Present	0%
26Wp7323	7.48	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
26Wp7323	7.49	Flake	FGV	Small	1.4	Smooth	Absent	0%
26Wp7323	7.50	Flake Frag	FGV	Small	2.2	Unidentifiable	Absent	0%
26Wp7323	7.51	Flake	FGV	Small	2.9	Smooth	Absent	0%
26Wp7323	7.52	BTF	FGV	Small	1.4	Complex	Absent	0%
26Wp7323	7.53	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7323	7.54	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%
26Wp7323	7.55	Flake	FGV	Small	1.7	Smooth	Absent	0%
26Wp7323	7.56	Flake Frag	FGV	Small	1.8	Unidentifiable	Absent	0%
26Wp7323	7.57	Flake	FGV	Small	1.6	Smooth	Absent	0%
26Wp7323	7.58	Flake Frag	FGV	Small	1.6	Unidentifiable	Absent	0%
26Wp7323	7.59	Flake Frag	FGV	Small	1.3	Unidentifiable	Absent	0%
26Wp7323	7.60	BTF	FGV	Small	1.9	Complex	Present	0%
26Wp7323	7.61	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%
26Wp7323	7.62	BTF	FGV	Small	1.0	Complex	Present	0%
26Wp7323	7.63	Cortical Spall Frag	FGV	Small	1.9	Unidentifiable	Absent	1-50%
26Wp7323	7.64	Flake Frag	FGV	Small	1.8	Unidentifiable	Absent	0%
26Wp7323	7.65	BTF	FGV	Small	1.1	Complex	Present	0%
26Wp7323	7.66	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
26Wp7323	7.67	Primary Cortical Spall	FGV	Small	1.3	Complex	Present	51-100%
26Wp7323	7.68	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7323	7.69	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%
26Wp7323	7.70	BTF	FGV	Small	1.4	Complex	Absent	0%
26Wp7323	7.71	BTF	FGV	Small	1.0	Complex	Absent	0%
26Wp7323	7.72	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	7.73	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	7.74	Flake	FGV	Small	1.1	Smooth	Absent	0%
26Wp7323	7.75	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7323	7.76	Flake	FGV	Small	1.0	Smooth	Absent	0%
26Wp7323	7.77	Cortical Spall Frag	FGV	Small	0.9	Unidentifiable	Absent	51-100%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7323	7.78	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7323	7.79	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7323	7.80	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7323	7.81	BTF	FGV	Small	0.6	Complex	Present	0%
26Wp7323	7.82	BTF	FGV	Small	0.4	Complex	Present	0%
26Wp7323	7.83	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	7.84	BTF	FGV	Small	0.3	Complex	Present	0%
26Wp7323	7.85	BTF	FGV	Small	0.5	Complex	Absent	0%
26Wp7323	7.86	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	7.87	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7323	7.88	Cortical Spall Frag	FGV	Small	0.3	Unidentifiable	Absent	1-50%
26Wp7323	7.89	Flake Frag	FGV	Small	0.5	Unidentifiable	Absent	0%
26Wp7323	7.90	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	7.91	BTF	FGV	Small	0.6	Complex	Present	0%
26Wp7323	7.92	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7323	7.93	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7323	7.94	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7323	7.95	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7323	7.96	BTF	FGV	Small	0.1	Complex	Present	0%
26Wp7330	8	Secondary Cortical Spall	CCS	Large	31.9	Smooth	Absent	1-50%
26Wp7335	2	Cortical Spall Frag	FGV	Large	18.9	Unidentifiable	Absent	1-50%
26Wp7335	6.01	Flake	RHY	Medium	11.3	Smooth	Absent	0%
26Wp7335	6.02	Cortical Spall Frag	CCS	Medium	5.6	Unidentifiable	Absent	51-100%
26Wp7335	6.03	Secondary Cortical Spall	FGV	Medium	22.8	Complex	Present	1-50%
26Wp7335	6.04	BTF	FGV	Medium	8.4	Complex	Absent	0%
26Wp7335	6.05	Cortical Spall Frag	FGV	Small	5.3	Unidentifiable	Absent	1-50%
26Wp7335	6.06	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7335	6.07	Cortical Spall Frag	FGV	Small	1.8	Unidentifiable	Absent	51-100%
26Wp7335	6.08	Flake Frag	FGV	Small	1.7	Unidentifiable	Absent	0%
26Wp7335	6.09	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp7335	6.10	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7335	6.11	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7335	6.12	Secondary Cortical Spall	FGV	Small	0.4	Complex	Absent	1-50%
26Wp7335	6.13	Primary Cortical Spall	FGV	Small	0.5	Complex	Present	51-100%
26Wp7335	6.14	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7335	6.15	BTF	FGV	Small	0.3	Complex	Absent	0%
26Wp7335	6.16	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7335	6.17	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7335	6.18	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7335	6.19	Retouch Chip	FGV	Very Small	0.1	Smooth	Absent	0%
26Wp7335	6.20	Flake Frag	FGV	Medium	19.5	Unidentifiable	Absent	0%
26Wp7335	6.21	Primary Cortical Spall	FGV	Medium	18.4	Cortical	Absent	51-100%
26Wp7335	6.22	Cortical Spall Frag	OBS	Medium	14.5	Unidentifiable	Absent	1-50%
26Wp7335	6.23	Cortical Spall Frag	FGV	Medium	14.4	Unidentifiable	Absent	1-50%
26Wp7335	6.24	Flake	FGV	Medium	9.2	Smooth	Absent	0%
26Wp7335	6.25	Cortical Spall Frag	FGV	Medium	10.6	Unidentifiable	Absent	51-100%
26Wp7335	6.26	Cortical Spall Frag	FGV	Medium	7.7	Unidentifiable	Absent	1-50%
26Wp7335	6.27	Flake	FGV	Medium	8.3	Complex	Absent	0%
26Wp7335	6.28	Cortical Spall Frag	FGV	Medium	5.9	Unidentifiable	Absent	51-100%
26Wp7335	6.29	Cortical Spall Frag	FGV	Medium	7.0	Unidentifiable	Absent	51-100%
26Wp7335	6.30	Flake Frag	FGV	Medium	4.1	Unidentifiable	Absent	0%
26Wp7335	6.31	Flake Frag	FGV	Medium	4.4	Unidentifiable	Absent	0%
26Wp7335	6.32	Flake Frag	FGV	Medium	4.9	Unidentifiable	Absent	0%
26Wp7335	6.33	Primary Cortical Spall	FGV	Medium	6.6	Complex	Absent	51-100%
26Wp7335	6.34	Primary Cortical Spall	FGV	Medium	5.6	Cortical	Absent	51-100%
26Wp7335	6.35	Flake Frag	FGV	Small	5.0	Unidentifiable	Absent	0%
26Wp7335	6.36	Angular Shatter	FGV	Medium	4.8	Unidentifiable	Absent	0%
26Wp7335	6.37	Flake Frag	FGV	Medium	3.2	Unidentifiable	Absent	0%
26Wp7335	6.38	Flake Frag	FGV	Medium	4.5	Unidentifiable	Absent	0%
26Wp7335	6.39	Cortical Spall Frag	FGV	Medium	5.5	Unidentifiable	Absent	51-100%
26Wp7335	6.40	BTF	FGV	Small	2.9	Complex	Absent	0%
26Wp7335	6.41	Flake Frag	FGV	Small	2.6	Unidentifiable	Absent	0%
26Wp7335	6.42	Secondary Cortical Spall	FGV	Small	3.3	Smooth	Absent	1-50%
26Wp7335	6.43	Flake Frag	FGV	Small	4.0	Unidentifiable	Absent	0%
26Wp7335	6.44	Flake Frag	FGV	Small	2.5	Unidentifiable	Absent	0%
26Wp7335	6.45	Flake Frag	FGV	Small	2.7	Unidentifiable	Absent	0%
26Wp7335	6.46	Flake Frag	FGV	Small	2.7	Unidentifiable	Absent	0%
26Wp7335	6.47	Flake	FGV	Small	1.7	Smooth	Absent	0%
26Wp7335	6.48	Cortical Spall Frag	FGV	Small	2.6	Unidentifiable	Absent	1-50%
26Wp7335	6.49	BTF	FGV	Small	2.8	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7335	6.50	Cortical Spall Frag	FGV	Small	1.6	Unidentifiable	Absent	1-50%
26Wp7335	6.51	Flake Frag	FGV	Small	1.6	Unidentifiable	Absent	0%
26Wp7335	6.52	Flake Frag	FGV	Small	1.6	Unidentifiable	Absent	0%
26Wp7335	6.53	BTF	FGV	Medium	3.0	Complex	Absent	0%
26Wp7335	6.54	Cortical Spall Frag	FGV	Small	2.1	Unidentifiable	Absent	51-100%
26Wp7335	6.55	Flake Frag	FGV	Small	2.2	Unidentifiable	Absent	0%
26Wp7335	6.56	Cortical Spall Frag	FGV	Small	2.4	Unidentifiable	Absent	1-50%
26Wp7335	6.57	Angular Shatter	FGV	Small	2.9	Unidentifiable	Absent	0%
26Wp7335	6.58	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7335	6.59	Flake Frag	FGV	Small	1.6	Unidentifiable	Absent	0%
26Wp7335	6.60	Cortical Spall Frag	FGV	Small	1.4	Unidentifiable	Absent	1-50%
26Wp7335	6.61	Cortical Spall Frag	FGV	Small	2.3	Unidentifiable	Absent	1-50%
26Wp7335	6.62	Flake Frag	FGV	Small	1.6	Unidentifiable	Absent	0%
26Wp7335	6.63	Flake Frag	FGV	Small	1.4	Unidentifiable	Absent	0%
26Wp7335	6.64	BTF	FGV	Small	1.0	Complex	Absent	0%
26Wp7335	6.65	Flake Frag	FGV	Small	1.0	Unidentifiable	Absent	0%
26Wp7335	6.66	BTF	FGV	Small	1.0	Complex	Absent	0%
26Wp7335	6.67	Flake Frag	FGV	Small	0.9	Unidentifiable	Absent	0%
26Wp7335	6.68	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7335	6.69	BTF	FGV	Small	0.7	Complex	Absent	0%
26Wp7335	6.70	BTF	FGV	Small	0.6	Complex	Absent	0%
26Wp7335	6.71	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7335	6.72	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7335	6.73	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7335	6.74	BTF	FGV	Small	0.5	Complex	Absent	0%
26Wp7335	6.75	BTF	FGV	Small	0.5	Complex	Absent	0%
26Wp7335	6.76	BTF	FGV	Small	0.4	Complex	Absent	0%
26Wp7335	6.77	BTF	FGV	Small	0.4	Complex	Present	0%
26Wp7335	6.78	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7335	6.79	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7335	6.80	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7335	9	Flake Frag	FGV	Medium	15.0	Unidentifiable	Absent	0%
26Wp7335	12	Flake Frag	CCS	Medium	4.3	Unidentifiable	Absent	0%
26Wp7336	8.01	BTF	OBS	Small	1.6	Complex	Present	0%
26Wp7336	8.02	BTF	OBS	Small	1.7	Complex	Present	0%
26Wp7336	8.03	BTF	OBS	Small	1.1	Complex	Absent	0%
26Wp7336	8.04	BTF	OBS	Small	0.2	Complex	Absent	0%
26Wp7336	8.05	BTF	OBS	Small	0.5	Complex	Present	0%
26Wp7336	8.06	BTF	OBS	Small	0.7	Complex	Present	0%
26Wp7336	8.07	BTF	OBS	Small	1.1	Complex	Present	0%
26Wp7336	8.08	BTF	OBS	Small	0.6	Complex	Present	0%
26Wp7336	8.09	BTF	OBS	Medium	2.5	Complex	Present	0%
26Wp7336	8.10	BTF	OBS	Small	0.5	Complex	Present	0%
26Wp7336	8.11	BTF	OBS	Small	0.4	Complex	Present	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7336	8.12	BTF	OBS	Small	0.2	Complex	Absent	0%
26Wp7336	8.13	BTF	OBS	Very Small	0.2	Complex	Absent	0%
26Wp7336	8.14	BTF	OBS	Small	0.2	Complex	Present	0%
26Wp7336	8.15	Flake Frag	OBS	Small	0.8	Unidentifiable	Present	0%
26Wp7336	8.16	Flake Frag	OBS	Small	0.6	Unidentifiable	Present	0%
26Wp7336	8.17	Flake Frag	OBS	Small	0.7	Unidentifiable	Present	0%
26Wp7336	8.18	Flake Frag	OBS	Small	0.3	Unidentifiable	Present	0%
26Wp7336	8.19	Flake Frag	OBS	Small	1.0	Unidentifiable	Present	0%
26Wp7336	8.20	Flake Frag	OBS	Small	0.2	Unidentifiable	Present	0%
26Wp7336	8.21	Flake Frag	OBS	Small	0.4	Unidentifiable	Present	0%
26Wp7336	8.22	Flake Frag	OBS	Small	1.4	Unidentifiable	Present	0%
26Wp7336	8.23	Flake Frag	OBS	Small	0.2	Unidentifiable	Present	0%
26Wp7336	8.24	Flake Frag	OBS	Small	0.4	Unidentifiable	Absent	0%
26Wp7336	8.25	Flake Frag	OBS	Small	1.3	Unidentifiable	Present	0%
26Wp7336	8.26	Flake Frag	OBS	Small	1.1	Unidentifiable	Present	0%
26Wp7336	8.27	Flake Frag	OBS	Small	1.8	Unidentifiable	Present	0%
26Wp7336	8.28	Flake Frag	OBS	Small	1.2	Unidentifiable	Present	0%
26Wp7336	8.29	Flake Frag	OBS	Small	0.6	Unidentifiable	Present	0%
26Wp7336	8.30	Flake Frag	OBS	Small	0.7	Unidentifiable	Present	0%
26Wp7336	8.31	Flake Frag	OBS	Small	0.8	Unidentifiable	Present	0%
26Wp7336	8.32	Retouch Chip Frag	OBS	Very Small	0.2	Unidentifiable	Present	0%
26Wp7336	8.33	Flake Frag	OBS	Small	0.3	Unidentifiable	Present	0%
26Wp7336	8.34	Flake Frag	OBS	Small	1.3	Unidentifiable	Absent	0%
26Wp7336	8.35	Flake Frag	OBS	Small	0.5	Unidentifiable	Present	0%
26Wp7336	8.36	Flake Frag	OBS	Small	0.2	Unidentifiable	Absent	0%
26Wp7336	8.37	Flake Frag	OBS	Small	0.1	Unidentifiable	Absent	0%
26Wp7336	8.38	Retouch Chip Frag	OBS	Very Small	0.1	Unidentifiable	Present	0%
26Wp7336	8.39	Flake Frag	FGV	Small	1.9	Unidentifiable	Absent	0%
26Wp7729	3.01	Flake Frag	CCS	Small	1.7	Unidentifiable	Absent	0%
26Wp7729	3.02	Flake Frag	CCS	Small	2.2	Unidentifiable	Absent	0%
26Wp7729	3.03	Flake Frag	CCS	Small	0.9	Unidentifiable	Absent	0%
