TIMBER BUTTE OBSIDIAN SOURCE SURVEY: GEOLOGY, PREHISTORY, CHEMICAL SOURCING, AND DEBITAGE ANALYSIS

A Thesis Presented in Partial Fulfillment of the Requirements for the
Master of Arts
With a
Major in Anthropology
In the
College of Graduate Studies
University of Idaho

By
Tyrone Lane Corn
August 2006

Major Professor: Robert Lee Sappington. Ph.D.

AUTHORIZATION TO SUBMIT
THESIS

This thesis of Tyrone L. Corn, submitted for the degree of Master of Arts with a major in Anthropology and titled "Timber Butte Obsidian Source Survey: Geology, Prehistory, Chemical Sourcing and Debitage Analysis," has been reviewed in final form. Permission, as indicated by signatures and dates given below, is now granted to submit final copies to the College of Graduate Studies for approval.

Major Professor

______________________________Date______________

Robert Lee Sappington

Committee Members

______________________________Date______________

Laura Putsche

______________________________Date______________

William C. Rember

Department Administrator

______________________________Date______________

Donald L. Tyler

Discipline's College Dean

______________________________Date______________

Katherine G. Aiken

Final Approval and Acceptance by the College of Graduate Studies

______________________________Date______________

Margrit von Braun

ABSTRACT

Through sourcing studies conducted over the last thirty years, the Timber Butte obsidian source has been demonstrated as the predominant obsidian source for southwest and west central Idaho. As the source is located on private property, physical and topographic details about the source, including a definitive characterization based on primary deposits, were lacking. Through the gracious permission of the landowner, the source areas were completely described, mapped, and chemically characterized. Additionally, a preliminary analysis of surface debitage and artifacts found in primary reduction areas has shed some light on the types of artifacts produced in the recent past. This thesis represents a preliminary step toward a better understanding of the Timber Butte source that will ideally help define future research of the subject and area.

ACKNOWLEDGMENTS

First and foremost, I would like to thank the members of my committee, Dr. Robert Lee Sappington (Chair), Dr. Laura Putsche, and Dr. William Rember. In particular, it was Dr. Sappington's pioneering work on obsidian sourcing in Idaho and specifically the Timber Butte source that first introduced me to the subject. However, without the assistance and patience of all committee members, the long-overdue completion of this thesis would not have been possible. I would also like to thank a number of people that aided and encouraged the effort over the years including William G. Reed, Susie Osgood, Dr. Robert Yohe, Dr. Ken Reid, Craig Skinner, Dr. Richard Hughes, Dr. Anna Prentiss, Nick Peterson, Dr. Matt Root, Dr. Jim Rudolph, and Mary Ann Davis. Additionally, I'd like to thank Dr. Donald Tyler for setting the hook of my career path with his Introduction to Anthropology class. Special thanks go to Lorraine Gross who read and edited draft materials and was willing to tolerate my being a less-than-ideal employee while finishing the process. Of course, none of this would have been possible without access to the source areas graciously granted by the landowner, thanks.

A different level of thanks is owed to members of my family. Throughout my childhood, my dad dragged me through the hills in a seemingly endless search for historic sites of all types, and was able to explain what the machines did before abandonment and decay. This was the beginning of my interest in archaeology, and for this I can't begin to thank him enough. The other half of my genetic makeup, my mother, has always impressed upon me that being happy is far more important than money or status, which is critical to working in archaeology. By far, the most profound thanks go to my wife of two years, Jane, whose super-human patience is the largest contributing factor in the completion of this thesis. Thank you and I promise I'll work on the house more.

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CHAPTER 1 – INTRODUCTION

Figure 1.1: View of the south side of the buttes

For nearly thirty years Timber Butte obsidian has been recognized as a significant source of obsidian for southwest and west central Idaho (Figure 1.1). Obsidian from Timber Butte has traveled as far as Kettle Falls in northeast Washington (480 kilometers) where it represents 28 percent of the on-site obsidian (Sappington 1984). However, as Timber Butte is on private land, survey access has been extremely limited. As a result, information about the source, its chemistry, and utilization were based on limited fieldwork. The source was known primarily through the many artifacts attributed to the source and raw material samples collected from non-private parcels adjacent to the buttes. Knowledge about the physical source areas was based on what needed to exist in order to explain the predominance of Timber Butte obsidian.

Having gained permission to examine the area for a window of nearly two weeks late in the fall of 1998, I formulated a number goals and research questions to guide the survey.

Goals and Research Questions

- Survey and record the geographic extent of the Timber Butte obsidian source.

- Construct a regional prehistory based on current literature with an emphasis on reported information related to Timber Butte obsidian.
- Definitively establish the chemical fingerprint of the source from the analysis of material samples collected from a primary depositional context.
- Perform a preliminary examination of surface debitage near source areas for an indication of what types of lithic products were being produced in the relatively recent past.

What follows amounts to an extremely detailed site report that meets the goals and answers the research questions of the project. Any of the chapters could easily be expanded into its own thesis, but this is only a general treatment that seeks to understand the big picture of the Timber Butte source while pointing the way toward future research needs.

CHAPTER 2 – LOCATION, GEOLOGY, TOPOGRAPHY, AND ENVIRONMENT

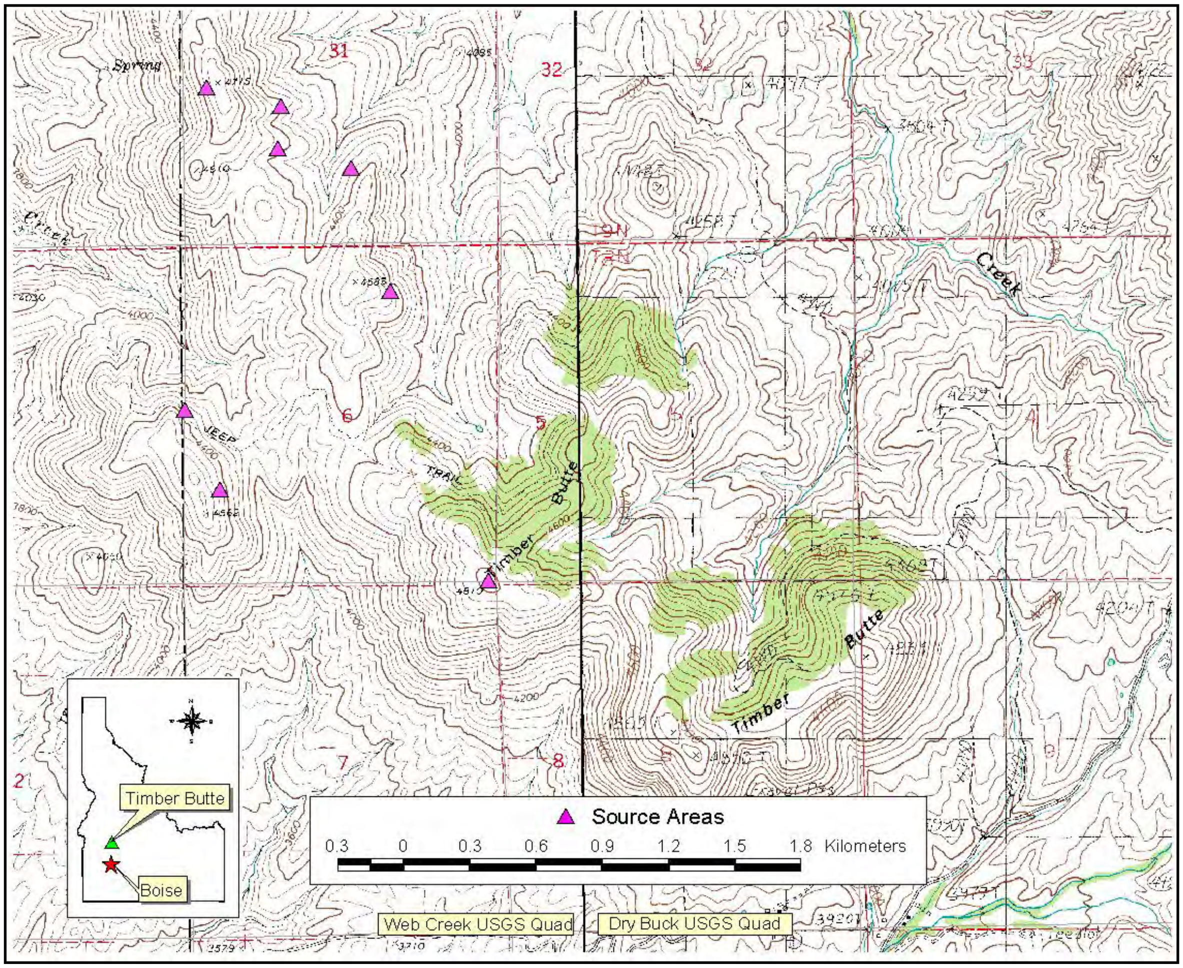

Figure 2.1: Timber Butte area within context of Idaho

Location

Although the place name Timber Butte implies a singular prominence of elevation, there are actually two buttes (east and west) that share the name (Figure 2.1). The buttes are located in Gem County, Idaho, Township 8 North, Range 2 East, sections 4 through 9, with associated slopes spilling into adjacent sections. The buttes are bisected roughly by the north/south boundary between the Dry Buck Valley and Webb Creek United States Geologic Survey (USGS) 1:24,000 series quadrangle maps. The town of Emmett is 30 kilometers (18.5 miles) to the south southwest, and Gardena, along the banks of the Payette River, is 10 kilometers (six miles) to the southeast. Although the towns of Sweet and Ola are little more than concentrations of residences, both are located along Squaw Creek immediately to the west.

Geology

The rhyolitic volcanism that produced the various exposures of Timber Butte obsidian is located at the interface between two extensive igneous provinces that have largely determined regional landforms; the Idaho Batholith and the Columbia River Basalt Group (Clemons 1990). Both, to varying extents, are involved in the occurrence of the Timber Butte Rhyolite.

Idaho Batholith

The Idaho Batholith is a large granitic mass that is the bedrock for most of Idaho's central mountainous region. Its formation began at a time when the west coast of North America coincided roughly with the western border of Idaho, approximately 150 million years ago (MYA). Like now, the Pacific Plate was subducted beneath the lighter continental crust in a slow motion collision creating tremendous pressure and heat. This heat generated an extensive subsurface magma chamber, or batholith. Before the batholith could fuel the same sort of volcanism that created the many volcanoes of the Cascade Range (such as Mt. St. Helens, WA, Mt. Baker, OR, and Mt. Lassen, CA), a series of microcontinents, riding on the Pacific plate, slammed into the western margin of North America, creating the real estate that became Oregon and Washington. As a result, the subduction zone moved hundreds of miles to the west and no longer fed the growth of the batholith. The molten material began cooling, and due to the general chemistry of the melt, crystallized primarily into granite. While the formation of the batholith is not believed to have reached the point of surface volcanism, it did force the overlying rock upward several miles. As a result, slabs as thick as several thousand feet fractured and slid off the batholith to the east, coming to rest in Montana almost 60 MYA. With the weight of the overlying layers removed, the batholith rebounded upward to as much as 3/4 of the area's original elevation (Alt and Hyndman 1989). No longer under the same depth and pressure of its formation, exposed granite fractures, and outcrops can weather into rounded features.

The area dominated by the batholith is in the Northern Rocky Mountain Physiographic Province which is characterized by north-and-south trending mountains encompassing the Salmon River and Boise Mountains (Alt and Hyndman 1989). Because the batholith is predominantly granitic, little in the way of viable tool stone sources are found on the batholith. The few exceptions include quartz crystal formed within the granitic melt, and jaspers and chalcedonies formed in association with smaller, peripheral igneous events and localized sedimentary rock formations. The topography of the batholith is rugged with peaks in excess of 3,000 meters (10,000 feet) above mean sea level, many of which experienced alpine glaciation during the Pleistocene. The hydrology of the Idaho Batholith includes much of the Salmon, Payette, and Boise River drainages and is bordered by the Snake River to the south and west.

Columbia River Basalt Groups

The Columbia River Basalt Group (CRBG) is the generic term for a series of flood basalts that cover most of eastern Oregon as well as portions of southwestern Idaho. They began approximately 17 MYA and concluded around 15 MYA (Swanson et al. 1979; Tolan et al. 1989; Reidel et al. 1989). The beginning and duration of this activity roughly coincides roughly with a period of diminished volcanic activity in the Cascade Range, fueling speculation that the two occurrences were related. It is possible the leading edge of the subducted Pacific Plate broke off, temporarily pausing the subduction needed to feed the Cascade volcanoes. It is further postulated that this portion of the Pacific Plate continued on its trajectory passing beneath central and eastern Oregon (Alt and Hyndman 1978). While this hypothesis easily accounts for the hiatus in Cascade volcanism, its link to the CRBG is more tenuous. The detached portion of Pacific Plate could have caused a westward flow of mantle material, pulling western Oregon with it and creating the fractures through which the Columbia River Basalts erupted. Although this is a plausible explanation of the events that switched Oregon’s volcanic activity from the Cascades to central Oregon and back again, it is in no way provable (Alt and Hyndman 1978). It is also possible that the tension fractures were remnant of the contact zones of the various islands and microcontinents that were accreted to the western margin of North America. This idea works well in concert with yet another possible cause related to mantle plumes such as the hotspot currently under Yellowstone (Miller 2006). In this model, the mantle plume would cause crustal thinning, extension, decompression, and rifting, along with the eruption of tholeiitic flows (Hooper 1990).

Regardless of its genesis, the CRBG consists of numerous units (at least 38) yielding a volume of approximately 174,000 cubic kilometers and covering about 164,000 square kilometers (Tolan et al. 1989). Two of these groups, the Imnaha and Grande Ronde, extend to the Timber Butte area (Clemons 1990). Erupting from the Cornucopia Dike swarm approximately 17 MYA, the Imnaha basalt flowed into low lying areas of southeastern Oregon and into Idaho on a lobe of the Columbia Plateau physiographic province known as the Weiser Embayment (Miller 2006). At least 19 separate flows of Imnaha basalt covered parts of the Weiser embayment reaching depths of up to 900 meters (3,000 feet)(Alt and Hyndman 1989). Imnaha basalt is well represented in the Timber Butte area, with outcrops indicating a total thickness of up to 270 meters (880 feet)(Clemons 1990). Responsible for roughly 85% of the CRBG's total extruded volume, the Grande Ronde basalt flows reached the Timber Butte area approximately 15.5 to 17 MYA yielding a thickness of about 75 meters (Tolan et al. 1989; Clemons 1990). The Grande Ronde flow overlies the older Imnaha basalt, as well as portions of the Timber Butte Rhyolite (Clemons 1990).

Adjacent Sedimentary Formations

Although less significant from a big picture standpoint, the Timber Butte area is also home to numerous regional and local sedimentary formations. While they do not play a part in the formation of Timber Butte obsidian, they constitute the living and travel surfaces that would have been used by indigenous inhabitants.

The Payette Formation consists of clay, ash, silt, and sand, and contains Miocene plant fossils. It overlays TBR and may have a lacustrine origin related to the lakes that once filled parts of the Weiser Embayment (Savage 1961). Above the Payette Formation is the Ten Mile Gravel Formation. It consists primarily of unconsolidated gravels likely deposited by the glacial melt waters of the Pleistocene (Savage 1961). Also in the area of the buttes are Caldwell and Nampa sediments. Associated with pluvial Lake Bonneville, they consist of clay, silt, sand, and gravel (Savage 1961).

Soils in the vicinity of the buttes are variable and complex due to the different possible parent materials (Savage 1961). Although there are highly localized deposits of both residual and transported soils near the buttes, the Squaw Creek drainage is characterized by two predominate soils types; the Sweet-Kepler Series (medium colored soils of the semiarid high terraces), and the Brownlee-Rainey-Ola Series (dark colored granitic soils of the moist subhumid zone) (Savage 1961). Soils on the buttes are residual, resulting from the erosion of the original rhyolite flows with minor contributions from adjacent basalt and granite bedrock.

Timber Butte Rhyolite

The Timber Butte Rhyolite (TBR) is located at the contact between the Idaho Batholith and the CRBG and is Potassium-Argon (K-Ar) dated to 14.1 MYA, +/- 0.6 million years. Curiously, there are portions of the younger Timber Butte Rhyolite that are overlain by older Grand Ronde basalt, suggesting that at least a portion of the Grande Ronde basalt may be misdated by as much as three million years (Clemons 1990; Clemons and Woods 1991). However, Reidel et al. (1989) place the age of the Grand Ronde between 17 and 15.6, and with the accepted range of accuracy, the discrepancy could be minimal. Additionally, unknown erosion of both Grand Ronde basalt and Timber Butte rhyolite could have obscured the truth of the matter.

TBR was initially thought to be related to Miocene rhyolite flows of the Idavada group. While these flows, which include the Silver City, Wall Creek, and Jarbidge rhyolites, are roughly contemporaneous (15-16.4 MYA), an examination of the chemistry does not support a relationship (Clemons 1990). Because of the proximity of Timber Butte to the Cornucopia Dike swarm (approximately 50 km to the east), it is possible that TBR was an adjacent byproduct of the CRBG (Clemons and Woods 1991). This would seem inconsistent given that basalt and rhyolite are at opposite ends of a spectrum defined by ferromagnesian and silica content, qualities termed mafic and felsic, respectively. This difference is also seen as the primary distinction between oceanic and continental crust. However, instead of erupting as another regional basalt flow, it is possible that the mafic parental magmas of the CRBG melted shallow areas of the felsic continental crust, causing the TBR flows. However, in Iceland, volcanism has been observed to exhibit a bimodal quality, alternating between basaltic and rhyolitic flows without the benefit of adjacent felsic crustal material (Hamilton 1965). In his work at the Island Park Caldera, Hamilton noted that bimodal assemblages of basalt and rhyolite were produced through a fractionation of mafic and felsic elements of a magma "owing to instability of the initial homogenous liquid, caused by pressure decrease during assent in a region of abnormally high thermal gradient" (Hamilton 1965:c-1). Although the Timber Butte area does not exhibit a bimodal eruptive sequence, the aberrant existence of rhyolite in a predominantly mafic-extrusive environment could be explained by this process. Plumes within the mantle such as the Yellowstone hot spot could easily produce regions of abnormally high thermal gradient. This fact, along with the tholeiitic (comparatively felsic) chemistry of the CRBG further supports such a genesis (Hamilton 1965). Other Miocene rhyolites in the Baker City and La Grande areas are likely related and could have been produced through the same process (Hamilton 1965; Clemons 1990).

TBR is composed of a 240-meter (790 foot) sequence of silicious volcanics and is the parent material to Timber Butte obsidian. Although an unknown amount of TBR has eroded, the remaining rock units are divided into a lower glassy and upper rocky portion (Clemons 1990). The lower TBR overlies Idaho Batholith and Imnaha Basalt and is approximately 50-60 meters thick. Lower TBR includes small kernels of obsidian and glassy rhyolites. Near the top of lower TBR is a tuff that contains clasts of weathered granodiorite that were either picked up by the viscous flow of rhyolite, or came from upslope adjacent granite bedrock. Lower TBR lithology suggests a limited distance from the vent of origin. Upper TBR is rocky with varying degrees of flowbanding and is approximately 180 meters thick (Clemons 1990). Later examination of the TBR flows designated a middle flow of acreationary tuff separating the lower and upper TBR (Clemons and Woods 1991). While small fragments of obsidian (< 2.0 cm) are found throughout the various TBR flows, none are of a size and quality suitable to stone tool production.

Obsidian and the Timber Butte Source

In general, obsidian is a naturally occurring volcanic glass that can be found in association with rhyolitic volcanism. It ranges in color from black, brown and green, to nearly clear. Its color can be homogeneous, or it can be speckled, banded, or streaked by variations of the possible colors. It is isotropic (exhibiting no crystalline structure) and as such favors fracture along no particular plane or direction (Hamilton et al. 1981). Its surface can be indistinguishable from commercial glass, or it can appear granular and have a silver, gold, or spectral sheen. Obsidian is rated 5 to 5.5 on the Moh scale of hardness and will decompose (devitrophy) in approximately 20 million years (Miller 2006). Rhyolite and obsidian, and even granite for that matter, have fundamentally similar chemical compositions and are produced from magmas having high silica content. In North America, obsidian distribution is limited to the western half of the continent, and it can be found throughout the world the in areas of tectonic volcanism (Miller 2006).

Although the formation of obsidian has likely been observed many times, witnesses either did not survive or did not see the importance of recording their observations. As a result, the formational process is not fully understood and has been pieced together through geologic evidence. It was long thought that the formation was due simply to rapid cooling that precluded the development of a crystalline structure. Today it is believed to have more to do with the water content of the rhyolite magma (Miller 2006). Regardless, it appears that volcanic glass can be produced by at least four processes: flow events of quickly-cooling glass (such as Obsidian Cliff, Yellowstone, WY, and Newberry Crater, OR), reconstituted from ash and pumice in the fiery heat and pressure of a pyroclastic flow, by accumulations of fountain-fed spatter near the source vent (Gonnermann and Manga 2004), or, in discrete layers or lenses within a rhyolite flow. The formational process of the Timber Butte obsidian appears to be the last option.

Figure 2.3: View up talus

The obsidian is not found in outcrops, but in surface expressions on the relatively flat butte tops, and in streams of talus down the steep upper slopes of the buttes. These exposures are the expected result of thin lenses of obsidian eroding from the parent material rhyolite flows. The talus surface expressions are indicative of an eroding slope moving into the obsidian lenses and the parent material. The talus form dramatic black stripes that starkly contrast with surrounding vegetation (Figure 2.3). By comparison, the surface expressions on level ground could be lost to an aggressive spring growth of annual grasses. Typically, the largest fragments of obsidian were observed in the talus expressions in the source area A, as defined by the survey (Chapter 5, Figure 2.4, and

Figure 2.4: Close up view of surface expression

Appendix A). Tabular fragments of obsidian having formational cortex on two sides support the formational process suggested here. The same fragments are commonly between 2 and 15 cm thick, although one piece measured nearly 40 cm from the top to the bottom of the flow layer.

By far, most of the obsidian found in the various surface expressions is the highly fragmented remains of thin, lenticular flows. Fragments are irregular and tabular, angular to subangular, and range in size from less than 1cm to more than 30 cm through the longest axis (Figure 2.4 – close up of surface expression). Most fragments exhibit a hazy, hydration patina on all surfaces. Some fragments exhibit cortex related to formation and/or weathering. The formational cortex, although somewhat obscured by hydration patina, is a relatively smooth surface, pocked by tiny gas bubbles and the imprint of ash particles. Such fragments also have a variety of convex, concave, and flat faces that seem to reflect the cast of adjacent rhyolite that constrained the intrusive or inclusive obsidian lens (Figure 2.5). The general shape of such fragments is noticeably different from the fractured material that dominates the surface expressions. Cortex resulting from chemical weathering (devitrophication-more advanced than the usual hydration patina) resembles a badlands topography, with a pseudo-stratigraphy of compressed bubble layers that are evident in contiguous peaks and valleys (Figure 2.6 and Appendix A).

Additionally, small obsidian nodules are found in what appear to be a primary deposit more than five kilometers (three miles) distant of the buttes. Although the nodules could be a secondary deposit transported by adjacent drainages, the obsidian is oddly concentrated to the exclusion of other local rock types. Additionally, they have a sugary, partially melted appearance that is unlike the usual "orange peel" appearance of stream battered obsidian cobbles. The cortex of the nodules is also significantly different from the formational cortex of obsidian produced in flow events and in lenses within a rhyolite flow. This deposit was likely produced by a pyroclastic flow erupting from the buttes, although a more thorough examination of the area would be necessary to make a definitive assessment. Such flows are commonly associated with rhyolitic volcanism and can travel significant distances from the vent of origin leaving distinct volcanoclastic deposits. It is probable that many such primary deposits of TB obsidian are located at various locations, perhaps many kilometers from the buttes. Although devoid of obsidian, several volcanoclastic deposits were observed by Clemons on various hillsides, lending support to the occurrence of pyroclastic-produced nodules (1990). Sadly, remnant volcanoclastic deposits were not observed near the obsidian nodules, so this explanation remains supposition.

In its native form, Timber Butte obsidian is primarily black in appearance. No other colors have been observed as yet. When fractured, thinner flakes can be uniformly black to nearly clear. Other flakes can exhibit distinct to indistinct banding as well as mottled, cloudy color changes. Opacity depends on the level of banding or mottled color change. Flakes measuring approximately 1 mm thick can be nearly opaque to transparent. Freshly fractured samples have a glassy luster, and a smooth surface texture. Although visible inclusions are rarely observed in raw material samples, there are occasional bubbles, or layers of bubbles, all of which appear compressed.