26Wp7729	3.04	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7729	3.05	BTF	CCS	Small	0.9	Complex	Absent	0%
26Wp7729	3.06	BTF	CCS	Small	0.8	Complex	Absent	0%
26Wp7729	3.07	Angular Shatter	CCS	Small	0.2	Unidentifiable	Absent	0%
26Wp7729	3.08	Flake Frag	CCS	Small	0.9	Unidentifiable	Absent	0%
26Wp7729	3.09	Cortical Spall Frag	CCS	Small	0.4	Unidentifiable	Absent	1-50%
26Wp7729	3.10	Flake Frag	CCS	Small	0.2	Unidentifiable	Absent	0%
26Wp7729	3.11	BTF	CCS	Small	0.5	Complex	Absent	0%
26Wp7729	3.12	Flake Frag	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp7729	3.13	Cortical Spall Frag	CCS	Small	0.6	Unidentifiable	Absent	51-100%
26Wp7729	3.14	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7729	3.15	Angular Shatter	CCS	Very Small	0.3	Unidentifiable	Absent	0%
26Wp7729	3.16	Retouch Chip	CCS	Very Small	0.2	Smooth	Absent	0%
26Wp7729	3.17	Flake Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	3.18	BTF	CCS	Very Small	0.1	Complex	Absent	0%
26Wp7729	3.19	Flake Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	3.20	BTF	CCS	Very Small	0.1	Complex	Absent	0%
26Wp7729	3.21	Retouch Chip	CCS	Very Small	0.1	Smooth	Absent	0%
26Wp7729	3.22	Retouch Chip	CCS	Very Small	0.1	Smooth	Absent	0%
26Wp7729	3.23	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	5.01	Secondary Cortical Spall	CCS	Small	1.0	Smooth	Absent	1-50%
26Wp7729	5.02	BTF	CCS	Small	0.9	Complex	Absent	0%
26Wp7729	5.03	Secondary Cortical Spall	CCS	Small	1.1	Cortical	Absent	1-50%
26Wp7729	5.04	BTF	CCS	Small	0.7	Complex	Absent	0%
26Wp7729	5.05	Secondary Cortical Spall	CCS	Small	0.7	Complex	Present	1-50%
26Wp7729	5.06	Flake Frag	CCS	Small	1.0	Unidentifiable	Absent	0%
26Wp7729	5.07	Flake Frag	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp7729	5.08	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7729	5.09	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7729	5.10	Primary Cortical Spall	CCS	Small	0.8	Complex	Absent	51-100%
26Wp7729	5.11	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7729	5.12	Flake Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	5.13	Cortical Spall Frag	CCS	Small	0.3	Unidentifiable	Absent	51-100%
26Wp7729	5.14	Flake	CCS	Small	0.3	Smooth	Absent	0%
26Wp7729	5.15	Flake Frag	CCS	Small	0.2	Unidentifiable	Absent	0%
26Wp7729	5.16	BTF	CCS	Very Small	0.2	Complex	Absent	0%
26Wp7729	5.17	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	5.18	Angular Shatter	CCS	Very Small	0.4	Unidentifiable	Absent	0%
26Wp7729	5.19	Flake Frag	CCS	Small	0.2	Unidentifiable	Absent	0%
26Wp7729	5.20	Flake Frag	CCS	Small	0.1	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7729	5.21	Flake Frag	CCS	Very Small	0.2	Unidentifiable	Absent	0%
26Wp7729	5.22	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	5.23	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	5.24	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	5.25	Angular Shatter	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	5.26	Flake Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	5.27	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	5.28	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7729	8.01	Flake Frag	CCS	Small	2.9	Unidentifiable	Absent	0%
26Wp7729	8.02	Flake	CCS	Small	0.8	Smooth	Absent	0%
26Wp7729	8.03	BTF	CCS	Small	1.9	Complex	Absent	0%
26Wp7729	8.04	Flake	CCS	Small	2.6	Smooth	Absent	0%
26Wp7729	8.05	BTF	CCS	Small	5.0	Complex	Present	0%
26Wp7729	8.06	Cortical Spall Frag	CCS	Small	2.0	Unidentifiable	Absent	1-50%
26Wp7729	8.07	Cortical Spall Frag	CCS	Small	1.9	Unidentifiable	Absent	1-50%
26Wp7729	8.08	Flake Frag	CCS	Small	2.0	Unidentifiable	Absent	0%
26Wp7729	8.09	Flake Frag	CCS	Small	1.4	Unidentifiable	Absent	0%
26Wp7729	8.10	Flake Frag	CCS	Small	1.4	Unidentifiable	Absent	0%
26Wp7729	8.11	BTF	CCS	Small	1.1	Complex	Absent	0%
26Wp7729	8.12	BTF	CCS	Small	1.0	Complex	Present	0%
26Wp7729	8.13	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7729	8.14	Flake	CCS	Small	0.7	Smooth	Absent	0%
26Wp7729	8.15	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7729	8.16	Flake Frag	CCS	Medium	1.0	Unidentifiable	Absent	0%
26Wp7729	8.17	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7729	8.18	BTF	CCS	Small	0.4	Complex	Absent	0%
26Wp7729	8.19	Angular Shatter	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp7729	8.20	BTF	CCS	Small	0.2	Complex	Absent	0%
26Wp7729	8.21	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	8.22	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	8.23	Retouch Chip	CCS	Very Small	0.2	Smooth	Absent	0%
26Wp7729	8.24	Flake Frag	CCS	Very Small	0.2	Unidentifiable	Absent	0%
26Wp7729	8.25	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	8.26	Flake Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	**FS #**	**Debitage Type**	**Raw Material**	**Size Value**	**Wgt (g)**	**Surface Platform Preparation**	**Surface Abrasion**	**% Cortex**
26Wp7729	8.27	Retouch Chip	CCS	Very Small	0.2	Smooth	Absent	0%
26Wp7729	8.28	Angular Shatter	CCS	Small	0.4	Unidentifiable	Absent	0%
26Wp7729	8.29	Retouch Chip	CCS	Very Small	0.3	Smooth	Absent	0%
26Wp7729	8.30	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	8.31	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	8.32	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	8.33	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	8.34	Retouch Chip	CCS	Very Small	0.1	Smooth	Absent	0%
26Wp7729	9.01	Flake Frag	CCS	Small	1.7	Unidentifiable	Absent	0%
26Wp7729	9.02	Primary Cortical Spall	CCS	Small	2.9	Complex	Absent	51-100%
26Wp7729	9.03	Flake	CCS	Small	1.5	Smooth	Absent	0%
26Wp7729	9.04	Flake	CCS	Small	2.4	Smooth	Absent	0%
26Wp7729	9.05	BTF	CCS	Small	1.1	Complex	Absent	0%
26Wp7729	9.06	Flake	CCS	Small	0.8	Smooth	Absent	0%
26Wp7729	9.07	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7729	9.08	Flake Frag	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp7729	9.09	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7729	9.10	Flake Frag	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp7729	9.11	Flake Frag	CCS	Small	0.9	Unidentifiable	Absent	0%
26Wp7729	9.12	BTF	CCS	Small	0.3	Complex	Present	0%
26Wp7729	9.13	BTF	CCS	Small	0.2	Complex	Absent	0%
26Wp7729	9.14	Flake Frag	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp7729	9.15	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7729	9.16	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7729	9.17	Flake Frag	CCS	Small	0.4	Unidentifiable	Absent	0%
26Wp7729	9.18	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7729	13	Flake Frag	OBS	Small	1.5	Unidentifiable	Absent	0%
26Wp7729	14	Flake Frag	CCS	Small	0.9	Unidentifiable	Absent	0%
26Wp7729	15.01	Flake Frag	OBS	Small	3.0	Unidentifiable	Absent	0%
26Wp7729	15.02	Flake Frag	CCS	Small	1.4	Unidentifiable	Absent	0%
26Wp7729	15.03	Cortical Spall Frag	CCS	Small	1.3	Unidentifiable	Absent	1-50%
26Wp7729	15.04	Flake	CCS	Small	1.4	Cortical	Present	0%
26Wp7729	15.05	Flake Frag	CCS	Small	2.5	Unidentifiable	Absent	0%
26Wp7729	15.06	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7729	15.07	BTF	CCS	Small	1.0	Complex	Present	0%
26Wp7729	15.08	BTF	CCS	Small	0.5	Complex	Absent	0%
26Wp7729	15.09	Flake Frag	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp7729	15.10	BTF	CCS	Small	0.4	Complex	Absent	0%
26Wp7729	15.11	BTF	CCS	Small	0.4	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7729	15.12	Flake	CCS	Small	0.5	Smooth	Absent	0%
26Wp7729	15.13	Flake	CCS	Small	0.4	Smooth	Absent	0%
26Wp7729	15.14	Flake	CCS	Small	0.5	Smooth	Absent	0%
26Wp7729	15.15	BTF	CCS	Small	0.4	Complex	Absent	0%
26Wp7729	15.16	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	15.17	BTF	CCS	Very Small	0.1	Complex	Absent	0%
26Wp7729	15.18	Flake	CCS	Small	0.3	Smooth	Absent	0%
26Wp7729	15.19	BTF	CCS	Small	0.3	Complex	Absent	0%
26Wp7729	15.20	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	15.21	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	15.22	Retouch Chip	CCS	Very Small	0.2	Smooth	Absent	0%
26Wp7729	15.23	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	15.24	Retouch Chip Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7729	15.25	Angular Shatter	CCS	Very Small	0.4	Unidentifiable	Absent	0%
26Wp7729	15.26	Flake	CCS	Large	27.4	Smooth	Absent	0%
26Wp7729	16	BTF	CCS	Medium	3.2	Complex	Absent	0%
26Wp7729	20	BTF	CCS	Small	2.0	Complex	Absent	0%
26Wp7729	21	Flake Frag	OBS	Small	1.2	Unidentifiable	Absent	0%
26Wp7729	22	Flake Frag	OBS	Small	0.5	Unidentifiable	Absent	0%
26Wp7735	5.01	BTF	CCS	Small	3.4	Complex	Absent	0%
26Wp7735	5.02	Flake Frag	CCS	Small	1.6	Unidentifiable	Absent	0%
26Wp7735	5.03	Secondary Cortical Spall	OTHR	Large	18.9	Cortical	Absent	1-50%
26Wp7735	5.04	Flake Frag	CCS	Small	2.3	Unidentifiable	Absent	0%
26Wp7735	5.05	Flake	CCS	Small	2.6	Smooth	Absent	0%
26Wp7735	5.06	Flake Frag	CCS	Small	1.3	Unidentifiable	Absent	0%
26Wp7735	5.07	BTF	CCS	Small	0.7	Complex	Absent	0%
26Wp7735	5.08	Flake Frag	CCS	Small	1.2	Unidentifiable	Absent	0%
26Wp7735	5.09	Flake Frag	CCS	Small	0.4	Unidentifiable	Absent	0%
26Wp7735	5.10	BTF	CCS	Small	0.7	Complex	Absent	0%
26Wp7735	5.11	Flake Frag	CCS	Small	1.1	Unidentifiable	Absent	0%
26Wp7735	5.12	BTF	CCS	Small	1.8	Complex	Absent	0%
26Wp7735	5.13	Flake	CCS	Small	2.3	Smooth	Absent	0%
26Wp7735	5.14	Flake	CCS	Small	0.9	Smooth	Absent	0%
26Wp7735	5.15	BTF	CCS	Small	1.7	Complex	Absent	0%
26Wp7735	5.16	BTF	CCS	Small	0.3	Complex	Absent	0%
26Wp7735	5.17	Flake Frag	CCS	Small	1.7	Unidentifiable	Absent	0%
26Wp7735	5.18	BTF	CCS	Small	0.8	Complex	Absent	0%
26Wp7735	5.19	BTF	CCS	Small	0.8	Complex	Absent	0%
26Wp7735	5.20	Flake Frag	CCS	Small	0.9	Unidentifiable	Absent	0%
26Wp7735	5.21	BTF	CCS	Small	0.7	Complex	Absent	0%
26Wp7735	5.22	BTF	CCS	Small	0.3	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7735	5.23	Flake Frag	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp7735	5.24	BTF	CCS	Small	0.8	Complex	Absent	0%
26Wp7735	5.25	Flake	CCS	Small	0.5	Smooth	Absent	0%
26Wp7735	5.26	BTF	CCS	Small	0.7	Complex	Absent	0%
26Wp7735	5.27	Flake Frag	CCS	Small	0.2	Unidentifiable	Absent	0%
26Wp7735	5.28	Flake Frag	CCS	Small	0.9	Unidentifiable	Absent	0%
26Wp7735	5.29	Flake Frag	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp7735	5.30	BTF	CCS	Small	0.2	Complex	Absent	0%
26Wp7735	5.31	BTF	CCS	Small	0.4	Complex	Absent	0%
26Wp7735	5.32	BTF	CCS	Small	0.8	Complex	Absent	0%
26Wp7735	5.33	BTF	CCS	Small	0.2	Complex	Absent	0%
26Wp7735	5.34	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7735	5.35	BTF	CCS	Small	0.3	Complex	Absent	0%
26Wp7735	5.36	Flake Frag	CCS	Small	0.1	Unidentifiable	Absent	0%
26Wp7735	5.37	Retouch Chip	CCS	Very Small	0.2	Smooth	Absent	0%
26Wp7735	5.38	BTF	CCS	Small	0.4	Complex	Absent	0%
26Wp7735	5.39	Flake Frag	CCS	Very Small	0.2	Unidentifiable	Absent	0%
26Wp7735	5.40	BTF	CCS	Small	0.7	Complex	Absent	0%
26Wp7735	5.41	BTF	CCS	Medium	6.8	Complex	Absent	0%
26Wp7735	5.42	BTF	CCS	Medium	5.5	Complex	Absent	0%
26Wp7735	5.43	BTF	CCS	Medium	4.1	Complex	Absent	0%
26Wp7735	5.44	Flake Frag	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp7735	5.45	Overshot Flake	CCS	Small	3.9	Unidentifiable	Absent	0%
26Wp7735	5.46	Overshot Flake	CCS	Small	2.4	Complex	Present	0%
26Wp7738	5.01	Cortical Spall Frag	CCS	Medium	15.3	Unidentifiable	Absent	1-50%