Figure 2.5: Example of formational cortex with light patina

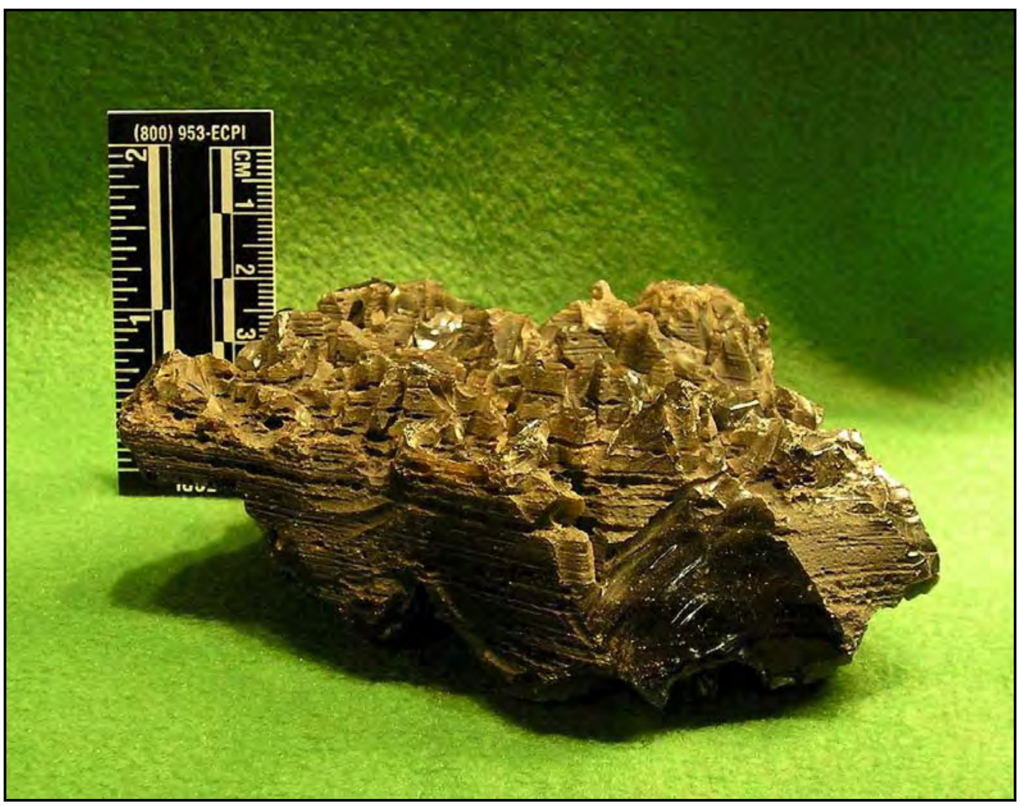

Figure 2.6: Example of advanced chemical weathering cortex

Topography

In keeping with the definition of a butte, the general area is an isolated prominence, surrounded by lower elevations. The east and west buttes have rounded summits, rising to 1,466 meters (4,810 feet) and 1,482 meters (4,865 feet) above mean sea level, respectively. The buttes include connecting ridges and saddles, as well as steep slopes to the adjacent lowlands. To the east are Sweet and Ola Valleys, and the Squaw Creek drainage that is responsible for their creation. To the south, elevations gradually decrease to approximately 760 meters (2,500 feet) near the banks of the Payette River near Montour. To the east, elevations drop more sharply, also on their way to the Payette River. To the north, after a drop of only about 200 meters (650 feet), elevations steadily increase with the landforms of the Idaho Batholith. The buttes can be seen as the far southern extent of the West Mountain Ridge that extends more than 100 kilometers (60 miles) north to the McCall/New Meadows area. Notable elevation features visible from the buttes include Squaw Butte to the west, Shafer Butte to the south southeast (on the Boise Ridge), and Crown Point to the south. The buttes are catchment to the Soldier, Fourmile, Sixmile, Timber, and Brownlee Creek drainages, with most being ephemeral.

Environment – Climate, Flora, and Fauna

Not only does Timber Butte straddle two major geologic provinces, it also rides the boundary between two climatic areas; the Intermountain Semidesert Province to the south and the Middle Rocky Mountain Steppe-Coniferous Forest-Alpine Meadow Province to the north (Bailey 1995). Although the demarcation between these two similar provinces is a solid line on the map, the reality is a mix of the two, the proportions of which are largely dependent on elevation and aspect. The climate is curiously mild given its latitude and elevation, due in part to the warming effect on air masses that pass over the region. The same air masses lose most of their moisture crossing the Cascade Range, leaving comparatively little for the mountains of Idaho (Bailey 1995).

More than 50 years of information collected by weather stations in the area of Timber Butte and compiled by the Western Regional Climate Center yield the following data.

Table 2-1: Data from Weather Stations Nearest Timber Butte

Weather Station	Average Max Temperature and month (Fahrenheit/Celsius)	Average Min Temperature and month (Fahrenheit/Celsius)	Average Annual precipitation (inches/cm)	Wettest month
Ola	90.7/32.6 – July	15.2/-9.3 – January	21.03/53.41	December
Ola 4S	90.7/32.6 – July	16.6/-8.5 – January	19.66/49.93	December
Emmett 2E	91.5/33.0 – July	21.8/-5.6 – January	13.26/33.68	January
Council	90.8/32.6 – July	15.9/-8.9 – January	24.01/60.98	January
Garden Valley	91.1/32.8 – July	17.3/-8.1 – January	24.47/62.15	December

Source: Western Regional Climate Center 2006

Although the weather stations in Ola and Emmett are closest to the buttes, the Council and Garden Valley areas are more similar to Timber Butte in terms of vegetation cover. While no data exist for Timber Butte in specific, the values would likely be an average of the stations listed in Table 2-1, with Ola and Emmett skewed toward the Intermountain Semidesert Province, and Council and Garden Valley more representative of the Middle Rocky Mountain Steppe Province. Such calculations (expressed in English/Metric) yield an average summer maximum temperature of 90.9/32.7, an average winter low of 17.3/-8.1, and an average annual precipitation of 20.48/52.01, although these values could vary slightly throughout the buttes due to elevation and aspect. The landowner indicated that it is rare that south facing slopes of the buttes are covered by snow for any significant length of time (Personal communication, landowner).

Vegetation in the Timber Butte area is characteristic of its elevation and limited annual precipitation. North facing slopes are heavily vegetated with Douglas fir (*Abies concolor*), ponderosa pine (*Pīnus ponderōsa)*, and associated forest shrubs and grasses including bitterbrush (*Purshia tridentata*), bluebunch wheatgrass (*Agropyron spicatum*), arrowleaf balsamroot (*Balsamorhiza sagittata*), rabbitbrush (*Chrysothamnus* spp.), and wild parsley (*Lomatium* spp.). Lacking forest cover, south facing slopes are covered by big sagebrush

(*Artemisia tridentata*), low sagebrush (*Artemisia arbuscula*), Idaho fescue (*Festuca idahoensis*), wild rye (*Elymus spp.*), and needle grass (*Stipa thurberiana*). In riparian areas, willow (*Salix* spp.), chokecherry (*Ribes oxyacanthoides*), currant (*Ribes* spp.), staghorn sumac (*Rhus typhina*), and cattail (*Typha latifolia*) are common (Savage 1961; Kleinfelder 2006). A slide taken by Dr. Lee Sappington in the mid 1970s shows a significant growth of camas (*Camassia quamash*) on the shallow slopes south of the buttes (Figure 2.7). Today, non-native invasive species such as Dalmatian toadflax (*Linaria dalmatica*), rush skeleton weed (*Chondrilla juncea*) and diffuse knapweed (*Centaurea diffusa*) have also infiltrated the region.

Currently the area is habitat to mammals such as elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), fox (*Vulpes* spp.), coyote (*Canis latrans*), bobcat (*Felis rufus*), and cougar (*Felis concolor*), as well as smaller mammals such as river otter (*Lutra canadensis*), beaver (*Castor canadensis*), porcupine (*Erethizon dorsatum*), badger (*Taxidea taxus*), raccoon (*Procyon lotor*), weasel (*Mustela* spp.), marmot (*Marmota* spp.), rabbit (*Sylvilagus* spp.), skunk (*Mephitis* spp.), and ground squirrel (*Spermophilus* spp.). Avian species of the area include Ruffed grouse (*Bonasa umbellus*), blue grouse (*Dendragapus obscurus*), wild turkey (*Meleagris gallopavo*), chukar (*Alectoris chukar*), and quail (*Callipepla* spp.). Waterfowl would also be occasionally present along the Squaw Creek drainage.

Prior to the dam building activities of the first half of the 20^{th} Century, it is likely that Squaw Creek saw at least limited runs of chinook (*Onchorynchus tshawytscha*) and steelhead trout (*Salmo gairdneri*). Today, Squaw Creek and its many tributaries hold rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus clarki*), Bull trout (*Salvenius confluentus*), mountain white fish (*Prosopium williamsoni*), large scale suckers (*Catostomus macrocheius*), and mountain suckers (*Catostomus platyrhynchus*). Additionally, freshwater clams (*Margaretifera margaretifera, Gonidea angulata*) are documented thought out the Snake River system and parts of the Boise and Weiser drainages (Meatte 1990).

Figure 2.7: Camas growing on the south slopes of the buttes

CHAPTER 3 - PREVIOUS INVESTIGATIONS

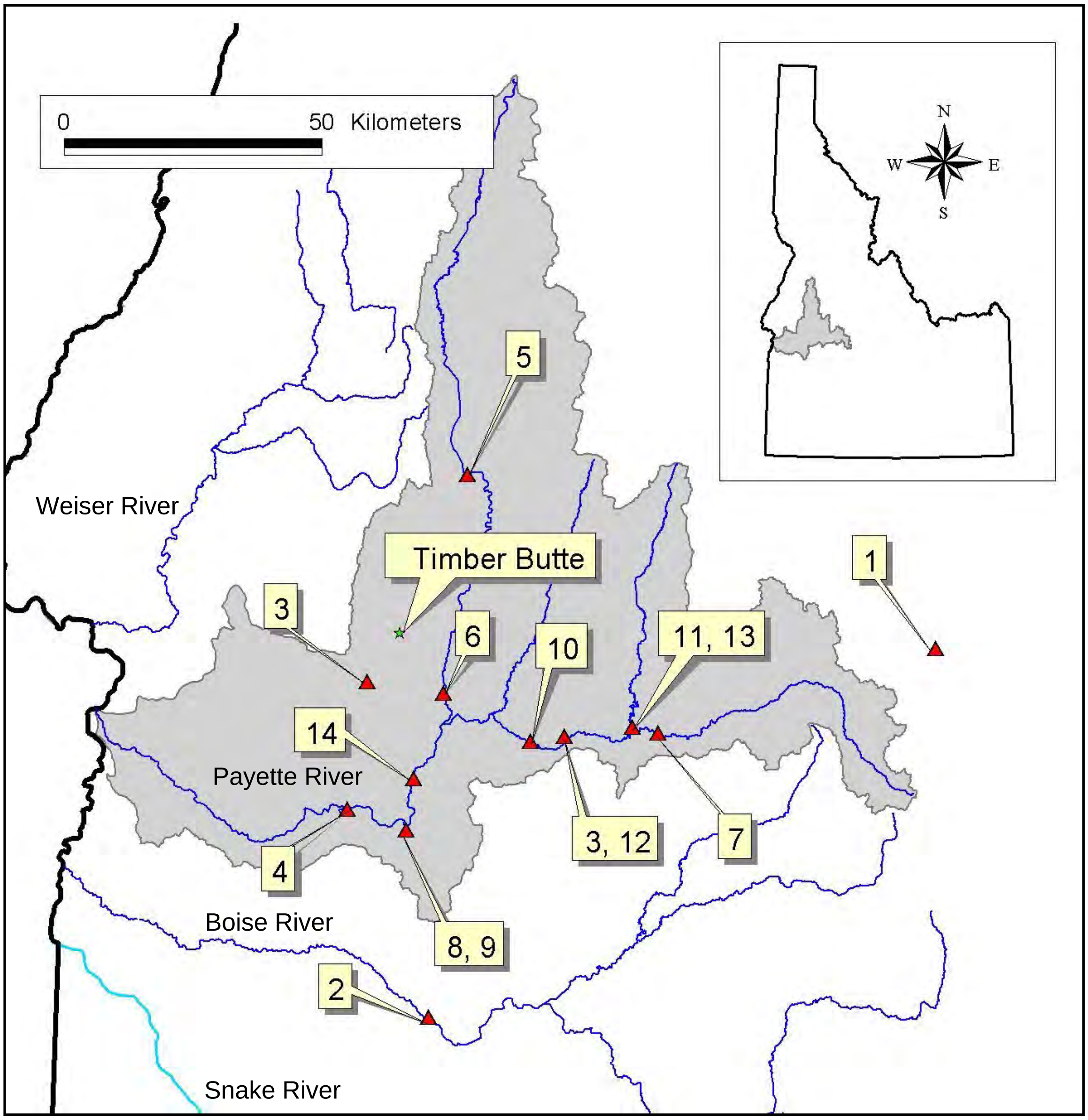

Figure 3.1: Approximate location of previous studies (red triangle) within and adjacent to the Payette drainage basin (grey). 1-Sargeant 1973; 2- Sappington 1981c; 3-Ames 1982 (two areas); 4-Artz 1983; 5-Arnold 1984; 6-Plew et al. 1984; 7-Plew and Fuhrman 1985; 8-Gaston and Peterson 1988; 9-Lewarch and Benson 1989; 10-Reed 1990; 11-Gallison and Reid 1992; 12-Gallison and Reid 1993; 13-Reid and Gallison 1994; 14-Kleinfelder 2006

Previous Investigations

The greater Payette drainage (Figure 3.1) has been examined for cultural resources for more than 30 years. Most of the work has taken the form of small surveys for borrow sources, road construction, and timber sales by the Boise and Payette National Forests, the

Idaho Bureau of Land Management, and the state of Idaho (Idaho Historic Preservation Office, 2005). The majority of these efforts included no testing, examining areas less than a few acres. However, a few notable studies involved phased excavations complete with radiometric dates, lithic, faunal, and floral analyses. As most of these projects were also driven by an undertaking and Section 106 of the National Historic Preservation Act (NHPA), they sought to evaluate the National Register of Historic Places (NRHP) eligibility of each resource. At the same time, research designs postulated questions important to establishing a better understand of the settlement and subsistence of precontact Payette drainage populations.

What follows is an examination of fourteen seminal projects within or immediately peripheral to the Payette River drainage. It is by no means an exhaustive treatment of all efforts that have contributed to the understanding of area prehistory. Figure 3.1 shows the general vicinity of each study area and its geographic relationship to the Payette drainage and Timber Butte.

Sargeant 1973

Redfish Overhang was first recorded by a 1964 survey directed by Alfred Bowers (1965), who recommended the site for further investigation. Sargeant excavated the site as part of a salvage program to protect threatened archaeological resources with the goal to expand the understanding of Haskett sites, and the overhang in particular (Sargeant 1973:3). Excavations located Haskett materials that are in association with datable materials that returned an age of 10,000 BP.

Sargeant sees a resemblance between the Haskett point and Hell Gap and Agate Basin Plano traditions from east of the continental divide, all of which are associated with bison hunting, although Haskett compares more favorably with Hell Gap than Agate Basin points due to a difference in flaking technique (Sargeant 1973:100).

The excavation also located a stemmed point that was typed as a Silver Lake point which is associated with the Western Pluvial Lakes Tradition. However, the point also falls within the morphological range of Windust (Sargeant 1973:63). Overall, Sargeant found it difficult to characterize the cultural use of the overhang on the basis of two identified point types.

Sappington 1981c

This report documents the 10-week excavation of the Lydle Gulch site (10AA72) in 1977 as well as an exhaustive analysis of the recovered artifacts. Of particular importance to this project is the work done on obsidian sourcing that contributed to the understanding and characterization of regional sources as well as the picture of obsidian use at the site. Prior to this effort, there was comparatively little if any sourcing data for the region (Sappington 1981c).

The site is located 13 km (8 miles) east of Boise along the Main Fork Boise River, near the current discharge for Lucky Peak Dam. In total, 83 cubic meters of soil were processed yielding a sizable assemblage that included multiple features, more than 100 tools and tool fragments, bone tools, faunal remains, cobble tools, debitage, and limited ceramics (:iii). The site was a temporary processing station (Sappington 1981c:179), that was likely peripheral to more permanent residences to the west in the Boise Valley. There is scant evidence for the use of fish and plant resources (Sappington 1981c:180).

According to obsidian sourcing results, 14 sources are represented, spanning a large geographic area. This suggests that groups occupying the site had either direct or indirect contact with other populations throughout the region (Sappington 1981c:181). More than 70% of all obsidian present at the site that was subjected to sourcing was sourced to Timber Butte, and the Owyhee source is the second most commonly utilized. For a more complete treatment of the importance of obsidian sourcing work at Lydle Gulch, see Chapter 7.

Typological analysis of the diagnostic projectile points and one radiometric date demonstrate that the site was used during two different periods of occupation between 4,500 and 200 years BP (Sappington 1981c:iii). Additionally, occupants were influenced by both Great Basin and Plateau culture areas with a shift toward exclusive GB affiliation in the later occupation (Sappington 1981c:181).

Ames 1982

This report represents investigations at 17 sites and potential sites in the middle portion of the Payette drainage. With fieldwork accomplished between 1979 and 1981, the effort examined several research questions and sought to determine National Register eligibility for each site. Twelve of the sites are along the South Fork Payette, and the remaining five are either on the North Fork Payette or the Squaw Creek drainage. Although Ames states that "The available data do not permit construction of a cultural chronology" an occupation spanning the last 5,000 years was demonstrated through projectile point typological sequences for the GB as well as investigations at Dry Creek Rockshelter (Ames 1982:77).

In general this effort has been criticized because it did not recognize components or produce radio carbon dates that could be valuable toward the construction of a local chronology (Reed 1990). However, Ames did note that none of the sites appears to be older than 5,000 years. He offers three possible explanations: sampling error, geologic agents have destroyed such sites, and the area was relatively uninhabited before 5,000 BP. Additionally, no evidence of fishing technologies or fish remains located at any of the sites, but the author admits that flotation samples may have found such evidence (Ames 1982:87).

Of particular interest is the work that was done at the sites near Timber Butte along Squaw Creek, principally 10BO217 and 10BO68. While small, unworked obsidian nodules are available on-site, none are large enough to account for the abundance and size of primary and secondary flakes. This led Ames to speculate that "all the big nodules may have been mined long ago" (Ames 1982:79). This assumption was ill-founded given that he had not visited the primary obsidian deposits of Timber Butte. Material available less than a mile away easily accounts for the reported size and volume of debitage found on site.

Artz 1983

This project involved testing of six sites in the Montour area to determine National Register (NR) eligibility for the Bureau of Reclamation. The sites are located approximately 15 km east of Emmett and 36 kilometers (22 miles) northwest of Boise. As one of the six sites was destroyed by erosion (10GM60), the project tested five sites (10GM50, 10GM55, 10GM56, 10GM59, 10GM61). Of the five sites, four are believed to be small, short-term occupation camps, with the remaining site a multi-component site (10GM61) with a house pit that may be the oldest recorded housepit in the area (Artz 1983).

Hydration dates from the tested sites suggest the oldest occupation is approximately 6,000 BP. While mussel shell and mammal bone (some charred) were found, no fish remains were located.

Projectile points for sites 10GM55 and 10GM56 are morphologically analogous to Desert side-notched and Northern side-notched. In terms of size they skew more toward Northern side-notched when compared to the projectile point metrics from Lydle Gulch and Dry Creek. Although a firm typological assignment was not determinate, both suggest a northern Great Basin influence. Elko series points, along with the presence of Rosesprings and Eastgate points in local armature collections further support the Great Basin influence.

The most significant find of this investigation was the location of at least one pit house (if not two), on a high terrace overlooking the southwest end of Montour Valley. Located at 10GM61, the profile of the pithouse was recognized in the wall of a silage trench associated with a nearby historic ranch. The feature was tested and possessed a high density of lithics and fire cracked rock (FCR). An obsidian flake excavated from the pithouse returned a hydration date of 3,118 BP, while an unprovenienced flake found near the pithouse returned a date of approximately 5,300 BP (Artz 1983:114). These dates could represent the oldest pithouse on any of the tributaries of the Snake. Excavations also revealed five occupation components (Artz 1983:117). The assemblage of fourteen formal tools includes two points that resemble concave base Humboldt points that returned hydration dates of 5,844 and 5,570 BP, although these points were not found in the pithouse (Artz 1983:116). Another "Midvale-like" bifaces returned a date of 5,420 BP. Obsidian represents 70% of the debitage (Artz 1983:121), all of which is assumed to be from Timber Butte given its proximity.

Arnold 1984

This document is the result of the examination of a set of amateur-assembled artifact collections, mostly from the western shore of Cascade Reservoir. The collections were used to assemble a preliminary prehistory of Long Valley based on typological comparison and obsidian hydration. The project was somewhat inspired by the work of zone archaeologist Jerry Wylie who postulated a continuity between late Cascade culture materials of the area and the materials found near Weiser that are generally associated with the Midvale Complex (Arnold 1984:1). Without an excavated context, Arnold is understandably hesitant to firmly type any of the artifacts. However it appears that Haskett and Windust are likely represented (Arnold 1984:130). With certainty Humboldt, Northern Side-notched, Cold Springs, Rosesprings, Hatwai eared, and Desert Side-notched are all present in the collections. And although it was not part of the study collections, a single Clovis point was collected from the same area.

Through his examination Arnold concludes that best evidence places the earliest occupation of Long Valley to approximately 8,000 to 5,000 BP. However, the presence of "Windust like" points as well as the Clovis point would push this as far back as 12,000 BP. Of the 241 obsidian items sourced for this project, 95% are attributed to Timber Butte. Arnold believes this to be reflective of little trade in and out of Long Valley (Arnold 1984:137). He also observes that typological comparison suggests that earlier occupations represent a mixed influence between GB and Plateau while the later occupations are more related to northern GB influences. At about 3,000 to 4,000 BP Elko series and Pinto points show up, with DSN, Cottonwood, Rosesprings and Eastgate making a later appearance (Arnold 1884:139). Additionally, his research cemented his belief that there is a clear connection between the Midvale Complex and groups in the Cascade area around 5,000 to 4,000 BP.

Plew et al. 1984

This report documents excavations at 10BO1, also known as the Silver Bridge Site. The site's prehistoric component is dated to between 5,000 and 2,000 BP, based on typological cross dating, obsidian hydration, and one radiometric date (Plew et al. 1984:51). The assemblage includes Elko series, Humboldt, and triangular stemmed points (Plew et al. 1984:34) along with more than 8,000 pieces of debitage. The artifacts located resemble the materials found at Dry Creek Rockshelter and other western Snake River and Payette River area sites (Plew et al. 1984:51). There is also continuity with the Midvale Complex and materials found around Cascade Reservoir.

Sourcing analysis was preformed on 120 pieces of obsidian debitage, and 95-98% is attributed to Timber Butte. It is assumed that the range of probability is a result of statistical analysis, and could represent the presence of unknowns. Plew, et al. conclude that the site is a locality of lithic reduction, hunting, and butchering with scattered evidence of some plant processing (Plew et al. 1984:97). Curiously, no material suggestive of fishing was located at the site. The authors further contend that the absence of materials older than 6,000 BP is likely representative of sampling error, but that the absence of materials younger than 2,000 is anthropogenic (Plew et al. 1984:102).

Plew and Fuhrman 1985

This report represents the testing of two sites near Lowman, Idaho: one a rockshelter (10BO6) and the other an open site (10BO53). It was discovered that the rockshelter site was stratigraphically destroyed by the disturbance of road construction activities, and the open site is noted as being disturbed, although to a far lesser extent.

Despite few diagnostic artifacts and poor stratigraphy, Plew and Fuhrman contend that both sites represent repeated, temporary use locales and suggest that the Payette drainage was host to a "relatively transient" occupation between 5,000 and 2,000 years ago (Plew and Fuhrman 1985:45). The investigation produced five hydration dates between 3,021 and 3,477 BP.

Gaston and Peterson 1988

This report represents the first phase of excavations at two sites (10BO418 and 10BO419) located along Cottonwood Creek, near the town of Horseshoe Bend, ID. A tributary of the main Payette, Cottonwood Creek joins the river approximately 5.6 kilometers (3.5 miles) downstream. Both sites are within 800 meters of each other and are approximately 35 kilometers (22 miles) north of Boise. The project was driven by a reroute of State Highway 55, and was designed to determine the National Register eligibility of the two sites. The same two sites were further tested by Lewarch and Benson (1989).