26Wp7738	5.02	Flake Frag	CCS	Small	4.3	Unidentifiable	Absent	0%
26Wp7738	5.03	BTF	CCS	Medium	7.2	Complex	Absent	0%
26Wp7738	5.04	Secondary Cortical Spall	CCS	Medium	34.7	Smooth	Absent	1-50%
26Wp7738	5.05	Primary Cortical Spall	CCS	Medium	18.1	Cortical	Absent	51-100%
26Wp7738	5.06	Flake	CCS	Small	2.1	Smooth	Absent	0%
26Wp7738	5.07	Flake	CCS	Medium	9.5	Smooth	Absent	0%
26Wp7738	5.08	Flake	CCS	Medium	10.8	Smooth	Absent	0%
26Wp7738	5.09	Secondary Cortical Spall	CCS	Large	50.8	Cortical	Absent	1-50%
26Wp7738	5.10	Secondary Cortical Spall	CCS	Large	90.3	Cortical	Absent	1-50%
26Wp7746	16.001	BTF	FGV	Small	1.0	Complex	Absent	0%
26Wp7746	16.002	Flake Frag	FGV	Small	0.8	Unidentifiable	Absent	0%
26Wp7746	16.003	Flake Frag	FGV	Small	1.2	Unidentifiable	Absent	0%
26Wp7746	16.004	Flake Frag	FGV	Small	3.3	Unidentifiable	Absent	0%
26Wp7746	16.005	Flake Frag	FGV	Small	4.0	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7746	16.006	Cortical Spall Frag	FGV	Small	12.7	Unidentifiable	Absent	1-50%
26Wp7746	16.007	BTF	FGV	Small	1.6	Complex	Absent	0%
26Wp7746	16.008	BTF	FGV	Small	1.4	Complex	Absent	0%
26Wp7746	16.009	Flake Frag	FGV	Small	1.1	Unidentifiable	Absent	0%
26Wp7746	16.010	Flake Frag	FGV	Medium	10.2	Unidentifiable	Absent	0%
26Wp7746	16.011	BTF	FGV	Small	1.6	Complex	Present	0%
26Wp7746	16.012	BTF	FGV	Small	1.1	Complex	Absent	0%
26Wp7746	16.013	Flake	FGV	Small	0.4	Smooth	Absent	0%
26Wp7746	16.014	Flake	FGV	Small	0.5	Smooth	Absent	0%
26Wp7746	16.015	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.016	Flake Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7746	16.017	BTF	FGV	Small	0.3	Complex	Absent	0%
26Wp7746	16.018	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7746	16.019	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.020	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7746	16.021	Flake Frag	FGV	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.022	Retouch Chip	FGV	Very Small	0.2	Complex	Absent	0%
26Wp7746	16.023	Retouch Chip Frag	FGV	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7746	16.024	Flake Frag	FGV	Small	0.6	Unidentifiable	Absent	0%
26Wp7746	16.025	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7746	16.026	Flake Frag	FGV	Small	0.4	Unidentifiable	Absent	0%
26Wp7746	16.027	Flake Frag	FGV	Small	0.2	Unidentifiable	Absent	0%
26Wp7746	16.028	BTF	FGV	Small	0.2	Complex	Absent	0%
26Wp7746	16.029	Flake Frag	FGV	Small	0.1	Unidentifiable	Absent	0%
26Wp7746	16.030	Flake Frag	OBS	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.031	BTF	OBS	Small	0.2	Complex	Absent	0%
26Wp7746	16.032	BTF	OBS	Small	0.2	Complex	Absent	0%
26Wp7746	16.033	Cortical Spall Frag	CCS	Small	1.2	Unidentifiable	Absent	51-100%
26Wp7746	16.034	Flake Frag	CCS	Medium	11.0	Unidentifiable	Absent	0%
26Wp7746	16.035	Secondary Cortical Spall	CCS	Small	2.8	Cortical	Absent	1-50%
26Wp7746	16.036	Flake	CCS	Small	1.0	Smooth	Absent	0%
26Wp7746	16.037	BTF	CCS	Medium	6.7	Complex	Absent	0%
26Wp7746	16.038	Cortical Spall Frag	CCS	Medium	7.5	Unidentifiable	Absent	51-100%
26Wp7746	16.039	Flake	CCS	Small	1.3	Smooth	Absent	0%
26Wp7746	16.040	BTF	CCS	Small	1.3	Complex	Absent	0%
26Wp7746	16.041	Secondary Cortical Spall	CCS	Medium	5.5	Complex	Absent	1-50%
26Wp7746	16.042	Flake Frag	CCS	Small	1.7	Unidentifiable	Absent	0%
26Wp7746	16.043	BTF	CCS	Small	2.3	Complex	Present	0%
26Wp7746	16.044	Cortical Spall Frag	CCS	Small	1.9	Unidentifiable	Absent	1-50%
26Wp7746	16.045	BTF	CCS	Small	3.9	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7746	16.046	Cortical Spall Frag	CCS	Medium	10.6	Unidentifiable	Absent	1-50%
26Wp7746	16.047	Flake Frag	CCS	Small	1.4	Unidentifiable	Absent	0%
26Wp7746	16.048	BTF	FGV	Small	0.2	Complex	Absent	0%
26Wp7746	16.049	Flake	CCS	Small	1.6	Smooth	Absent	0%
26Wp7746	16.050	BTF	CCS	Small	2.7	Complex	Absent	0%
26Wp7746	16.051	Flake Frag	CCS	Very Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.052	Secondary Cortical Spall	CCS	Medium	10.8	Complex	Absent	1-50%
26Wp7746	16.053	Flake Frag	CCS	Small	1.8	Unidentifiable	Absent	0%
26Wp7746	16.054	Flake	CCS	Small	2.1	Smooth	Absent	0%
26Wp7746	16.055	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.056	Flake Frag	CCS	Small	1.2	Unidentifiable	Absent	0%
26Wp7746	16.057	Flake Frag	CCS	Small	1.2	Unidentifiable	Absent	0%
26Wp7746	16.058	Secondary Cortical Spall	CCS	Small	1.2	Smooth	Absent	1-50%
26Wp7746	16.059	Cortical Spall Frag	CCS	Small	2.4	Unidentifiable	Absent	51-100%
26Wp7746	16.060	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.061	Flake Frag	CCS	Small	1.2	Unidentifiable	Absent	0%
26Wp7746	16.062	Flake Frag	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp7746	16.063	Flake	CCS	Small	2.8	Smooth	Absent	0%
26Wp7746	16.064	Flake	CCS	Small	0.3	Smooth	Absent	0%
26Wp7746	16.065	Flake Frag	CCS	Small	0.9	Unidentifiable	Absent	0%
26Wp7746	16.066	Cortical Spall Frag	CCS	Small	1.8	Unidentifiable	Absent	1-50%
26Wp7746	16.067	BTF	CCS	Small	1.8	Complex	Absent	0%
26Wp7746	16.068	Flake Frag	CCS	Medium	6.4	Unidentifiable	Absent	0%
26Wp7746	16.069	Primary Cortical Spall	CCS	Medium	8.7	Smooth	Absent	51-100%
26Wp7746	16.070	Flake Frag	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7746	16.071	Secondary Cortical Spall	CCS	Small	3.8	Cortical	Absent	1-50%
26Wp7746	16.072	Flake Frag	CCS	Small	1.4	Unidentifiable	Absent	0%
26Wp7746	16.073	Angular Shatter	CCS	Small	0.5	Unidentifiable	Absent	0%
26Wp7746	16.074	Flake	CCS	Small	5.1	Smooth	Absent	0%
26Wp7746	16.075	Flake Frag	CCS	Small	3.0	Unidentifiable	Absent	0%
26Wp7746	16.076	BTF	CCS	Small	1.0	Complex	Absent	0%
26Wp7746	16.077	Flake Frag	CCS	Small	0.4	Unidentifiable	Absent	0%
26Wp7746	16.078	Flake Frag	CCS	Small	2.1	Unidentifiable	Absent	0%
26Wp7746	16.079	Flake Frag	CCS	Small	0.6	Unidentifiable	Absent	0%
26Wp7746	16.080	Flake	CCS	Small	1.2	Smooth	Absent	0%
26Wp7746	16.081	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7746	16.082	Flake Frag	CCS	Medium	5.8	Unidentifiable	Absent	0%
26Wp7746	16.083	BTF	CCS	Small	4.2	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7746	16.084	Flake	CCS	Small	1.3	Smooth	Absent	0%
26Wp7746	16.085	Flake Frag	CCS	Small	1.1	Unidentifiable	Absent	0%
26Wp7746	16.086	Flake Frag	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp7746	16.087	Flake	CCS	Small	0.8	Smooth	Absent	0%
26Wp7746	16.088	Flake	CCS	Small	0.7	Smooth	Absent	0%
26Wp7746	16.089	Secondary Cortical Spall	CCS	Small	2.6	Cortical	Absent	1-50%
26Wp7746	16.090	Flake Frag	CCS	Small	4.6	Unidentifiable	Absent	0%
26Wp7746	16.091	BTF	CCS	Small	3.1	Complex	Absent	0%
26Wp7746	16.092	BTF	CCS	Small	1.1	Complex	Absent	0%
26Wp7746	16.093	Flake Frag	CCS	Small	0.1	Unidentifiable	Absent	0%
26Wp7746	16.094	BTF	CCS	Small	0.2	Complex	Absent	0%
26Wp7746	16.095	Retouch Chip	CCS	Very Small	0.1	Smooth	Absent	0%
26Wp7746	16.096	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.097	BTF	CCS	Small	0.7	Complex	Present	0%
26Wp7746	16.098	Angular Shatter	CCS	Small	2.8	Unidentifiable	Absent	0%
26Wp7746	16.099	Primary Cortical Spall	CCS	Small	0.8	Smooth	Absent	51-100%
26Wp7746	16.100	Flake	CCS	Small	0.9	Smooth	Absent	0%
26Wp7746	16.101	BTF	CCS	Small	0.9	Complex	Absent	0%
26Wp7746	16.102	Cortical Spall Frag	CCS	Small	2.3	Unidentifiable	Absent	1-50%
26Wp7746	16.103	Flake Frag	CCS	Small	2.5	Unidentifiable	Absent	0%
26Wp7746	16.104	BTF	CCS	Small	1.0	Complex	Present	0%
26Wp7746	16.105	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.106	Flake Frag	CCS	Small	2.3	Unidentifiable	Absent	0%
26Wp7746	16.107	Flake Frag	CCS	Small	1.6	Unidentifiable	Absent	0%
26Wp7746	16.108	Flake Frag	CCS	Small	1.8	Unidentifiable	Absent	0%
26Wp7746	16.109	Flake	CCS	Small	1.4	Smooth	Absent	0%
26Wp7746	16.110	Angular Shatter	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp7746	16.111	Flake Frag	CCS	Medium	8.0	Unidentifiable	Absent	0%
26Wp7746	16.112	Flake	CCS	Small	1.3	Smooth	Absent	0%
26Wp7746	16.113	Primary Cortical Spall	CCS	Medium	6.6	Cortical	Absent	51-100%
26Wp7746	16.114	BTF	CCS	Very Small	0.3	Complex	Present	0%
26Wp7746	16.115	Flake Frag	CCS	Small	1.3	Unidentifiable	Absent	0%
26Wp7746	16.116	Flake Frag	CCS	Small	1.3	Unidentifiable	Absent	0%
26Wp7746	16.117	Flake Frag	CCS	Small	1.5	Unidentifiable	Absent	0%
26Wp7746	16.118	Flake Frag	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7746	16.119	Flake	CCS	Small	1.9	Smooth	Absent	0%
26Wp7746	16.120	Flake	CCS	Small	1.4	Smooth	Absent	0%
26Wp7746	16.121	Flake Frag	CCS	Small	1.9	Unidentifiable	Absent	0%
26Wp7746	16.122	Flake Frag	CCS	Small	1.5	Unidentifiable	Absent	0%
26Wp7746	16.123	Flake Frag	CCS	Small	0.9	Unidentifiable	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7746	16.124	BTF	CCS	Very Small	0.3	Complex	Present	0%
26Wp7746	16.125	Flake	CCS	Small	1.8	Smooth	Absent	0%
26Wp7746	16.126	Flake Frag	CCS	Small	0.7	Unidentifiable	Absent	0%
26Wp7746	16.127	Angular Shatter	CCS	Small	0.8	Unidentifiable	Absent	0%
26Wp7746	16.128	Angular Shatter	CCS	Small	1.0	Unidentifiable	Absent	0%
26Wp7746	16.129	Flake	CCS	Small	0.5	Smooth	Present	0%
26Wp7746	16.130	BTF	CCS	Small	0.8	Complex	Absent	0%
26Wp7746	16.131	Secondary Cortical Spall	CCS	Medium	14.1	Complex	Absent	1-50%
26Wp7746	16.132	Flake Frag	CCS	Small	2.8	Unidentifiable	Absent	0%
26Wp7746	16.133	Secondary Cortical Spall	CCS	Small	2.2	Cortical	Absent	1-50%
26Wp7746	16.134	BTF	CCS	Small	0.3	Complex	Absent	0%
26Wp7746	16.135	Flake Frag	CCS	Small	4.0	Unidentifiable	Absent	0%
26Wp7746	16.136	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.137	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.138	Flake Frag	CCS	Very Small	0.1	Unidentifiable	Absent	0%
26Wp7746	16.139	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7746	16.140	Flake	CCS	Small	0.4	Smooth	Absent	0%
26Wp7746	16.141	Flake Frag	CCS	Small	1.3	Unidentifiable	Absent	0%
26Wp7746	16.142	Cortical Spall Frag	CCS	Small	1.0	Unidentifiable	Absent	1-50%
26Wp7746	16.143	BTF	CCS	Small	0.8	Complex	Absent	0%
26Wp7746	16.144	Flake Frag	CCS	Small	2.5	Unidentifiable	Absent	0%
26Wp7746	16.145	Flake Frag	CCS	Small	1.4	Unidentifiable	Absent	0%
26Wp7746	16.146	Flake Frag	CCS	Small	3.1	Unidentifiable	Absent	0%
26Wp7746	16.147	Flake Frag	CCS	Small	1.6	Unidentifiable	Absent	0%
26Wp7748	4.01	Flake Frag	FGV	Small	0.7	Unidentifiable	Absent	0%
26Wp7748	4.02	Cortical Spall Frag	FGV	Small	1.0	Unidentifiable	Absent	51-100%
26Wp7748	4.03	BTF	OBS	Small	0.8	Complex	Absent	0%
26Wp7748	4.04	Flake Frag	OBS	Small	0.4	Unidentifiable	Absent	0%
26Wp7748	4.05	BTF	OBS	Small	0.3	Complex	Absent	0%
26Wp7748	4.06	Flake Frag	OBS	Small	0.3	Unidentifiable	Absent	0%
26Wp7748	4.07	Flake Frag	OBS	Small	0.4	Unidentifiable	Absent	0%
26Wp7748	4.08	Flake Frag	OBS	Small	0.5	Unidentifiable	Absent	0%
26Wp7748	4.09	Flake Frag	OBS	Small	0.1	Unidentifiable	Absent	0%
26Wp7748	4.10	Flake Frag	OBS	Small	0.4	Unidentifiable	Absent	0%
26Wp7748	4.11	Flake Frag	OBS	Small	0.3	Unidentifiable	Absent	0%
26Wp7748	4.12	BTF	OBS	Small	0.4	Complex	Absent	0%
26Wp7748	4.13	BTF	CCS	Small	2.3	Complex	Absent	0%
26Wp7748	4.14	Flake	CCS	Medium	5.5	Smooth	Absent	0%
26Wp7748	4.15	BTF	CCS	Medium	4.3	Complex	Absent	0%
26Wp7748	4.16	Flake Frag	CCS	Small	1.6	Unidentifiable	Absent	0%
26Wp7748	4.17	BTF	CCS	Small	2.1	Complex	Absent	0%