The sites are believed to be upland hunting camps based largely on the fact that projectile points and projectile point fragments make up 32% of all located artifacts and the high percentage of tertiary debitage. In terms of artifacts found, the two sites are more alike than not. The assemblages follow a general pattern similar to other sites in the northern Great Basin and include large side-notched points, Elko series, Rosegate, and Desert Side-notched points, Greywear ceramics, a mano, an abrader, and rock features that are particularly abundant in later components (Gaston and Peterson 1988:145-155). Typological cross dating suggests an occupation beginning at least 6,000 BP. Sites seem to have been intermittently occupied by regularly returning groups.

Lewarch and Benson 1989

This investigation represents the second and final round of excavations at sites 10BO418 and 10BO419 previously excavated by Gaston and Peterson (1988). During these efforts, two occupation episodes were defined at 10BO418. The first was recognized by the presence of large side-notched points and is typologically dated to approximately 4,000 to 3,000 BP. The later occupation is dated at approximately 1,500 to 500 BP, also dated typologically by the presence of Rosegate points and ceramics.

Five "components or use periods" were identified at 10BO419, with the earliest typologically dating to approximately 5,000 BP with the presence of large lanceolate points. The ceramics are associated with the later use periods and analysis suggests that the sherds could have been produced from locally available clay.

The assemblages of the two sites are comparable to those of other sites in southwest Idaho and other Payette drainage sites, which implies at least a degree of cultural continuity. Both sites seem to represent relative stability with little evidence of long distance trade (Lewarch and Benson 1989:9-10). The authors note that bioturbation is particularly troublesome in establishing a local chronology, which is in agreement with the work of Kleinfelder near Gardena (Lewarch and Benson 1989:9-11). Curiously, there is a marked decrease in obsidian use over the last 500 years (Lewarch and Benson 1989:9-12).

The assemblages suggest late stages of tool manufacturing, tool curation, hunting and processing of game animals and some plant materials. The investigators observed distinct, spatially separate activity areas and perceive a link to a 2,000 year technological stability.

Reed 1990

This investigation tested four sites located along the Banks Lowman Road between MP 17 and 22. The focus was to re-test 10BO114 which was previously tested and evaluated by Ames (1982) as ineligible to the National Register, an evaluation with which the state archaeologist did not agree and suggested additional work.

The authors note that "[t]he South Fork Payette appears to be part of the aboriginal territory used by the Northern Paiute and Northern Shoshone" (Reed 1990:12). This is consistent with the location of Bliss points which are usually associated with proto-historic, riverine habitation sites principally along the Snake and Owyhee. The assemblages of the four sites are similar to Plateau and GB materials.

Overall, the four sites are remarkably similar in location and artifact assemblages. Rosegate, Elko Series, and Humboldt points suggest a Great Basin influence. No sourcing was done. However, it is assumed to be Timber Butte obsidian, an assumption that is supported somewhat by the findings at the proximal Silver Bridge and Horseshoe Bend investigations.

Gallison and Reid 1992

This was the first phase of testing at two adjacent sites at the Deadwood Campground (10VY34/49) at the confluence of the Deadwood River and the South Fork Payette. The sites are located just upstream of Big Falls, and therefore upstream of the upriver limit of anadromous fish.

Testing was limited to 20 shovel tests and 2, 1x1 meter excavation units. The excavation located 2 hearth features, faunal remains, and projectile points that type to the last 1,500 years, although this date is speculative. The site is classified as a field camp. By far the majority of debitage recovered is obsidian at 94.7 percent, which is assumed to be from the Timber Butte source. The site area is relatively concentrated and most of the debitage was located in the upper 40-50 cm of the site.

Gallison and Reid 1993

The Big Falls Portage site was tested because of impacts related to foot traffic on a trail used by recreational boaters to bypass Big Falls. This same falls represents the upriver limit of anadromous fish runs on the South Fork Payette, making it an ideal place to harvest Chinook salmon and steelhead trout. The site has a high surface density of lithics and is confined to a relatively small area. The site is proximal to other area excavations of the authors as well as others (Ames 1982; Plew and Fuhrman 1985; Reed 1990), and the assemblage falls within the same general pattern. Deposits are typologically cross-dated to the last 2,000 years.

Ten obsidian points were subjected to sourcing analysis and all are sourced to Timber Butte. The ten points include Rosegate, Elko series, and six unnotched Bliss points. Three of the points were also subjected to residue analysis. One of the three, a Bliss point, returned a generic positive for trout, however this same antiserum cross-reacts with Chinook salmon residue as well.

The authors observe that landforms older than 5,000 years are absent in much of the South Fork Payette canyon, which is perhaps linked to Lucas's (1999) contention about increased erosion during a brief wet period at the close of the altithermal.

The excavation failed to locate fish remains despite being the most likely reason for the existence and location of the site. It is an otherwise unattractive location for habitation. The authors maintain that the site still retains a high potential to contribute new and additional information regarding local and regional prehistory.

Reid and Gallison 1994

This was the second phase of testing at the two sites at the Deadwood Campground (10VY34 and 10VY49) at the confluence of the Deadwood River and the South Fork Payette. The authors narrowed the site classification to a "warm weather field camp" (Reid and Gallison 1994:27). Work identified a total of seven features and carbon dates range from 759 to 1,400 +/-60 BP. More information was gained, but none of it significantly altered the interpretation of the first excavation.

Kleinfelder 2006

This project tested a site (10BO157) along the Main Payette near Gardena, Idaho, and less than 19 kilometers (12 miles) from Timber Butte. Initial testing indicated that the site occupied a large area and suggested a significant depth of cultural fill. Because of this it was hoped that excavation would expose a long, well stratified occupation that could contribute significantly to an understanding of local archaeology.

Unfortunately, test units revealed a high level of disturbance thanks to the Columbian ground squirrel. Additionally, faunal and botanical materials were poorly preserved, no clearly defined features were located, and almost the entire assemblage is composed of obsidian debitage. Radiocarbon dating and typological comparison suggest that the site was occupied between 2,400 and 1,700 BP. An analysis of the debitage suggests that biface production was the primary reduction at the site. Although several lithic material types are present, obsidian makes up 97.7 percent of the assemblage. All of the obsidian debitage that was subjected to sourcing analysis is attributable to Timber Butte.

Summary of Previous Investigations in the Payette Drainage

These investigations have produced significant data for sites that date to the last 5,000 to 6,000 years. The paucity of sites older than 6,000 years within the Payette drainage could be a result of sampling error, a lack of landforms older than 6,000 years, or reflective of actual regional use by aboriginal populations (Ames 1982; Gallison and Reid 1992, 1993; Lucas 1999). However, the investigations do suggest particular trends from the Middle Archaic to the Contact Period. In particular, earlier occupations seem to represent a mix of Great Basin and Plateau influence with later occupations representing a more exclusive Great basin affiliation.

Although the conclusion is not surprising given its location, Timber Butte obsidian is clearly demonstrated as the principal source of volcanic glass throughout the Payette drainage. In all observed cases it is the dominant if not the only obsidian represented in assemblages.

The locations and types of sites documented suggest a seasonal round occupation of the landscape with winter villages along rivers at regional low elevations and a series of task-specific camps leading into the high country, following a progression of anadromous fish runs, herd movements, and plant resource maturation.

While work in the area shows that the Payette drainage was part of a rich cultural landscape, many questions remain unanswered. Although isolated Clovis and Windust points have been located in the study area, Clovis and Windust age occupations are conspicuously absent. This alone identifies the need for additional investigations in the area likely involving other scientific disciplines to identify living surfaces of the appropriate age.

These trends will be further examined in the subsequent treatment of the local and regional cultural sequence in Chapter 4.

CHAPTER 4 – CULTURE AREAS, AREA CHRONOLOGY AND ETHNOLOGY

Culture Areas

Timber Butte lies not only at the boundary of major climatic and geologic provinces, but along the boundary between the Columbia Plateau and Great Basin Culture areas (Figure 4.1). As the material remains of indigenous cultures that inhabited the Timber Butte area seem to exhibit aspects of both, an examination of regional prehistory requires at least a brief treatment of the Plateau and Great Basin culture areas.

Columbia Plateau Culture Area

The Columbia Plateau Culture Area is, in general, the 200,000-square mile area drained by the Columbia and Fraser rivers. This does not include the middle and upper portions of the Snake River which are considered to reside in the northern portion of the Great Basin Culture Area. The area is bordered by the Cascade Range to the west, the Blue Mountains and Salmon River to the south, the Rockies to the east, and the Rockies and the northern reach of the Columbia drainage to the north (Walker 1998). In terms of the recognized adjacent culture areas, the Columbia Plateau is bounded by the Subarctic to the north, Plains to the east, Northwest Coast to the west, and the Great Basin to the south. Notable features within the area include the extensive Columbia and Snake River Basalt flows, the Salmon River Mountains, The Okanogan Highlands, and the Fraser and Thompson plateaus.

The Columbia Plateau can be further divided into three major areas: the northern forested mountainous area (Fraser and Thompson drainages), the arid to semi-arid central and western area (Columbia Plateau), and the south and eastern area (Clearwater and lower Snake drainages) (Andrefsky 2006). At the time of Euro-American contact, the Columbia Plateau Culture area was inhabited by Salish (Kalispel and Coeur d’Alene) language speaking groups to the north, Sahaptin (Nez Perce) speaking groups in the central and western area, and Numic speaking groups (Northern Paiute, Bannock, and Northern Shoshone) along the middle and upper Snake River drainage on the southern extent of the culture area (Meatte 1990; Walker 1998).

Regardless of these distinctions of language and geography, Plateau groups share a general cultural pattern that includes riverine settlement patterns, extensive regional trade, and village and band level political organization (Walker 1998). Additionally, all exhibit a diverse subsistence that employs a sophisticated fishing technology and the use of a wide range of plant and animal resources. The southern plateau is recognized as a "primary center of American Indian equestrian development in North America" (Walker 1998:3). Differences among Plateau groups seem to be related to precipitation and elevation, rather than latitude or longitude.

Great Basin Culture Area

The Great Basin Culture Area coincides with the Great Basin hydrographic region that was first recognized and named by John C. Fremont during his 1844 expedition. The goal of the expedition, at least in part, was to locate a fabled waterway believed to have its headwaters in the Rocky Mountains and drain to the San Francisco Bay. Not finding such a river, he instead found an uncharted area surrounded by mountains having no external drainage (D'Azevedo 1986). Although the physiographic province has since been expanded to include environmentally similar adjacent areas that do exhibit external drainage, the "basin proper" remains the defining core of the province (D'Azevedo 1986). This core is defined by the basin and range territory, a series of parallel north-south trending mountain ranges and the basins between. Many of the basins, during cooler and wetter times of the Pleistocene and early Holocene, were expansive shallow lakes that supported a diverse flora and fauna. The adjacent areas included in the physiographic province encompass the Owyhee and Weiser River drainages and much of the middle and upper Snake River of southern Idaho.

Although the cultural province was first recognized by Mason and others in the late nineteenth and early twentieth centuries, it was not until 1939 that Kroeber defined the boundaries as largely coincident to those of current scholarship (Kroeber 1939; D'Azevedo 1986). The culture area accounts for approximately 400,000 square miles, which is considerably larger than the hydrographic province (D'Azevedo 1986; Fagan 1991). The

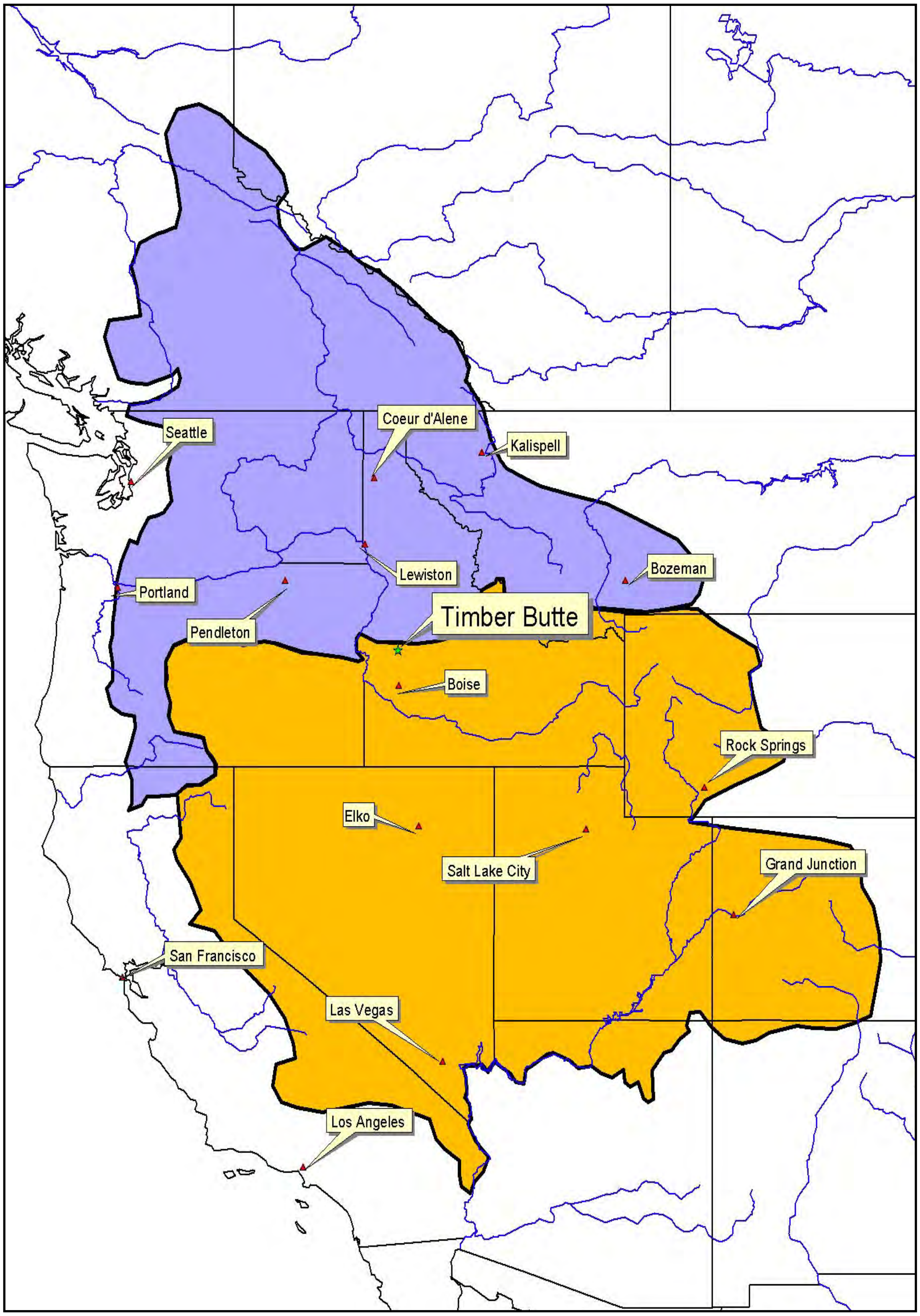

Figure 4.1: Plateau (blue) and Great Basin (gold) Culture Areas. Adapted from Handbook of North American Indians, Plateau and Great Basin Volumes

area is extremely arid and is bounded by the Rockies to the east, the Sierra Nevada Mountains to the west, the Columbia Plateau to the north, and the American Southwest to the south (Fagan 1991).

Although the Washoe language group is within the Great Basin along its western edge, the Uto-Aztecan language family is dominant throughout the culture area (Jacobsen 1986). Numic is represented by Western, Central, and Southern Numic subgroups (Miller 1986). Western Numic speakers included the Northern Paiute and ranged from most of western Nevada to southeastern and central Oregon; Central Numic groups (Shoshone and Bannock) ranged from Death Valley to most of southern Idaho and western Wyoming; and Southern Numic groups ran from southeastern California through most of Utah and western Colorado (Miller 1986). When viewed on a map, the three areas are roughly wedge-shaped with all expanding away from the southwestern corner of the Great Basin. This, coupled with an increased linguistic diversity near the point of each area, suggests that the area near Mono Lake and Owens Valley may be the Numic point of origin (Miller 1986). Although glottochronology is highly subjective and can produce only relative estimates, such studies place the beginning of the Numic expansion at approximately 10 to 15 centuries ago (Miller 1986).

Native American groups of the Great Basin were broad-spectrum hunter-gatherers who utilized a variety of plant, animal, and insect resources. In the central and southern portions of the Great Basin there was a particular focus on large game such as deer, pronghorn, and bighorn sheep, and such plant resource of mesquite, agave, and pinyon (Fowler 1986). In the northern reaches of the area and where available, groups hunted the same game animals but developed a particular reliance on the anadromous fish runs of the Owyhee, Weiser, and Snake rivers (Fowler 1986). The northern area is also known for widespread camas harvest, which it has in common with Plateau populations to the north. Despite these differences, groups throughout the Great Basin shared similar kinship systems (Shapiro 1986), cosmology, ritual practices, and mythology (Hultkrantz 1986).

Chronology Recognition

Prehistoric chronologies attempt to divide the past into meaningful spans of time that represent prevailing cultures or cultural trends. Although it is commonly said that chronologies are formed or constructed, they are preferably recognized through a cross-typological comparison of datable artifacts. Typologically similar artifacts found contemporaneously throughout a given region are assumed to represent at least a degree of cultural homogeneity. When properly based on the professionally excavated data of numerous sites, a chronology can provide a temporal yardstick against which future discoveries can be measured and placed into an understandable context. As such, the recognition of chronologies is a primary goal of archaeological investigations.

Unfortunately, an assemblage of artifacts can yield only so much information about a past culture. The remainder of the big picture is a product of interpretation. While such interpretation is ideally based on a body of experience and ethnographic analogy, it remains supposition and may never illuminate the entire story. And, as long as humans are the sole practitioners of archaeological investigation, interpretation will be biased and subjective. This subjectivity can lead to a variety of interpretations, even when based on the same data.

Jesse Jennings had this to say about the composition of region-wide chronologies, and although this sentiment was expressed in 1968 and is aimed at the difficulty of such a task in the Great Basin, the same issue afflicts the Payette drainage:

> *Because of the diversity of prehistoric cultural expressions, there is no currently accepted chronological framework that claims to present any detailed cultural connections across the entire Great Basin* (Jennings 1968:114).

Were the Payette Basin to represent a generally homogenous environment, and given that culture is at least responsive to environment, the recognition of a regional prehistoric chronology should be a relatively easy task. Unfortunately, as previously stated, the greater Timber Butte area is at the interface of the Plateau and Great Basin culture areas and is anything but environmentally homogeneous. It includes a variety of microclimates related to geology, hydrology and elevation that in turn produced a fluorescence of localized cultural adaptations. Such a lack of environmental homogeneity complicates the task of constructing a regional chronology, although broad trends remain recognizable.

Local and Regional Chronologies

Although there has been no previous attempt to construct a chronology specific to the Payette Basin, several efforts have produced cultural sequences for adjacent and overlapping regions. The various chronologies are written principally from either a Great Basin or Columbia Plateau perspective (Leonhardy and Rice 1970; Butler 1986; Cressman 1986; Jennings 1968, 1986; Fagan 1991; Ames et al. 1998; Roll and Hackenberger 1998), while others have produced more localized sequences (Meatte 1990), or grappled with the task of integrating data from more than one culture area (Ringe and Holmer 1987; Lohse 1994; Plew 2000).

The sequence produced by Leonhardy and Rice (1970) is founded on a series of excavated rockshelters along the Lower Snake River. Their chronology consists of six phases. From the earliest to the latest, they are: the Windust phase (10000 BP - 8000 BP), the Cascade phase (8000 BP - 5000 BP), the Tucannon phase (5000 BP - 1500 BP), the Harder phase (1500 BP - 700 BP), the Piq'unin phase (700 BP - 200 BP), and the Numi'pu phase (200 BP - modern era). This sequence has a particular applicability to the Payette drainage as it flows into the Middle Snake. As such, it is likely that prehistoric inhabitants of the Payette had strong cultural ties to groups along the Lower Snake.

Kenneth Ames, Don Dumond, Jerry Galm, and Rick Minor (Ames, et al. 1998) also produced a chronology of the southeastern portion of the Columbia Plateau. They defined three periods, many of which are further divided into subperiods. From earliest to latest, they are: Period I (11,500 to 7-6,400 BP, with two subperiods), Period II (7-6,400 to 3,900 BP), and Period II (3,900 to 280 BP, with three subperiods). This sequence also has a bearing on the Payette drainage area.

The cultural sequence compiled by Meatte comes closest to a geographic overlap with the Payette River Basin. The study area covers the Payette Basin in part, as well as other Snake River tributary systems to the south (Meatte 1990). Meatte's sequence involves both a comprehensive examination of area archaeological evidence as broken down into spans of 1,000 years, and a chronology consisting of three periods (Meatte 1990). The periods are Broad Spectrum Foraging (11,500 to 4,500 BP), Semi-Sedentary Foraging (4,200 to 250 BP), and Equestrian Foragers (250 to 100 BP). The approach is straightforward, and is largely based on changing settlement pasterns.

Also working with an area at the contact between culture areas, Ringe and Holmer (1987) defined a cultural sequence for the Upper Snake River. Their chronology is constructed around diagnostic projectile points of the Northern Great Basin, the Northwestern Great Plains, and the Northern Rocky Mountains. Although it is heavily reliant on the excavations at Wilson Butte Cave and work done on the Idaho National Laboratory (INL) property, it is also an interpolation of established regional chronologies.

Payette Basin Cultural Sequence

This sequence integrates elements of at least ten regional chronologies, while recognizing the Payette basin as an area at the contact of two culture areas (Figure 4.2). It utilizes the temporal divisions most similar to those used by Plew (2000) and Ringe and Holmer (1987). At the same time, it pays particular attention to cultural sequences that overlap or are adjacent to the Payette basin, such as the interpretations of Meatte (1990) and Leonhardy and Rice (1970). As such, the prehistory of the Payette drainage is partitioned into Late Pleistocene, Paleo-Indian, Archaic, and Contact Periods. The Archaic is further divided into early, middle and late subperiods. Although the Paleo-Indian and Archaic divisions are common throughout North American chronologies representing different culture areas, the structure does not preclude room for regional and local

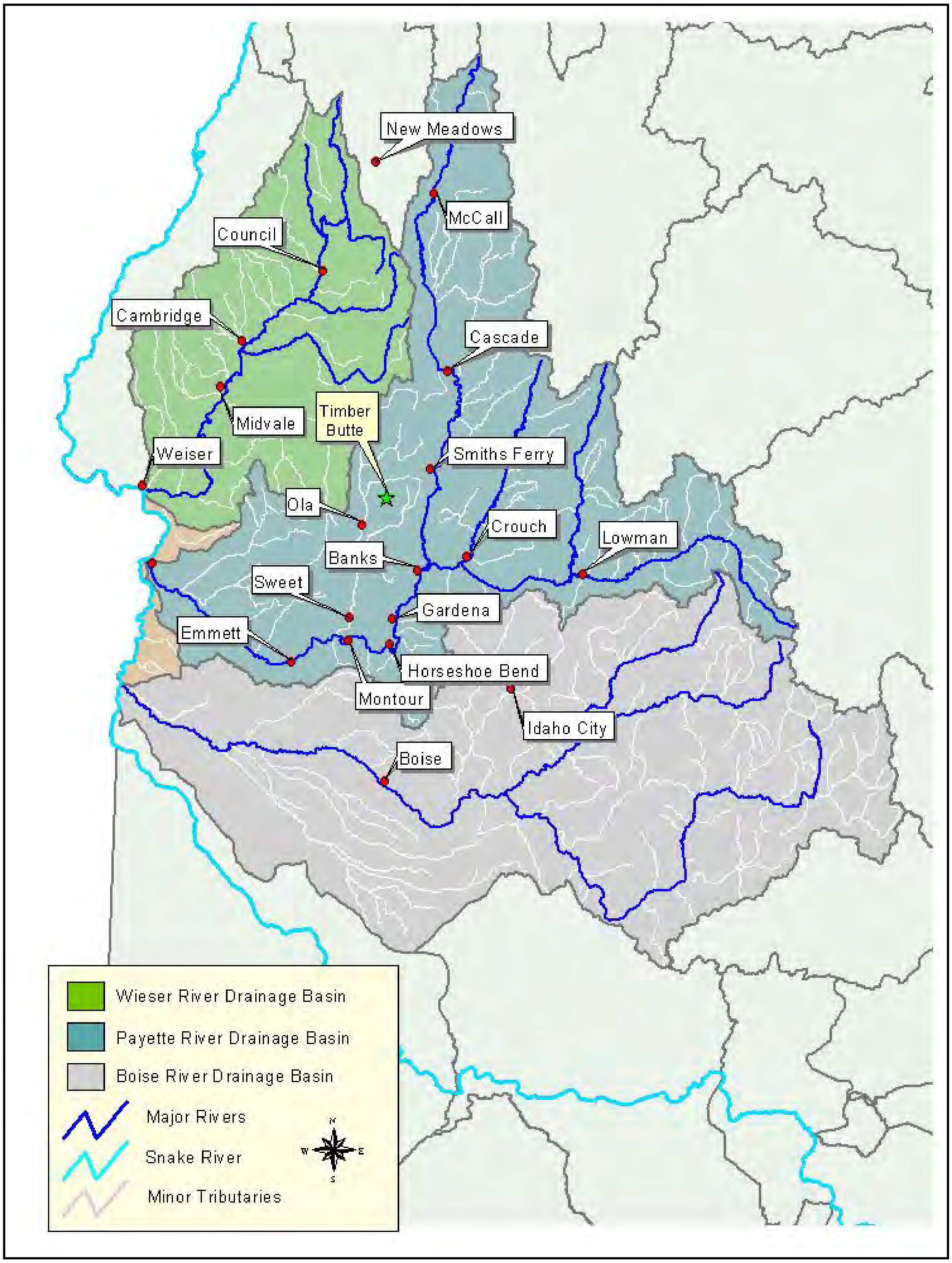

Figure 4.2: Payette, Weiser, and Boise River Drainage Basins

variation. It is important to note that this sequence is derived largely from the work and documentation of the authors mentioned in Chapter 3 and earlier in this chapter. However, there is also a significant personal (author) contribution based on numerous surveys within the Payette drainage (including the Timber Butte area) as well as several excavations along the Payette and its tributaries. All dates have been converted to before present (BP) values.