Appendix D: Debitage Data

Site	FS #	Debitage Type	Raw Material	Size Value	Wgt (g)	Surface Platform Preparation	Surface Abrasion	% Cortex
26Wp7748	4.18	Flake Frag	CCS	Small	2.1	Unidentifiable	Absent	0%
26Wp7748	4.19	Flake	CCS	Small	1.6	Smooth	Absent	0%
26Wp7748	4.20	Flake Frag	CCS	Small	1.0	Unidentifiable	Absent	0%
26Wp7748	4.21	BTF	CCS	Small	0.4	Complex	Absent	0%
26Wp7748	4.22	Flake Frag	CCS	Small	0.3	Unidentifiable	Absent	0%
26Wp7748	4.23	Retouch Chip	CCS	Very Small	0.1	Smooth	Absent	0%
26Wp7748	4.24	Flake Frag	CCS	Small	0.1	Unidentifiable	Absent	0%
26Wp7748	4.25	Flake Frag	CCS	Small	1.0	Unidentifiable	Absent	0%

Note: **Debitage Type:** BTF=Biface Thinning Flake; Frag=Fragment

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	1	Finished but Unhafted Biface	CCS	5.7	3.3	0.9	17.9
CRNV-04-7721	2	Unidentified Stemmed point	OBS	2.2	1.9	0.5	2.3
CRNV-04-7721	3	Parman Stemmed point	FGV	5.3	3.5	0.9	20.2
CRNV-04-7721	4	Retouched Flake Fragment	FGV	3.1	3.3	0.4	6.1
CRNV-04-7721	5	Unidentified Stemmed point	OBS	3.1	2.6	1.1	9.4
CRNV-04-7721	6	Retouched Flake Fragment	OBS	1.7	1.7	0.4	1.3
CRNV-04-7721	8	Unidentified Stemmed point	FGV	2.9	2.5	0.6	5.8
CRNV-04-7721	9	Finished but Unhafted Biface	FGV	3.4	2.9	0.9	7.8
CRNV-04-7721	10	Late Stage Biface	FGV	1.0	2.6	0.6	1.6
CRNV-04-7721	11	Unidentified Stemmed point	CCS	2.1	1.9	0.5	2.8
CRNV-04-7721	12	Single-Spurred Graver	CCS	3.7	2.2	0.6	6.5
CRNV-04-7721	13	Crescent	OBS	2.4	2.0	0.8	3.5
CRNV-04-7721	14	Scraper/Graver	OBS	1.9	2.5	0.6	2.3
CRNV-04-7721	15	Parman Stemmed point	FGV	4.0	3.9	0.7	12.7
CRNV-04-7721	16	Parman Stemmed point	FGV	4.0	3.9	0.9	12.9
CRNV-04-7721	17	Unidentified Stemmed point	OBS	2.3	2.5	0.6	4.2
CRNV-04-7721	18	Middle Stage Biface	FGV	4.5	4.0	0.9	18.5
CRNV-04-7721	19	Finished but Unhafted Biface	FGV	4.2	3.6	0.7	10.2
CRNV-04-7721	20	Parman Stemmed point	FGV	2.5	2.9	0.5	4.1
CRNV-04-7721	21	Late Stage Biface	FGV	3.0	2.8	0.7	6.2
CRNV-04-7721	22	Late Stage Biface	FGV	2.0	3.3	0.5	4.1
CRNV-04-7721	23	Late Stage Biface	FGV	1.9	4.0	0.6	6.1
CRNV-04-7721	24	End Scraper Fragment	FGV	3.6	5.4	1.5	36.0
CRNV-04-7721	25	Retouched Flake Fragment	FGV	2.1	2.5	0.5	2.7
CRNV-04-7721	26	Middle Stage Biface	OBS	2.8	3.1	1.0	8.9
CRNV-04-7721	27	Retouched Flake Fragment	CCS	2.2	2.8	0.8	4.6
CRNV-04-7721	28	Late Stage Biface	FGV	4.7	4.6	0.7	18.2
CRNV-04-7721	30	Parman Stemmed point	FGV	4.1	2.6	0.7	6.8
CRNV-04-7721	31	Retouched Flake Fragment	FGV	3.9	4.1	0.8	14.1
CRNV-04-7721	32	Unilateral Side Scraper	FGV	6.0	3.3	1.7	40.1
CRNV-04-7721	33	End Scraper Fragment	CCS	5.5	3.4	1.0	23.0
CRNV-04-7721	34	Finished but Unhafted Biface	FGV	3.2	2.9	0.8	6.7
CRNV-04-7721	35	Unidentified Stemmed point	OBS	2.0	2.2	0.6	3.2
CRNV-04-7721	37	Late Stage Biface	FGV	3.4	3.9	0.7	10.7
CRNV-04-7721	38	Late Stage Biface	FGV	4.7	4.0	1.1	17.9
CRNV-04-7721	39	Finished but Unhafted Biface	FGV	3.6	3.8	0.7	10.0
CRNV-04-7721	40	Middle Stage Biface	FGV	3.7	3.1	0.7	10.2
CRNV-04-7721	41	Unidentified Stemmed point	FGV	2.6	1.9	0.6	3.5
CRNV-04-7721	42	Unidentified Stemmed point	FGV	5.7	4.3	0.8	23.9
CRNV-04-7721	43	Late Stage Biface	FGV	4.0	4.0	0.9	19.1
CRNV-04-7721	44	Cougar Mtn Stemmed point	FGV	3.3	3.4	0.8	9.9
CRNV-04-7721	45	Finished but Unhafted Biface	FGV	3.3	4.5	1.0	18.2