Late Pleistocene Period (Prior to 12,500 BP)

This period is analogous to the Pre-Projectile Point period of Ringe and Holmer (1987), and is meant to be a placeholder for future credible discoveries that may challenge the long-held belief that the Clovis Culture was the first to colonize the Americas. However, given the scant evidence of regional occupation during this period, the name does not seek to confirm or deny the existence of a particular technology or culture; only to place it within a geologic timeframe. Butler (1986) and Cressman (1986) also define the earliest period as extending beyond 12,500 BP without the need for a recognizable or characteristic assemblage. The earliest levels of Wilson Butte Cave produced a date of approximately 15,000 BP in association with bone fragments, two flakes, and a triangular flaked point or knife that is not diagnostic of any known tradition (Gruhn 1961; Jennings 1986; Ringe and Holmer 1987). More recent excavations at Wilson Butte Cave date the same stratum at approximately 10,500 BP, casting doubt on earlier claims of antiquity (Meatte 1990; Plew 2000).

However there is well-dated evidence for pre-Clovis occupations throughout the New World (Yohe and Woods 2002). The typical cases of Meadowcroft Rockshelter in Pennsylvania and Monte Verde in Chile are joined by other sites in New York and Texas (Adovasio 2006). Most of these sites date to approximately 15,000 BP and represent similar assemblages that include small prismatic blade cores, limited textiles, and small blades. Additionally, in Monte Verde, faunal and floral remains demonstrate a year-round occupation of a broad-spectrum foraging group. This image lies in stark contrast to the cold weather, highly transient, big game hunter, romantic stereotype that is likely an impediment to the truth (Adovasio 2006). Adovasio suggests that the pre-Clovis materials could represent a pioneer wave of migration into the New World, and Clovis could represent the first residential wave. Clovis occupations with stone floors at the Gault site in Texas suggest that Clovis populations may have been more sedentary lending credence to the idea.

Paleo-Indian Period (12,500 to 8,000 BP)

The temporal divisions of this period coincide roughly with other regional chronologies that also recognize and term a Paleo-Indian Period (Ringe and Holmer 1987; Fagan 1991; Plew 2000). As Paleo-Indian sites are rare in the Payette Basin, this period is recognized on the basis of materials found throughout a larger region. As such, its characterization is similar, if not functionally indistinguishable, from other regional chronologies. This period is generally associated with a subsistence that was based largely on hunting now extinct Pleistocene megafauna, such as camel, sloth, mammoth, and Bison *Antiquus*. The period is host to at least three distinct technological traditions that are recognized through specialized spear and projectile points. These distinct technological traditions are Clovis (12,000 to 11,000 BP), Folsom (11,000 to 10,600 BP), and Plano (10,600 to 7,800 BP) (Butler 1986; Plew 2000). The spear or projectile points of these traditions appear to be highly specialized toward the harvest of particular species of the late Pleistocene megafauna populations (Jennings 1968, 1986; Fagan 1991). Both Clovis and Folsom points are characterized by a fluted base, which appears to be unique to the New World. The flutes are scars resulting from the removal of a channel flake from the base, toward the distal end. These flutes are assumed to facilitate a particular hafting technique (Crabtree 1982). Unfortunately, the surviving projectile points likely represent only a small percentage of the Paleo-Indian material culture, and subsequently only a small portion of the culture (Adovasio 2006).

It has been long assumed that each of these traditions represent a different culture group that either died out or was replaced by the subsequent culture. However, it is also possible that the different traditions represent the diffusion of technological change within the same culture group, or even across culture groups. Evidence resulting from the examination of mitochondrial DNA, and the similarity between early Paleo-Indian points and a 20,000 year old European stone tool tradition (Solutrean), could be representative of this idea (Baker and Bradley 1997).

During the Paleo-Indian Period, the climate within the Payette drainage was cooler and wetter than today (Plew 2000). A sparse population density of hunter-gatherers characterizes the time. Groups were small and highly mobile, engaging in a broad-spectrum foraging subsistence economy that focused on pluvial and riverine resources (Ames et al. 1998; Meatte 1990; Fagan 1991). Beyond the use of rockshelters, intentionally constructed dwellings or structures have not been found in association with Paleo-Indian populations (Ames et al. 1998).

Although Clovis projectile points have been located throughout southern Idaho, none have been recovered from an excavated context or with datable materials. The best evidence of Clovis-aged deposits comes from Wilson Butte Cave, Kelvin's Cave, and Jaguar Cave (Ringe and Holmer 1987; Plew 2000). At the latter, the butchered remains of 268 large mountain sheep are dated to between 11,540 and 10,270 BP (Plew 2000). Despite this find, the Clovis point is believed to be a tool specific to hunting mammoth. Isolated surface finds of diagnostically Clovis points have been found near Buhl, Glenn's Ferry, East Fork Bruneau River, Twin Falls, Paddock Reservoir, and near Timber Butte on the west shore of Cascade Reservoir (Meatte 1990; Titmus and Woods 1992). The specimen found at Cascade Reservoir is obsidian and has been sourced to Timber Butte (Peterson 1998, 2006 personal communication).

The Clovis tradition is also represented by a cache of Clovis points and bifaces at the Simon Site, near Fairfield (Butler 1978). Unfortunately, the site was discovered through construction-related ground disturbance, and only a small portion of the cache was recovered through controlled excavation techniques (Meatte 1990; Plew 2000). Although not on the Payette drainage, the Simon Site is closest to the South Fork Boise River, which eventually joins the Snake River approximately 40 kilometers (25 miles) south of its confluence with the Payette. The Simon Site Clovis Cache is similar to other caches in the region, such as the Richey-Roberts Site near Wenatchee, Washington, and the Anzick burial and cache in Montana (Lahren 1974; Gramley 1993). Caching materials suggests a good understanding of the landscape and the seasonal availability of resources on the part of those who cached the items.

Like Clovis, the short-lived Folsom Tradition (11,000 to 10,600 BP) is defined principally by isolated surface finds with one possible exception. At Owl Cave, two bifacially fluted points and one unifacially fluted point were found in association with modified mammoth remains (Green 1983; Lohse 1994).

Also like Clovis, most Folsom materials in Southern Idaho come from isolated surface finds. Folsom points have been located at Cane Creek Reservoir, Devil's Creek, Timmerman Hills, and Reynolds Creek. The specimen found at Reynolds Creek has been sourced as Timber Butte obsidian (Meatte 1990). Groups that employed the Folsom projectile point, like the Clovis before them, were also broad spectrum foragers living in small, highly mobile groups. The Folsom point is seen as a tool specialized toward hunting extinct and existing forms of bison (Jennings 1968), although there is also a strong association between Folsom and mountain sheep at Owl Cave.

The Plano tradition is generally defined by a variety of lanceolate projectile points that are dated between 10,600 to 7,800 BP. The principal morphological identifier is lack of the flutes that define Clovis and Folsom traditions (Jennings 1968). In adjacent areas the tradition is represented by Agate Basin, Duncan, Midland, Hell Gap, Scottsbluff, and Eden type points (Jennings 1968). In his examination of the prehistory of the Snake and Salmon rivers, Butler states that Plano is the best documented of the Paleo-Indian traditions (1986). In agreement with this, the Plano Tradition is well represented by numerous isolated surface finds as well as excavated contexts.

Like other Paleo-Indians, groups of the various Plano traditions were also broad-spectrum foragers. The Plano points are thought to be specialized toward hunting bison at lower elevations, and mountain sheep in the high country (Swanson 1972). However, they also utilized jumps to kill bison and exploited a range of other prey animals. The occasional recovery of milling stones suggests that they may have had an increased reliance on plant resources (Jennings 1968).

Plano materials have been found at Deer Creek Rockshelter, Birch Creek Rockshelter, Owl Cave, Wilson Butte, and Dirty Shame Rockshelter (Swanson et al. 1964; Meatte 1990; Plew 2000). At Owl Cave, more than 30 Plano points were found in association with the remains of more than 70 bison. Examination of the faunal remains indicates that the bone bed is the result of at least two events (Lohse 1994), demonstrating that the cave was used as a bison trap at least twice about 8000 years ago. Plano materials were also found at Wilson Butte, along with a milling stone. Sheep bones dating to this period were also found at Jaguar Cave, but not in association with diagnostic artifacts.

In the Payette River drainage, the Plano tradition is represented by Haskett and Windust points. Once again, these point types may be characteristic of distinct cultures, or locally specialized traditions within the same or related cultures.

The Haskett point was first located along the Snake River near American Falls Reservoir and dates to between 11,000 and 8,000 BP and more accurately between 10,000 and 9,000 BP (Meatte 1990). Haskett points come in two variants, the smaller of which is assumed to be the salvaged remnant of the larger (Butler 1978). There is a resemblance between Haskett and Birch Creek, Hell Gap and Agate Basin points characteristic of bison kill sites on the Northern Great Plains (Swanson 1972). However, Frison (1978) claims there is a difference in flaking technology (Kaberline 2003).

With the exception of the type site, Haskett points have not been found in association with faunal remains (Plew 2000). Near Stanley at Redfish Overhang, Haskett points were found in association with a hearth dated to approximately 10,000. Of particular interest is the Redfish Overhang Haskett point that has been sourced to Timber Butte. Haskett-like points have also been recovered at Birch Creek Rockshelters.

First defined by Leonhardy and Rice (1970), Windust is another Plano variant that is well represented in the region. The characteristic artifact is a short, broad, typically stemmed projectile point that is morphologically similar to Silver Lake and Eden Points (Sargeant 1973; Meatte 1990). The associated assemblage includes scrapers, long prismatic flakes, utilized flakes, lanceolate knives, and cobble tools, but does not include tool types associated with plant processing. Windust materials define what Leonhardy and Rice believed to be the earliest continual cultural manifestation on the Lower Snake River. With a date between 10,000 to 9,000 BP, but perhaps as far back as 12,000 BP, Windust is likely related to the earlier Lind Coulee (Leonhardy and Rice 1970; Jennings 1968). The Windust tradition is a well-developed lithic technology, mainly using cryptocrystalline silicates, but also other materials such as fine-grained basalt. The Hatwai site yielded a large Windust component (Ames et al. 1981) and Windust points have been identified in collections from the Long Valley area and surveys along the west shore of Cascade Reservoir (Arnold 1984; Peterson 2006 personal communication). This indicates that groups of the Windust tradition included the mountainous regions of the Payette drainage into their territorial range (Arnold 1984; Kaberline 2003).

Organic material in association with a stemmed projectile point (not associated with the Haskett assemblage) at Redfish Overhang produced a radiocarbon date of approximately 8000 BP. Although the point was initially typed as a Silver Lake point, it may be a Windust point, potentially extending the geographic range of the tradition (Sargeant 1973; Kaberline 2003).