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	46	Parman Stemmed point	FGV	3.4	3.5	0.8	8.5
CRNV-04-7721	47	Retouched Flake	CCS	2.3	3.3	0.6	4.2
CRNV-04-7721	48	Parman Stemmed point	FGV	4.6	3.2	0.5	9.2
CRNV-04-7721	49	Cougar Mtn Stemmed point	FGV	2.6	3.4	0.6	8.5
CRNV-04-7721	50	Retouched Flake	FGV	4.7	3.6	0.7	11.6
CRNV-04-7721	51	Side Scraper Fragment	CCS	5.6	5.9	1.7	63.6
CRNV-04-7721	52	Early Stage Biface	CCS	5.0	1.9	1.6	14.2
CRNV-04-7721	53	End Scraper Fragment	OBS	2.4	1.6	0.5	2.5
CRNV-04-7721	54	Retouched Flake Fragment	FGV	1.8	3.2	0.4	2.6
CRNV-04-7721	55	Unilateral Side Scraper	CCS	5.5	4.2	0.9	17.1
CRNV-04-7721	56	Scraper/Graver	FGV	4.6	5.1	1.2	30.9
CRNV-04-7721	57	Unidentified Stemmed point	FGV	2.4	2.1	0.6	3.2
CRNV-04-7721	58	Late Stage Biface	FGV	2.1	2.8	1.0	5.0
CRNV-04-7721	59	Retouched Flake Fragment	CCS	2.4	3.3	0.7	6.0
CRNV-04-7721	60	Finished but Unhafted Biface	FGV	3.7	3.6	1.0	12.2
CRNV-04-7721	61	Retouched Flake Fragment	CCS	2.4	2.1	0.5	2.7
CRNV-04-7721	62	Retouched Flake Fragment	CCS	2.3	2.4	0.4	2.3
CRNV-04-7721	63	Finished but Unhafted Biface	FGV	2.1	2.3	0.9	3.6
CRNV-04-7721	64	Haskett Stemmed point	FGV	5.2	2.5	0.9	14.2
CRNV-04-7721	65	Late Stage Biface	FGV	2.6	3.2	0.6	5.2
CRNV-04-7721	66	Middle Stage Biface	FGV	7.3	3.7	1.2	34.9
CRNV-04-7721	67	End/Side Scraper	CCS	5.2	5.4	1.3	35.5
CRNV-04-7721	68	Retouched Flake Fragment	CCS	2.8	2.7	0.5	3.6
CRNV-04-7721	69	Side Scraper Fragment	FGV	3.1	3.0	0.8	10.1
CRNV-04-7721	70	Middle Stage Biface	FGV	4.3	5.2	1.1	28.1
CRNV-04-7721	71	Middle Stage Biface	FGV	3.3	4.7	0.9	14.1
CRNV-04-7721	72	Middle Stage Biface	CCS	3.9	2.1	2.0	11.4
CRNV-04-7721	73	Late Stage Biface	FGV	3.7	4.0	0.9	16.2
CRNV-04-7721	74	Finished but Unhafted Biface	FGV	3.8	3.0	1.0	11.9
CRNV-04-7721	75	Unidentified Stemmed point	FGV	4.9	2.2	0.9	12.0
CRNV-04-7721	76	Late Stage Biface	FGV	3.1	5.1	1.0	16.3
CRNV-04-7721	77	Middle Stage Biface	FGV	4.7	1.9	1.4	12.6
CRNV-04-7721	78	Late Stage Biface	FGV	4.4	5.2	0.9	22.9
CRNV-04-7721	79	Side Scraper Fragment	FGV	2.6	5.4	1.1	14.1
CRNV-04-7721	80	Late Stage Biface	FGV	3.6	4.1	0.7	10.6
CRNV-04-7721	81	End Scraper Fragment	CCS	7.4	3.3	1.0	26.2
CRNV-04-7721	82	Late Stage Biface	FGV	2.5	2.7	0.7	5.5
CRNV-04-7721	83	Middle Stage Biface	FGV	4.0	4.6	1.1	22.4
CRNV-04-7721	84	Unidentified Stemmed point	FGV	3.2	2.0	0.6	4.3
CRNV-04-7721	85	Late Stage Biface	FGV	3.2	4.0	0.8	11.3
CRNV-04-7721	86	Angle Scraper	CCS	3.6	3.8	0.6	8.4
CRNV-04-7721	87	Unidentified Stemmed point	FGV	3.5	1.9	0.7	5.8
CRNV-04-7721	88	Crescent	FGV	3.1	2.7	0.6	5.2

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	89	Unidentified Stemmed point	FGV	3.2	3.3	0.9	11.4
CRNV-04-7721	90	Finished but Unhafted Biface	FGV	3.0	2.1	0.5	5.0
CRNV-04-7721	91	End Scraper on Flake	CCS	4.0	3.2	0.9	11.2
CRNV-04-7721	92	Retouched Flake Fragment	FGV	2.3	3.6	0.6	6.9
CRNV-04-7721	93	Late Stage Biface	FGV	3.0	3.8	0.7	10.9
CRNV-04-7721	94	Middle Stage Biface	FGV	2.6	3.0	0.7	4.8
CRNV-04-7721	95	Late Stage Biface	FGV	5.4	4.9	0.8	21.9
CRNV-04-7721	96	Middle Stage Biface	FGV	2.7	3.3	0.8	7.7
CRNV-04-7721	97	Cougar Mtn Stemmed point	FGV	2.6	3.6	0.6	6.7
CRNV-04-7721	98	Side Scraper Fragment	FGV	5.3	4.5	1.0	26.9
CRNV-04-7721	99	Middle Stage Biface	FGV	3.9	3.4	1.1	11.0
CRNV-04-7721	100	Late Stage Biface	FGV	4.1	3.3	1.0	14.7
CRNV-04-7721	101	Late Stage Biface	OBS	0.7	1.8	0.6	1.0
CRNV-04-7721	102	Finished but Unhafted Biface	FGV	3.7	2.6	0.6	5.6
CRNV-04-7721	103	Retouched Flake Fragment	OBS	3.4	1.2	0.8	3.0
CRNV-04-7721	104	Late Stage Biface	FGV	2.4	3.2	0.5	4.1
CRNV-04-7721	105	Single-Spurred Graver	OBS	2.6	2.3	0.4	2.2
CRNV-04-7721	106	Retouched Flake Fragment	OBS	1.6	1.9	0.5	1.6
CRNV-04-7721	107	Finished but Unhafted Biface	OBS	2.6	1.4	0.6	2.1
CRNV-04-7721	108	Retouched Flake	OBS	1.5	1.9	0.6	1.4
CRNV-04-7721	109	Western Fluted point	CCS	3.8	3.4	0.9	10.4
CRNV-04-7721	111	Finished but Unhafted Biface	CCS	2.1	3.8	0.8	5.6
CRNV-04-7721	112	Retouched Flake Fragment	CCS	2.1	1.6	0.5	2.1
CRNV-04-7721	113	Single-Spurred Graver	CCS	2.2	3.5	0.6	4.6
CRNV-04-7721	114	End Scraper Fragment	CCS	3.0	3.3	1.1	13.8
CRNV-04-7721	115	Retouched Flake	CCS	4.6	3.3	0.9	12.6
CRNV-04-7721	116	Single-Spurred Graver	CCS	1.6	1.5	0.4	1.6
CRNV-04-7721	117	Single-Spurred Graver	OBS	1.9	1.7	0.4	1.1
CRNV-04-7721	118	Crescent	OBS	3.6	1.9	0.8	4.9
CRNV-04-7721	119	Bifacially Retouched Side Scraper	OBS	2.1	2.4	0.6	2.8
CRNV-04-7721	120	End Scraper on Flake	CCS	3.1	2.3	1.0	6.3
CRNV-04-7721	121	Retouched Flake Fragment	OBS	2.0	1.1	0.5	1.1
CRNV-04-7721	122	Retouched Flake	OBS	1.8	1.5	0.3	0.8
CRNV-04-7721	124	Retouched Flake Fragment	CCS	3.9	3.8	0.8	16.6
CRNV-04-7721	125	Middle Stage Biface	CCS	4.8	3.6	1.0	23.1
CRNV-04-7721	126	Finished but Unhafted Biface	CCS	2.5	2.7	0.7	4.7
CRNV-04-7721	127	Retouched Flake	CCS	4.9	3.1	1.2	14.7
CRNV-04-7721	128	End Scraper Fragment	CCS	2.3	2.9	0.5	4.4
CRNV-04-7721	129	End Scraper on Flake	CCS	3.7	3.0	0.9	8.9
CRNV-04-7721	130	Early Stage Biface	CCS	6.3	4.0	1.8	45.4
CRNV-04-7721	131	Retouched Flake Fragment	CCS	5.2	2.7	0.8	12.0
CRNV-04-7721	132	Scraper/Notch	CCS	4.8	2.8	1.0	13.0

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	133	Retouched Flake Fragment	CCS	3.1	2.4	0.7	4.6
CRNV-04-7721	134	Unidentified Stemmed point	FGV	2.2	2.3	0.8	5.5
CRNV-04-7721	135	Retouched Flake	OBS	1.9	2.2	0.5	2.1
CRNV-04-7721	136	Bifacially Retouched Side Scraper	CCS	4.5	2.4	0.9	10.3
CRNV-04-7721	137	End Scraper on Blade	CCS	4.9	2.3	1.0	12.2
CRNV-04-7721	138	Middle Stage Biface	CCS	4.3	5.1	2.0	41.7
CRNV-04-7721	139	End Scraper Fragment	CCS	4.3	5.1	0.8	20.4
CRNV-04-7721	140	Graver on Stemmed point	OBS	1.9	1.5	0.4	1.3
CRNV-04-7721	141	Late Stage Biface	OBS	4.2	3.3	1.0	12.8
CRNV-04-7721	142	Unidentified Stemmed point	OBS	2.9	2.1	0.7	4.4
CRNV-04-7721	143	Western Fluted point	CCS	2.5	2.3	0.7	4.0
CRNV-04-7721	144	Unilateral Side Scraper	CCS	4.6	2.7	1.1	14.9
CRNV-04-7721	145	Retouched Flake Fragment	CCS	1.7	2.5	0.6	2.2
CRNV-04-7721	146	Crescent	CCS	4.8	1.9	0.6	6.0
CRNV-04-7721	147	Unidentified Stemmed point	FGV	4.8	2.3	1.0	12.7
CRNV-04-7721	148	Unidentified Stemmed point	OBS	2.1	2.4	0.7	3.2
CRNV-04-7721	149	Backed Knife	CCS	3.8	3.8	1.2	16.9
CRNV-04-7721	150	Haskett Stemmed point	FGV	5.7	2.6	1.0	16.8
CRNV-04-7721	151	Middle Stage Biface	CCS	4.4	5.3	1.2	29.1
CRNV-04-7721	152	Single-Spurred Graver	OBS	2.1	1.7	0.5	2.0
CRNV-04-7721	153	Late Stage Biface	FGV	4.5	2.6	1.0	15.8
CRNV-04-7721	154	Notch/Graver	CCS	4.8	3.4	0.7	13.1
CRNV-04-7721	155	End Scraper on Flake	FGV	4.7	4.8	1.0	21.7
CRNV-04-7721	156	Late Stage Biface	FGV	2.7	2.6	0.7	6.6
CRNV-04-7721	157	End/Side Scraper	FGV	3.6	3.0	0.7	9.2
CRNV-04-7721	158	End Scraper on Flake	CCS	2.6	2.8	0.5	3.3
CRNV-04-7721	159	Retouched Flake Fragment	CCS	3.9	2.6	0.4	6.0
CRNV-04-7721	160	Alternatively Retouched Side Scraper	FGV	5.4	7.0	1.4	59.0
CRNV-04-7721	161	Retouched Flake Fragment	CCS	3.7	3.5	0.7	9.5
CRNV-04-7721	162	Late Stage Biface	FGV	4.0	5.1	0.9	17.1
CRNV-04-7721	163	Middle Stage Biface	FGV	3.6	3.9	1.4	22.7
CRNV-04-7721	164	Middle Stage Biface	QTZT	4.7	3.2	0.9	15.6
CRNV-04-7721	165	Crescent	OBS	3.3	1.8	0.7	4.3
CRNV-04-7721	166	End Scraper on Flake	CCS	4.7	5.0	1.3	25.6
CRNV-04-7721	167	Backed Knife	CCS	3.9	4.1	1.1	17.7
CRNV-04-7721	168	Cougar Mtn Stemmed point	FGV	3.0	4.1	0.6	9.4
CRNV-04-7721	169	Unilateral Side Scraper	CCS	2.7	4.1	1.0	9.2
CRNV-04-7721	170	Unidentified Stemmed point	OBS	3.8	2.1	0.9	7.2
CRNV-04-7721	173	Convergent Scraper	CCS	2.5	3.4	0.6	6.0
CRNV-04-7721	174	Retouched Flake/Scraper	CCS	3.8	2.5	0.5	5.0
CRNV-04-7721	175	Parman Stemmed point	FGV	3.6	2.3	0.6	6.7
CRNV-04-7721	176	Unidentified Stemmed point	FGV	2.9	2.5	0.6	5.3

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	177	Early Stage Biface	FGV	4.5	5.8	1.4	33.0
CRNV-04-7721	178	Haskett Stemmed point	CCS	6.9	2.5	1.0	17.2
CRNV-04-7721	179	Unidentified Stemmed point	FGV	5.2	2.5	1.1	15.5
CRNV-04-7721	180	End Scraper on Flake	CCS	4.3	4.4	1.3	26.4
CRNV-04-7721	181	Parman Stemmed point	FGV	3.8	2.6	0.6	4.9
CRNV-04-7721	182	Retouched Flake Fragment	FGV	3.3	3.4	0.9	9.9
CRNV-04-7721	183	Unidentified Stemmed point	FGV	4.2	2.9	1.0	12.7
CRNV-04-7721	184	Retouched Flake	CCS	2.7	2.2	0.6	3.4
CRNV-04-7721	185	Retouched Flake	CCS	3.8	3.9	1.0	12.5
CRNV-04-7721	186	Late Stage Biface	FGV	2.7	4.2	0.8	8.5
CRNV-04-7721	187	Late Stage Biface	FGV	4.6	4.0	0.9	19.3
CRNV-04-7721	188	Retouched Flake Fragment	CCS	2.0	2.5	0.4	2.2
CRNV-04-7721	189	Transverse Scraper	CCS	4.1	7.1	1.8	47.3
CRNV-04-7721	190	Unidentified Stemmed point	FGV	2.3	2.1	0.7	4.3
CRNV-04-7721	191	Retouched Flake	FGV	5.7	5.0	1.4	33.0
CRNV-04-7721	192	Parman Stemmed point	CCS	4.7	4.2	0.7	10.5
CRNV-04-7721	193	Single-Spurred Graver	CCS	5.4	2.8	0.6	10.8
CRNV-04-7721	194	Side Scraper Fragment	FGV	5.8	4.5	1.5	42.0
CRNV-04-7721	195	Middle Stage Biface	CCS	4.3	6.8	1.7	39.1
CRNV-04-7721	196	Retouched Flake Fragment	CCS	4.5	3.0	1.1	13.2
CRNV-04-7721	197	Retouched Flake	OBS	2.7	2.8	0.6	3.6
CRNV-04-7721	199	Unidentified Stemmed point	FGV	3.4	2.1	0.7	5.5
CRNV-04-7721	200	Western Fluted point	CCS	3.4	3.4	0.7	10.7
CRNV-04-7721	201	Retouched Flake	CCS	4.4	4.3	1.0	16.8
CRNV-04-7721	204	Haskett Stemmed point	CCS	6.8	3.4	1.0	25.5
CRNV-04-7721	205	Unidentified Stemmed point	CCS	4.1	2.1	0.7	7.0
CRNV-04-7721	206	Finished but Unhafted Biface	CCS	2.9	2.6	0.8	6.2
CRNV-04-7721	207	Parman Stemmed point	FGV	4.6	6.2	1.2	28.6
CRNV-04-7721	208	Retouched Flake Fragment	OBS	1.8	1.8	0.5	2.0
CRNV-04-7721	209	Side Scraper Fragment	OBS	3.3	3.3	1.2	11.5
CRNV-04-7721	210	Retouched Flake Fragment	FGV	3.5	2.9	1.1	9.1
CRNV-04-7721	211	Unilateral Side Scraper	CCS	3.9	3.2	0.7	13.4
CRNV-04-7721	212	Retouched Flake	FGV	4.3	2.9	0.9	9.8
CRNV-04-7721	213	Finished but Unhafted Biface	CCS	3.6	2.9	1.0	12.3
CRNV-04-7721	214	Middle Stage Biface	FGV	5.0	3.6	1.0	13.8
CRNV-04-7721	216	Finished but Unhafted Biface	FGV	5.5	4.9	1.0	19.5
CRNV-04-7721	217	Retouched Flake Fragment	OBS	1.7	3.3	0.9	4.8
CRNV-04-7721	218	Retouched Flake	CCS	2.1	2.2	0.7	5.3
CRNV-04-7721	219	Retouched Flake/Scraper	OBS	2.2	1.7	0.9	2.6
CRNV-04-7721	220	Cougar Mtn Stemmed point	FGV	4.9	2.8	1.0	16.1
CRNV-04-7721	221	End Scraper on Flake	CCS	4.9	3.1	0.7	12.0
CRNV-04-7721	222	Black Rock Concave Base point	QTZT	3.6	2.6	0.6	6.1

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	223	Middle Stage Biface	CCS	5.2	4.1	1.0	19.9
CRNV-04-7721	224	End Scraper on Stemmed point	CCS	7.0	2.8	0.8	17.3
CRNV-04-7721	225	End/Side Scraper	CCS	3.7	2.8	1.2	12.5
CRNV-04-7721	226	Retouched Flake	CCS	4.2	2.7	0.6	5.4
CRNV-04-7721	227	Retouched Flake/Scraper	CCS	2.6	2.1	0.8	3.5
CRNV-04-7721	229	Retouched Flake/Scraper	CCS	3.1	2.7	0.6	5.4
CRNV-04-7721	230	Retouched Flake	CCS	4.2	3.5	1.0	16.5
CRNV-04-7721	231	Retouched Flake	CCS	3.7	4.6	1.1	17.9
CRNV-04-7721	232	Unidentified Stemmed point	OBS	2.4	2.4	1.0	7.9
CRNV-04-7721	233	Retouched Flake	CCS	4.2	3.5	0.5	6.9
CRNV-04-7721	234	End/Side Scraper	CCS	4.8	2.9	0.9	15.8
CRNV-04-7721	235	Late Stage Biface	FGV	3.3	3.4	0.7	7.9
CRNV-04-7721	236	Unidentified Stemmed point	CCS	2.4	2.2	0.8	4.5
CRNV-04-7721	237	Cougar Mtn Stemmed point	QTZT	6.1	2.9	0.9	16.4
CRNV-04-7721	238	Crescent	CCS	3.1	1.6	0.6	4.6
CRNV-04-7721	250	End Scraper on Flake	FGV	3.2	5.8	1.1	20.9
CRNV-04-7721	255	Retouched Flake Fragment	OBS	1.3	1.6	0.3	0.6
CRNV-04-7721	256	Unidentified Stemmed point	FGV	2.6	2.3	0.7	4.9
CRNV-04-7721	257	Round End Scraper	CCS	2.9	3.2	0.7	9.2
CRNV-04-7721	258	Unidentified Stemmed point	FGV	3.6	2.6	0.9	10.7
CRNV-04-7721	262	Retouched Flake	CCS	3.8	2.8	0.7	6.3
CRNV-04-7721	265	End/Side Scraper	CCS	2.5	2.2	0.5	2.4
CRNV-04-7721	270	Middle Stage Biface	OBS	1.6	2.2	0.6	2.5
CRNV-04-7721	273	Retouched Flake	OBS	1.6	1.4	0.3	0.7
CRNV-04-7721	284	Retouched Flake Fragment	OBS	1.1	1.4	0.3	0.4
CRNV-04-7721	286	Crescent	CCS	3.9	2.3	0.6	5.6
CRNV-04-7721	288	Retouched Flake Fragment	CCS	2.6	1.9	0.4	1.6
CRNV-04-7721	289	Western Fluted point	OBS	1.3	3.3	0.6	3.9
CRNV-04-7721	290	Retouched Flake Fragment	OBS	1.6	1.8	0.7	1.8
CRNV-04-7721	294	Retouched Flake	CCS	6.0	2.2	0.9	9.4
CRNV-04-7721	301	Late Stage Biface	FGV	4.5	4.9	1.0	20.0
CRNV-04-7721	303	Retouched Flake	CCS	2.7	1.2	0.4	1.4
CRNV-04-7721	307	Finished but Unhafted Biface	OBS	1.4	1.7	0.6	1.3
CRNV-04-7721	317	Retouched Flake	CCS	3.0	1.6	0.5	2.2
CRNV-04-7721	319	Retouched Flake Fragment	CCS	2.0	2.2	0.2	1.4
CRNV-04-7721	321	Retouched Flake Fragment	FGV	1.3	1.3	0.3	0.8
CRNV-04-7721	322	Retouched Flake Fragment	OBS	1.0	1.3	0.3	0.4
CRNV-04-7721	328.1	Retouched Flake Fragment	OBS	1.5	1.7	0.3	0.7
CRNV-04-7721	337	Retouched Flake	FGV	2.6	3.6	1.0	6.9
CRNV-04-7721	346	Retouched Flake Fragment	FGV	3.3	3.9	0.8	10.8
CRNV-04-7721	352	Windust Stemmed point	FGV	1.6	2.1	0.5	1.7
CRNV-04-7721	370	Retouched Flake Fragment	FGV	2.3	1.7	0.5	2.3

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	377	Late Stage Biface	FGV	4.1	4.2	0.9	13.6
CRNV-04-7721	379	Late Stage Biface	FGV	1.6	3.7	0.7	4.9
CRNV-04-7721	382	Early Stage Biface	CCS	3.6	3.4	1.1	13.9
CRNV-04-7721	388	Multiple-Spurred Graver	FGV	2.5	2.8	0.5	3.6
CRNV-04-7721	390	Retouched Flake	FGV	2.3	1.7	0.4	1.9
CRNV-04-7721	394	Retouched Flake Fragment	CCS	1.7	2.4	0.4	2.0
CRNV-04-7721	395	Retouched Flake Fragment	FGV	1.8	2.4	0.4	1.6
CRNV-04-7721	397	Retouched Flake Fragment	FGV	2.5	3.5	0.5	4.5
CRNV-04-7721	398	Retouched Flake Fragment	CCS	1.5	2.0	0.4	1.0
CRNV-04-7721	400	Retouched Flake	FGV	2.4	2.2	0.6	2.5
CRNV-04-7721	401	Retouched Flake	FGV	2.8	3.5	0.6	7.2
CRNV-04-7721	404	Backed Knife	FGV	4.2	10.6	2.2	62.3
CRNV-04-7721	406	Middle Stage Biface	OBS	2.7	1.2	0.9	3.0
CRNV-04-7721	409	End Scraper Fragment	FGV	3.8	2.7	1.5	17.7
CRNV-04-7721	410	Finished but Unhafted Biface	FGV	1.8	2.9	0.7	4.2
CRNV-04-7721	418	Retouched Flake Fragment	FGV	2.5	1.7	0.3	1.7
CRNV-04-7721	421	Retouched Flake Fragment	FGV	2.7	2.1	0.7	4.2
CRNV-04-7721	426	Finished but Unhafted Biface	CCS	4.0	3.5	0.5	6.0
CRNV-04-7721	427	Early Stage Biface	FGV	4.0	3.5	1.0	11.7
CRNV-04-7721	430	End Scraper Fragment	CCS	3.7	2.7	0.9	10.7
CRNV-04-7721	431	Bilateral Side Scraper	CCS	3.9	1.7	1.0	8.3
CRNV-04-7721	432	Unidentified Stemmed point	FGV	3.3	2.2	0.7	7.7
CRNV-04-7721	433	End Scraper on Flake	CCS	3.4	3.9	1.1	16.5
CRNV-04-7721	434	Unidentified Stemmed point	OBS	2.8	2.0	0.6	3.1
CRNV-04-7721	435	Three-Sided Scraper	CCS	3.4	2.5	0.8	7.4
CRNV-04-7721	436	Unilateral Side Scraper	OBS	2.7	2.7	0.7	3.7
CRNV-04-7721	437	Crescent	CCS	3.4	2.7	0.9	8.8
CRNV-04-7721	438	Late Stage Biface	CCS	4.8	3.9	0.8	18.7
CRNV-04-7721	439	Scraper/Notch	CCS	3.9	3.4	0.7	10.3
CRNV-04-7721	440	Early Stage Biface	CCS	5.6	4.9	1.6	46.3
CRNV-04-7721	441	Middle Stage Biface	CCS	4.8	4.1	1.0	24.5
CRNV-04-7721	442	Middle Stage Biface	OBS	4.0	2.8	1.2	13.7
CRNV-04-7721	443	Retouched Flake	CCS	4.7	3.2	0.7	11.9
CRNV-04-7721	444	End Scraper Fragment	CCS	6.1	7.0	1.6	88.9
CRNV-04-7721	445	Retouched Flake Fragment	CCS	3.7	3.2	0.6	6.8
CRNV-04-7721	446	Convergent Scraper	OBS	4.7	3.6	1.0	17.6
CRNV-04-7721	447	Finished but Unhafted Biface	CCS	6.9	4.3	1.4	51.2
CRNV-04-7721	448	Late Stage Biface	FGV	3.2	3.1	0.7	9.0
CRNV-04-7721	449	Retouched Flake Fragment	CCS	4.0	3.7	0.6	10.3
CRNV-04-7721	450	Drill on Stemmed point	CCS	2.9	2.6	0.7	5.1
CRNV-04-7721	453	Finished but Unhafted Biface	OBS	1.5	2.5	0.8	2.7
CRNV-04-7721	454	End/Side Scraper	CCS	8.0	5.1	1.8	80.0
CRNV-04-7721	455	Finished but Unhafted Biface	OBS	1.2*	2.5	0.5	2.2

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	456	Unidentifiable Point Fragment	FGV	2.4	1.9	0.7	2.4
CRNV-04-7721	457	Late Stage Biface	OBS	1.9	1.2	0.6	1.2
CRNV-04-7721	458	Unidentified Stemmed point	FGV	3.8	2.6	0.8	11.6
CRNV-04-7721	459	Unidentified Stemmed point	FGV	2.7	1.8	0.7	3.5
CRNV-04-7721	460	Retouched Flake	CCS	3.4	2.1	3.8	3.5
CRNV-04-7721	461	Middle Stage Biface	CCS	3.0	3.3	0.9	9.4
CRNV-04-7721	462	Cougar Mtn Stemmed point	FGV	5.1	3.9	0.9	21.4
CRNV-04-7721	463	End Scraper Fragment	CCS	6.1	4.4	1.3	34.2
CRNV-04-7721	464	Parman Stemmed point	FGV	2.2	2.3	0.6	4.1
CRNV-04-7721	465	Late Stage Biface	FGV	3.0	3.1	0.7	6.2
CRNV-04-7721	466	Cougar Mtn Stemmed point	FGV	3.5	3.6	0.6	8.0
CRNV-04-7721	467	Scraper/Burin	CCS	6.3	3.4	1.0	17.6
CRNV-04-7721	468	Middle Stage Biface	OBS	3.0	2.5	0.8	4.9
CRNV-04-7721	469	Finished but Unhafted Biface	CCS	3.7	4.3	0.6	11.0
CRNV-04-7721	470	Unilateral Side Scraper	FGV	2.4	4.0	0.6	7.5
CRNV-04-7721	471	Retouched Flake	CCS	4.2	5.4	1.4	27.6
CRNV-04-7721	472	Early Stage Biface	CCS	6.5	4.0	2.0	46.9
CRNV-04-7721	473	Retouched Flake/Scraper	CCS	2.4	2.1	0.5	2.6
CRNV-04-7721	474	Unidentified Stemmed point	FGV	4.0	2.7	0.9	10.8
CRNV-04-7721	475	Middle Stage Biface	OBS	1.3	3.1	1.3	6.2
CRNV-04-7721	476	Bilateral Side Scraper	FGV	2.4	2.7	0.9	7.7
CRNV-04-7721	477	Scraper/Graver	CCS	4.5	3.5	0.7	9.8
CRNV-04-7721	478	Parman Stemmed point	FGV	4.3*	2.8	0.7	10.3
CRNV-04-7721	479	Retouched Flake	CCS	3.0	3.1	0.7	8.1
CRNV-04-7721	480	Unidentified Stemmed point	FGV	4.8	3.0	0.9	14.6
CRNV-04-7721	481	Bilateral Side Scraper	CCS	3.9	3.1	0.6	8.5
CRNV-04-7721	482	Unidentified Stemmed point	FGV	2.2	2.4	0.6	4.4
CRNV-04-7721	483	Late Stage Biface	FGV	3.7	2.8	1.1	13.0
CRNV-04-7721	484	Black Rock Concave Base point	CCS	4.2	2.8	0.6	8.2
CRNV-04-7721	485	Retouched Flake	CCS	6.1	4.2	1.6	31.7
CRNV-04-7721	486	Early Stage Biface	CCS	5.1	4.8	1.6	32.6
CRNV-04-7721	487	Notch	FGV	5.3	4.0	1.1	27.1
CRNV-04-7721	488	End Scraper on Flake	CCS	4.3	4.1	0.8	13.7
CRNV-04-7721	489	Cougar Mtn Stemmed point	RHY	4.6*	2.3	0.8	7.8
CRNV-04-7721	490	Parman Stemmed point	CCS	4.1	2.9	0.5	7.7
CRNV-04-7721	491	Early Stage Biface	CCS	7.0	4.2	1.9	42.7
CRNV-04-7721	492	Finished but Unhafted Biface	FGV	4.7	3.5	0.7	10.3
CRNV-04-7721	493	Retouched Flake	CCS	4.0	3.8	0.8	11.4
CRNV-04-7721	494	Unidentified Stemmed point	FGV	3.5	2.1	0.6	5.1
CRNV-04-7721	495	Retouched Flake	CCS	3.3	4.3	0.7	9.6
CRNV-04-7721	496	Cougar Mtn Stemmed point	CCS	6.1	3.5	1.4	27.4
CRNV-04-7721	497	Retouched Flake/Graver	CCS	3.9	1.9	0.4	3.6

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	498	Crescent	OBS	2.1	1.6	0.6	2.3
CRNV-04-7721	499	Haskett Stemmed point	FGV	6.6	2.8	0.7	20.3
CRNV-04-7721	500	Middle Stage Biface	FGV	6.1	5.4	1.8	55.5
CRNV-04-7721	501	Unilateral Side Scraper	CCS	5.3	3.8	0.8	16.0
CRNV-04-7721	502	Crescent	CCS	4.2	3.0	0.8	12.9
CRNV-04-7721	503	Spurred End Scraper	CCS	3.5	2.1	0.5	3.6
CRNV-04-7721	504	Unilateral Side Scraper	CCS	7.0	4.4	1.1	34.1
CRNV-04-7721	505	Unidentified Stemmed point	FGV	2.8	2.7	0.9	8.5
CRNV-04-7721	506	Unidentified Stemmed point	OBS	1.7	2.0	0.5	2.3
CRNV-04-7721	507	Retouched Flake/Scraper	CCS	3.6	3.1	0.6	4.4
CRNV-04-7721	508	Side Scraper Fragment	FGV	3.8	3.3	0.9	14.4
CRNV-04-7721	510	End Scraper Fragment	CCS	3.0	4.0	1.0	15.3
CRNV-04-7721	512	Middle Stage Biface	CCS	3.7	2.8	0.7	9.7
CRNV-04-7721	513	Late Stage Biface	CCS	3.1	2.9	0.7	8.6
CRNV-04-7721	514	Finished but Unhafted Biface	FGV	2.8	2.1	0.8	4.0
CRNV-04-7721	515	Cougar Mtn Stemmed point	RHY	4.1	3.3	1.0	14.7
CRNV-04-7721	516	Unidentified Stemmed point	FGV	5.4	2.5	0.9	12.3
CRNV-04-7721	517	Crescent	CCS	5.2	3.3	1.2	18.4
CRNV-04-7721	518	Cougar Mtn Stemmed point	FGV	3.0	2.3	0.8	8.3
CRNV-04-7721	519	Cougar Mtn Stemmed point	FGV	6.4	3.7	1.1	27.9
CRNV-04-7721	520	Cougar Mtn Stemmed point	FGV	8.9	3.3	0.8	24.3
CRNV-04-7721	521	End Scraper on Flake	CCS	6.6	3.5	1.4	29.2
CRNV-04-7721	522	Crescent	CCS	3.0	2.1	0.6	4.9
CRNV-04-7721	523	Western Fluted point	OBS	2.0	3.1	0.6	5.0
CRNV-04-7721	524	Unidentified Stemmed point	CCS	4.0	3.3	0.9	14.6
CRNV-04-7721	525	Cougar Mtn Stemmed point	FGV	4.8	3.8	0.9	22.0
CRNV-04-7721	526	Late Stage Biface	FGV	9.7	3.6	1.4	48.6
CRNV-04-7721	527	Middle Stage Biface	OBS	2.1	2.9	0.9	4.2
CRNV-04-7721	528	End/Side Scraper	CCS	3.7	4.1	0.9	13.3
CRNV-04-7721	529	Crescent	OBS	3.1	2.0	0.7	4.6
CRNV-04-7721	530	End Scraper on Blade	CCS	4.6	2.5	0.8	9.1
CRNV-04-7721	531	Retouched Flake Fragment	OBS	2.5	2.8	0.8	4.1
CRNV-04-7721	532	Retouched Flake	CCS	2.7	3.1	0.5	4.4
CRNV-04-7721	533	Middle Stage Biface	CCS	3.7	3.9	1.1	15.4
CRNV-04-7721	534	Retouched Flake Fragment	OBS	2.2	2.1	0.4	2.1
CRNV-04-7721	535	End Scraper Fragment	CCS	3.3	3.8	1.2	17.8
CRNV-04-7721	536	Finished but Unhafted Biface	FGV	4.0	2.9	0.9	13.8
CRNV-04-7721	537	Early Stage Biface	FGV	7.4	3.7	2.0	49.5
CRNV-04-7721	538	Late Stage Biface	FGV	4.4	4.3	0.9	19.9
CRNV-04-7721	539	Unilateral Side Scraper	CCS	4.6	5.7	1.0	22.5
CRNV-04-7721	540	End Scraper on Flake	CCS	4.1	3.2	1.3	16.3
CRNV-04-7721	541	Crescent	OBS	2.4	2.0	0.5	2.0
CRNV-04-7721	542	End Scraper on Flake	CCS	4.1	2.8	0.8	8.4

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
CRNV-04-7721	543	Side Scraper Fragment	CCS	2.9	1.8	0.6	3.4
CRNV-04-7721	544	Retouched Flake	CCS	4.5	4.0	0.7	10.8
CRNV-04-7721	545	Early Stage Biface	CCS	3.0	4.1	1.8	26.2
CRNV-04-7721	546	Early Stage Biface	CCS	3.9	5.8	1.2	27.5
CRNV-04-7721	548	End Scraper Fragment	CCS	3.6	2.6	0.9	10.3
CRNV-04-7721	549	Unidentified Stemmed point	FGV	3.2	2.1	0.6	5.2
CRNV-04-7721	29a	Cougar Mtn Stemmed point	FGV	3.5	2.6	0.8	10.1
CRNV-04-7721	29b	Cougar Mtn Stemmed point	FGV	3.3	3.0	0.9	12.6
CRNV-04-7721	365a	Side Scraper Fragment	FGV	1.8	3.9	0.8	7.7
CRNV-04-7721	365b	Middle Stage Biface	FGV	2.1	2.5	0.7	4.2
26Wp1173	10	Retouched Flake	CCS	5.9	3.8	1.1	18.8
26Wp1173	11	Single-Spurred Graver	CCS	3.6	3.7	0.8	8
26Wp1173	17	Middle Stage Biface	FGV	5.1*	3.9	0.8	17.2
26Wp1173	20	End Scraper Fragment	CCS	3.1	3.0	0.8	9
26Wp1173	22.1	Retouched Flake	CCS	2.4	15.4	0.8	3.6
26Wp1173	23	Single-Spurred Graver	FGV	1.8	3.0	0.3	1.7
26Wp1173	25.1	Middle Stage Biface	CCS	3.5*	2.0*	1.2	7.5
26Wp1173	29	Unilateral Side Scraper	CCS	4.0	2.2	0.6	4.4
26Wp1173	32	Bilateral Side Scraper	OBS	2.4	2.7	0.5	4.2
26Wp1173	34	Unidentified Stemmed point	RHY	4.7*	2.5	1.1	11.2
26Wp1173	35	Late Stage Biface	FGV	3.2*	3.7	1.1	12
26Wp1173	36	Unilateral Side Scraper	CCS	3.9	3.8	1.2	17.9
26Wp1173	37	Retouched Flake	CCS	3.7	4.2	1.1	11.1
26Wp1173	38	Western Fluted point	CCS	1.4*	3.5	0.5	3.3
26Wp1173	39	Unilateral Side Scraper	FGV	3.6	3.7	0.9	12
26Wp1173	40	Side Scraper Fragment	OBS	2.1	1.7	0.5	1.3
26Wp1173	43	Multiple-Spurred Graver	CCS	2.4	3.0	0.6	3.7
26Wp1173	54	Middle Stage Biface	OBS	2.2*	2.7	0.9	4.9
26Wp1173	56	Windust Stemmed point	OBS	1.4*	2.0	0.6	1.9
26Wp1173	57	Late Stage Biface	FGV	3.7*	2.5	0.8	8.4
26Wp1173	58	Late Stage Biface	FGV	2.6*	2.8	0.8	7.1
26Wp1173	61	Late Stage Biface	FGV	2.8*	1.6	0.5	2.2
26Wp1173	62	Late Stage Biface	FGV	2.0*	1.6	0.4	1
26Wp1173	63	Retouched Flake	CCS	4.4	3.5	0.8	11
26Wp1173	64	Retouched Flake	CCS	3.4	3.3	1.0	7.3
26Wp1173	65	Silver Lake Stemmed point	OBS	3.1	2.2	8.7	4.8
26Wp1173	72.01	Middle Stage Biface	CCS	2.8*	1.6*	0.9	3.7
26Wp1174	2	Black Rock Concave Base point	FGV	3.5	2.1	0.5	4.1
26Wp1177	1	Retouched Flake Fragment	OBS	2.5	2.0	0.3	1.8
26Wp1177	2	Late Stage Biface	CCS	1.5*	1.9*	0.7	2.2
26Wp1177	3	Early Stage Biface	FGV	4.5*	2.9	1.2	14.4
26Wp1177	4	Late Stage Biface	CCS	2.3*	2.5*	0.9	6.7

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
26Wp1177	5	Windust Stemmed point	FGV	1.6*	2.0	0.6	2.4
26Wp1177	6	Unilateral Side Scraper	FGV	3.5	4.8	1.3	29.9
26Wp1177	7	Early Stage Biface	CCS	4.6	4.7	1.9	46.9
26Wp1177	8	Unidentified Stemmed point	FGV	1.7*	2.0	0.6	2.3
26Wp1177	9	Windust Stemmed point	OBS	2.0	2.1	0.7	3.1
26Wp1177	10	Unidentified Stemmed point	OBS	1.9	2.4	0.6	2.8
26Wp1177	11	Retouched Flake Fragment	CCS	3.5	2.4	0.7	6.8
26Wp1177	12	Retouched Flake Fragment	CCS	2.3	2.2	0.6	2.8
26Wp1177	13	Scraper/Graver	CCS	2.3	1.7	0.7	3.3
26Wp1177	14	Retouched Flake Fragment	OBS	2.7	2.5	0.5	3.3
26Wp1177	15	Windust Stemmed point	CCS	1.4*	1.9	0.5	1.4
26Wp1177	16	Retouched Flake Fragment	CCS	5.5	4.3	1.6	37.7
26Wp1177	18	Western Fluted point	OBS	1.7	0.8	0.6	0.8
26Wp1177	19	Late Stage Biface	FGV	4.6*	3.7	1.1	15.8
26Wp1177	25	Middle Stage Biface	FGV	1.8*	2.5*	0.6	2.7
26Wp1177	26	Retouched Flake Fragment	CCS	4.0	1.5	0.6	3.9
26Wp1177	27	Early Stage Biface	CCS	5.1*	3.4*	1.8	35.6
26Wp7316	1	Unidentified Stemmed point	CCS	3.7*	2.2	0.7	6.1
26Wp7316	2	Retouched Flake	CCS	2.7	1.9	0.5	2
26Wp7316	3	Side Scraper Fragment	CCS	3.8	3.1	1.1	11.4
26Wp7316	4	Parman Stemmed point	FGV	3.8*	2.7	1.0	12.7
26Wp7316	5	Multiple-Spurred Graver	CCS	3.5	2.8	0.8	5.3
26Wp7316	7	Retouched Flake	OBS	2.0	1.6	0.3	1.1
26Wp7316	8	Retouched Flake	FGV	5.9	4.8	1.6	41.7
26Wp7316	9	Late Stage Biface	FGV	6.7*	3.5	1.1	29.8
26Wp7316	10	Cougar Mtn Stemmed point	FGV	2.3*	3.6	0.9	10.5
26Wp7316	11	Retouched Flake Fragment	CCS	3.1	3.9	0.6	5.3
26Wp7317	1	End Scraper Fragment	FGV	4.6	6.4	0.9	31.1
26Wp7317	4	Retouched Flake	CCS	4.8	3.0	1.5	16.8
26Wp7317	6	Wedge/Scraper	CCS	4.2	2.6	1.5	14.1
26Wp7317	7	End/Side Scraper	FGV	6.5	5.1	2.0	79.6
26Wp7317	8	Haskett Stemmed point	FGV	7.3	2.4	1.0	19.5
26Wp7317	10	Retouched Flake	CCS	3.2	2.7	0.7	5.9
26Wp7318	2	Transverse Scraper	FGV	2.9	5.7	1.1	19.3
26Wp7318	3	Late Stage Biface	FGV	4.6*	2.6	1.3	14.2
26Wp7318	4	Retouched Flake	CCS	5.7	2.4	0.8	12
26Wp7318	6	Late Stage Biface	FGV	2.1*	3.0	0.6	3.7
26Wp7318	7	Unidentified Stemmed point	FGV	2.5*	2.1	0.5	4.3
26Wp7318	9.001	Unilateral Side Scraper	FGV	5.1	3.2	1.5	19.6
26Wp7321	3	Finished but Unhafted Biface	FGV	3.7*	2.2	0.9	6.5
26Wp7321	4	Finished but Unhafted Biface	FGV	3.7*	3.9	0.9	10.6
26Wp7321	6	Cougar Mtn Stemmed point	OBS	8.5	3.1	0.9	23.2
26Wp7321	11	Unidentified Stemmed point	FGV	2.2*	2.3	0.7	3.9

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
26Wp7321	12	Late Stage Biface	FGV	2.6*	2.7*	0.8	5.1
26Wp7321	13	Retouched Flake Fragment	CCS	2.9	4.4	0.7	9
26Wp7321	14	Retouched Flake	CCS	4.7	3.0	0.5	5.9
26Wp7321	15	Retouched Flake	CCS	3.7	3.4	1.0	11.4
26Wp7321	16	Retouched Flake Fragment	CCS	1.7	2.3	0.5	1.6
26Wp7323	1	Unidentified Stemmed point	FGV	2.5*	2.0	0.6	3.1
26Wp7323	2	Unidentified Stemmed point	FGV	1.6*	2.3	0.7	3.3
26Wp7323	3	Late Stage Biface	FGV	3.8*	2.7	0.6	7.7
26Wp7323	6	Late Stage Biface	FGV	4*	3.0	0.9	13.7
26Wp7323	8	End Scraper Fragment	FGV	2.8	3.0	1.1	10.4
26Wp7323	9	Side Scraper Fragment	FGV	4.4	2.4	0.9	8.6
26Wp7323	10	Multiple-Spurred Graver	FGV	1.9	2.1	0.4	1.7
26Wp7324	1	Scraper/Graver	CCS	3.1	1.9	0.7	4
26Wp7324	2	Side Scraper Fragment	CCS	1.9	4.1	0.8	6.7
26Wp7324	3	Retouched Flake	CCS	3.4	2.8	0.5	3.7
26Wp7330	1	Late Stage Biface	CCS	3.9	2.7	0.8	9.2
26Wp7330	2	Biface/Side Scraper	CCS	2.6	3.2	1.7	9.6
26Wp7330	3	Retouched Flake Fragment	FGV	1.9	3.5	0.9	5
26Wp7330	5	Late Stage Biface	CCS	3.2	2.7	0.8	5.4
26Wp7330	6	Middle Stage Biface	CCS	4.7	3.1	1.7	19.2
26Wp7330	7	Retouched Flake	CCS	2.3	3.6	0.8	5.3
26Wp7331	1	Side Scraper Fragment	FGV	2.6	1.0	0.7	2.2
26Wp7331	2	Notch	FGV	1.8	4.0	0.8	4.4
26Wp7332	1	Finished but Unhafted Biface	CCS	5.6	3.3	0.8	13.1
26Wp7332	3	Finished but Unhafted Biface	FGV	3.9*	2.9	0.7	12.3
26Wp7332	4	Finished but Unhafted Biface	FGV	3.5*	2.3	0.7	5.2
26Wp7335	1	Unilateral Side Scraper	FGV	5.9	5.7	1.4	53.5
26Wp7335	3	Retouched Flake Fragment	FGV	3.7	3.8	1.0	12.6
26Wp7335	4	Retouched Flake	FGV	3.3	4.0	0.8	11.3
26Wp7335	5	Windust Stemmed point	OBS	2.6	1.8	0.6	2.8
26Wp7335	7	Biface/Side Scraper	FGV	6.0	4.3	1.8	51
26Wp7335	8	Retouched Flake Fragment	FGV	3.3	5.0	1.0	16.6
26Wp7335	10	Side Scraper Fragment	FGV	4.8	3.6	1.5	28.4
26Wp7335	11	Retouched Flake Fragment	FGV	2.9	3.4	0.6	8
26Wp7335	13	End Scraper Fragment	CCS	2.5	2.6	1.1	6.3
26Wp7336	1	Retouched Flake/Scraper	FGV	4.3	4.6	1.2	19.5
26Wp7336	2	Windust Stemmed point	FGV	2.8*	2.1*	0.6	2.7
26Wp7336	3	End Scraper on Flake	CCS	5.4	5.5	1.7	51.8
26Wp7336	4	Side Scraper Fragment	CCS	5.3	4.5	1.1	32.9
26Wp7336	5	Side Scraper Fragment	CCS	2.8	2.1	1.0	4.9
26Wp7336	6	Windust Stemmed point	FGV	1.2*	1.9*	0.6	1.6
26Wp7336	7	Parman Stemmed point	OBS	1.2	1.9	0.6	1.4
26Wp7336	9	Windust Stemmed point	FGV	1.7*	2.1*	0.6	2.6

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
26Wp7336	10	Unidentified Stemmed point	OBS	1.3	1.7	0.6	1.4
26Wp7336	11	Scraper/Graver	CCS	2.7	2.4	0.9	4.8
26Wp7336	12	Late Stage Biface	FGV	3.8	4.1	1.1	12.5
26Wp7336	13	End Scraper Fragment	CCS	1.5	2.6	0.5	1.4
26Wp7336	14	Notch	CCS	3.8	1.9	0.7	5.2
26Wp7336	15	Side Scraper Fragment	OBS	3.5	3.2	0.6	5.8
26Wp7729	1	Western Fluted point	CCS	4.9	3.0	0.9	12.4
26Wp7729	2	Crescent	CCS	3.9	1.8	0.5	6.0
26Wp7729	4	Western Fluted point	CCS	1.8*	2.2*	0.6	2.7
26Wp7729	6	Side Scraper Fragment	CCS	2.6	2.1	1.0	3.8
26Wp7729	10	Retouched Flake Fragment	CCS	2.1	2.0	0.5	2.2
26Wp7729	11	Late Stage Biface	CCS	4.3	2.8	0.7	10.3
26Wp7729	12	Unilateral Side Scraper	CCS	3.9	4.0	0.8	11.1
26Wp7729	17	Convergent Scraper	CCS	3.4	2.7	1.2	8.0
26Wp7729	18	Late Stage Biface	CCS	3.8*	3.4	0.8	11.5
26Wp7729	19	Unilateral Side Scraper	CCS	4.0	3.9	1.1	15.2
26Wp7729	23	Retouched Flake Fragment	CCS	3.4	2.4	0.7	6.1
26Wp7729	24	Finished but Unhafted Biface	OBS	1.9*	2.3	0.6	2.3
26Wp7729	26	Multiple-Spurred Graver	CCS	1.5	2.2	0.5	1.7
26Wp7729	27	Retouched Flake Fragment	CCS	2.3	2.3	0.3	1.8
26Wp7733	1	Finished but Unhafted Biface	FGV	5.3*	3.7	1.1	30.7
26Wp7735	1	Late Stage Biface	CCS	4.5*	1.8*	0.7	3.7
26Wp7735	2	Finished but Unhafted Biface	CCS	3.4*	2.6	0.7	5.7
26Wp7735	3	Biface/End Scraper	CCS	2.5	4.5	1.0	12.9
26Wp7735	4	Western Fluted point	CCS	1.7*	2.5*	0.7	3.5
26Wp7735	6	Backed Knife	CCS	5.0	3.8	1.6	29.0
26Wp7735	7	Retouched Flake	CCS	3.9	3.0	0.7	6.8
26Wp7738	1	Middle Stage Biface	FGV	4.4*	5.1	1.0	21.9
26Wp7738	2	Backed Knife	CCS	7.5	3.2	1.4	36.3
26Wp7738	3	Cougar Mtn Stemmed point	FGV	5.3*	3.2	1.0	20.9
26Wp7738	4	Side Scraper Fragment	CCS	5.5	4.2	1.8	38.5
26Wp7738	6	Scraper/Notch	CCS	4.0	4.0	0.8	11.8
26Wp7739	1	Silver Lake Stemmed point	FGV	6.1	2.7	0.7	12.8
26Wp7739	19	Cougar Mtn Stemmed point	FGV	4.1*	2.9*	1.0	19.1
26Wp7739	28	Middle Stage Biface	FGV	5.5	4.1	0.9	25.0
26Wp7739	29	Haskett Stemmed point	FGV	4.4*	2.3	0.9	11.5
26Wp7740	8	Parman Stemmed point	FGV	3.1*	2.7	0.7	6.3
26Wp7746	1	Unidentified Stemmed point	FGV	4.2*	3.0	1.1	17.4
26Wp7746	2	Haskett Stemmed point	CCS	3.2*	2.1	0.7	5.0
26Wp7746	3	Retouched Flake Fragment	FGV	3.6	4.5	0.7	11.9
26Wp7746	4	Haskett Stemmed point	CCS	3.4*	2.7	0.7	6.5
26Wp7746	5	Side Scraper Fragment	OBS	5.6	3.2	0.8	9.5
26Wp7746	6	Unidentified Stemmed point	FGV	2.4*	2.6	1.0	9.8

Appendix E: Bifacial and Unifacial Artifact Data

Site	FS #	Artifact Type	Raw Material	Max Length (cm)	Max Width (cm)	Max Thickness (cm)	Wgt (g)
26Wp7746	7	Cougar Mtn Stemmed point	FGV	4.6*	2.3	1.1	13.7
26Wp7746	8	Finished but Unhafted Biface	CCS	2.3*	1.7	0.5	1.8
26Wp7746	9	Unidentified Stemmed point	FGV	4.4*	2.4	0.9	11.5
26Wp7746	10	Parman Stemmed point	FGV	2.8*	2.4	1.0	6.2
26Wp7746	11	Finished but Unhafted Biface	FGV	4.1*	3.7	1.2	19.1
26Wp7746	12	Side Scraper Fragment	CCS	5.9	2.5	0.8	11.2
26Wp7746	13	Parman Stemmed point	FGV	3.2*	2.4	0.9	7.3
26Wp7746	14	Unidentified Stemmed point	CCS	2.3*	1.3	0.6	1.8
26Wp7746	15	Finished but Unhafted Biface	FGV	4.9*	2.8	1.0	13.1
26Wp7746	17	Retouched Flake Fragment	CCS	1.6	2.3	0.5	1.7
26Wp7748	1	Finished but Unhafted Biface	CCS	1.8*	3.1*	0.6	5.3
26Wp7748	2	Unidentified Stemmed point	OBS	1.9*	1.9	0.6	2.4
26Wp7748	3	Finished but Unhafted Biface	OBS	1.2	1.9	0.5	0.8
26Wp7748	5	Retouched Flake Fragment	CCS	1.2*	1.9	0.4	0.8
Isolate 2	-	Unidentified Stemmed point	CCS	3.3*	2.1	0.5	4.1
Isolate 6	-	Parman Stemmed point	OBS	3.8	1.9	0.8	4.3
Isolate 12	-	Haskett Stemmed point	QTZT	4.9*	2.3	0.7	8.5
Isolate 34	-	Unidentified Stemmed point	OBS	3.8*	1.8	0.9	6.5

Note: An asterisk (*) indicates an incomplete dimension of a broken tool