Recent excavations at the Cooper's Ferry site on the Lower Salmon located stemmed points morphologically similar to Windust (Wisner 1998). Radiocarbon dates from associated organic materials indicate a date between 11,000 and 12,000 BP. Provided these dates can be substantiated and lean toward 12,000 BP, it would indicate an overlap between fluted and stemmed point traditions. Additionally, later work (Davis 2001) also dates the earliest occupation of the Cooper's Ferry site to approximately 11,500 BP. More in line with the generally accepted range of Windust is the chisel-pointed stemmed point found with the Buhl burial dated to approximately 10,600 BP (Green et al. 1998a).

The end of the Paleo-Indian period is commonly defined by the drastic climactic changes and the extinction of the megafauna on which Paleo-Indian populations relied. It has been suggested that the extinction of Pleistocene megafauna is directly related to wasteful practices and over hunting by Paleo-Indian populations. Although such population expansion models are rapidly losing ground, it is hypothesized that groups exploded through North and South America at such a rate that the mega fauna were unable to develop defensive behaviors. While hunting pressures could have been a contributing factor, it is more likely related to the change to a warmer and drier climate, and the reduction of permanent water sources due to lowering water tables. The extinction event occurred throughout the world at the same time, in places where the megafauna were harvested steadily for thousands of years, further weakening such arguments (Fagan 1991).

The Archaic Period (8,000 to 250 BP)

The Archaic Period is recognized as a unique temporal entity, although it is further divided into early, middle and late subperiods. While these divisions are ideally recognized and arranged around significant culture change as evidenced by changes in artifact types, counts and morphology, there is also a semantic utility to dividing a large span of time into manageable units.

Early Archaic Period (8,000 - 5000 BP)

The beginning of the Early Archaic is defined similarly among several regional chronologies (Butler 1986; Ringe and Holmer 1987; Plew 2000) and roughly coincides with the eruption of Mt. Mazama at approximately 7,700 BP (Ames et al. 1998). Additionally, as the subperiod is defined here, it is concurrent to what Leonhardy and Rice (1970) first termed the Cascade Phase (8,000 to 5,000 BP). The Early Archaic subperiod represents the beginning of a gradual increase in plant and fish resources utilization that typifies the Archaic in the southeastern Plateau and northern Great Basin. Additionally, exotic trade goods and mortuary practices hint toward trade networks and an increasing sedentism.

The Cascade material culture is well represented in the Payette drainage and was the dominant tradition of the Early Archaic. The Cascade tradition is defined on the basis of 10 sites along the Lower Snake and seems to have developed from Windust (Leonhardy and Rice 1970). The tradition is divided into two subphases based on the presence or absence of the Cold Springs side-notched point that is only found in the later subphase. Not all sites include both subphases, and the dividing line appears to be the eruption of Mt. Mazama, although Leonhardy and Rice contend that it represented only a brief disruption of culture. The rest of the Cascade assemblage is functionally the same. Hallmark artifacts include edge-ground cobbles, scrapers, manos, plentiful utilized flakes, and the Cascade projectile point. While the lithic materials vary, the tradition shows a preference for fine-grained basalt despite the local and regional availability of quality obsidian and viable cryptocrystalline silicate. Although related artifacts are rare, salmon appears to be the new resource and manos are related to an increase in seed processing. The earliest radiocarbon dates are approximately 8,000 BP, although the tradition seems to have been well established by then.

A little further east, the Early Archaic is defined by the appearance of large Bitterroot and Northern Side-notched projectile points which appear across a wide distribution as defined by Mummy Cave, Bison Rockshelter, Dirty Shame Rockshelter, Wilson Butte Cave, and Hogup Cave, and have an association with bison hunting (Ringe and Holmer 1987). The Northern Side-notched point is morphologically analogous to the Cold Springs side-notched. The dated appearance of the Northern Side-notched points led Ringe and Holmer to postulate that the type developed on the plains and moved westward at the start of the Altithermal (1987), perhaps following the movement of bison responding to the climatic change. However, the authors admit that the accuracy range of the dating technique could level the dates. Regardless of the impetus of movement, Northern Side-notched points are found throughout the Payette drainage and could be related to Mountain Sheep harvest as well.

A unique trend as identified through a distinct burial pattern, the Western Idaho Archaic Burial Complex (WIABC), was initially identified at the Braden Site but is now known through at least nine sites (Pavesic 1985; Plew 2000). The complex was first dated between 4,500 and 4,000 BP, with a possible extension to 3,500 BP (Pavesic 1985), placing it in the Middle Archaic. However, another site consistent with the complex, the DeMoss Site, has been dated to be approximately 6000 years old, placing at least the beginning of the complex in the Early Archaic (Green et al. 1998a; National Park Service 2000). The WIABC is typified by multiple human burials, some of which may be cremated, the presence of red ochre, associated bifaces caches, Cascade projectile points, pipes, and beads that are often made with exotic materials (National Park Service 2000).

An understanding of the cultural entity or entities that produced the WIABC is limited as all the representative sites are burials lacking habitation features. Additionally, most of the sites were located accidentally by landowner development projects, with after-the-fact professional excavation. However, it is possible to speculate about aspects of the culture through an examination of the skeletal remains and the mortuary practices. It has been suggested by Pavesic (1985) that the presence of exotic materials demonstrates a pattern of burial wealth related to the acquisition of such goods. Pavesic further contends that the responsible culture was an egalitarian, kin-based society (1985), but differing treatment of interred individuals suggests a social stratification not consistent with egalitarian groups (Plew 2000). Pavesic also says that it was a time of relative cultural and environmental stability and abundance (1985), but this is not well documented by other dated sites. In fact, it appears to have been a time of climatic adjustment (Chatters 1998).

Given that the same types of interment practices are also seen at Marmes Rockshelter on the Lower Snake and are identified with the coeval Cascade Tradition, it at least feasible that the WIABC is the mortuary practice of the late Cascade Phase, as defined by Leonhardy and Rice (Green et al. 1986b). Where it developed within the geographic range of the Cascade culture has yet to be determined by the existing data. It also likely that the WIABC persisted, at least in part, through the later Midvale complex and appears to be a development of the Cascade culture. This is suggested by other regional burials of the Late Archaic such as the internments at Dry Creek Rockshelter and the DeMoss Site (Webster 1978; Green et al. 1998a).

Middle Archaic Period (5000 - 3500 BP)

The cultural sequence of Leonhardy and Rice is clearly applicable in the study area from the Paleo Indian to the Early Archaic Period. This is largely due to a regional continuity of Windust and Cascade Phase materials (Leonhardy and Rice 1970; Sargeant 1973; Ames et al. 1982; Arnold 1984; Reed 1990; Peterson 2006 personal communication). Further, Cascade materials are locally prevalent, dominating the last 3,000 years of the Early Archaic. Along the Lower Snake, the Cascade Phase was replaced by the Tucannon Phase. Leonhardy and Rice do not perceive a historical connection between the two phases, a point that has fueled considerable debate and speculation (Lucas 1999; Ames 1982).

The subsequent Tucannon Phase is not well represented in the Weiser, Boise, or Payette drainages. Aside from projectile points typed to Tucannon along the Lower Clearwater and Salmon rivers (Kingsbury 1997; Ames 1982), the phase is conspicuously scarce in southwestern Idaho. As such, the Leonhardy and Rice chronology has little utility to the Middle Archaic of the study area.

East of Idaho's western border, Cascade populations seem to have been somewhat isolated from Plateau influence. Instead of being replaced by Tucannon, Cascade populations persisted and gradually transitioned in response to local environments. This transition is recognized primarily through the incorporation of local developments. The first development was the WIABC, which likely had its beginnings in the Early Archaic. The second development was the Midvale Complex which likely came about in the final days of the Late Archaic, but is known as a Middle Archaic manifestation. Both seem to have flavored an evolving Cascade Culture, and at the same time are indicative of greater regional trends of Great Basin and Plateau populations, suggesting some contact, perhaps in the form of regional trade networks.

The Midvale Complex was first recognized through work at basalt quarries near Mesa Hill and Midvale, Idaho. As a result, it was characterized primarily through the lithic technology which favors fine-grained basalt. Today it is viewed through the context of a larger number of more diverse sites (Meatte 1990). Roll and Hackenberger suggest that the complex is a reflection of increased settlement in tributaries and upper valleys (1998). Although the complex is known through a variety of projectile points that include stemmed, large side-notched and leaf shaped points, a plano-convex scraper is the most diagnostic artifact (Kaberline 2003). The complex also includes the persistence of Cascade points (Meatte 1990), strengthening the argument that the Cascade culture continued with the modification of Midvale Complex and WIABC developments. As a result, the Middle Archaic Cascade of the Weiser and Payette drainages is termed the Midvale Culture by this chronology.

When the complex was first recognized, there were few associated absolute dates. As a result, the beginning of Midvale was dated through cross-typological comparison. While Warren (1971) saw a similarity between Midvale and Middle Archaic bifaces, Reubelmann (1973) perceived a connection between Midvale and late Phase Cascade leaf-shaped and notched bifaces. If Warren is correct, the complex dates to approximately 4,500 BP. However, if Reubelmann is correct, the complex is an Early Archaic manifestation, dating to approximately 7,000 to 5,000 BP (Kaberline 2003). Regardless, the complex appears to have originated near the confluence of the Weiser and Snake rivers.

While it was never specifically termed Midvale, the sites near Montour are only a few of the many documented sites within the study area that date to the Middle Archaic. The earliest occupation at Lydle Gulch dates to approximately 4,500 BP (Sappington 1981c) along with sites along the South Fork Payette, Squaw Creek and Cottonwood Creek that extend the date to 5,000 BP (Ames 1982; Plew and Fuhrman 1985; Gaston and Peterson 1988; Lewarch and Benson 1989; Plew 2000). However, the Midvale label may not be appropriate along the Boise river drainage and along the upper Snake River.

Curiously, the same investigators noticed an absence of materials older than 5,000 BP at the same Payette drainage sites (Ames 1982; Plew et al 1984; Gallison and Reid 1993). Additionally, Cressman (1986) observed a time gap between 7,000 and 5,000 BP. These observations led Ames to postulate three possible explanations including sampling error, geologic agents have destroyed such sites, or the area was relatively uninhabited before 5,000 BP, although he contends that the last explanation is less likely (1982). Plew et al. (1984) believed that sampling error was responsible. However, the work of Steve Lucas (1999) on the Cascade/Tucannon transition along the Lower Snake supports a geologic explanation that could have some utility in the Payette drainage. It is his contention that 5,500 BP was a period of significant erosion due to an increase in effective precipitation that came at the end of the altithermal. This would result in higher river levels, increased erosion, and a general degradation of water quality for riverine resources (Lucas 1999).

Midvale populations or Middle Archaic groups represent the first evidence of year-round occupation with the appearance of large pit house structures between 3,500 to 1,500 BP (Roll and Hackenberger 1998; Meatte 1990). House pits at Givens Hot Springs (10OE1689) along the middle Snake were occupied approximately 4,000 years ago (Green 1982). A pithouse located at 10GM61 near Montour may represent the earliest documented pithouse in the study area. Located by Artz (1983), the profile of the pithouse was discovered in the wall of a silage trench. An obsidian flake excavated from the feature returned a hydration date of 3,118 BP, while an unprovenienced flake near the feature returned an approximate date of 5,300 BP. Although the earlier date may not be in association with the pithouse, the assemblage of formal tools (located adjacent to the feature) also dates to that approximate time. In particular, one "Midvale-like" bifaces returned a hydration date of 5,400 BP (Artz 1983:114).

The subsistence of Middle Archaic groups appears relatively homogenous throughout the southern Plateau and the northern Great basin, particularly in areas where anadromous fish resources and root crops were available.

Ringe and Holmer also term this time period the Middle Archaic and define it largely based on the proliferation of projectile point styles (1987). In particular, the period is recognized by a florescence of Humboldt and the introduction of Elko-like points, the latter of which is seminal to Great Basin type-style chronologies. This agrees with the observed trend of an increased contact with Great Basin groups in the Middle Archaic.

In sum, the Middle Archaic was a complicated period that reflects a shift in regional cultural influence. Unlike Cascade populations to the west, the Cascade of the Weiser, Boise, and Payette drainages were not replaced by the Tucannon. Instead, evidence suggests that the Cascade culture continued and experienced a gradual, locally responsive evolution that included the development of a basalt specific lithic industry and the adoption of elaborate mortuary practices.

Through these changes the culture became less recognizable as distinctly Cascade, and instead is termed Midvale. The Midvale culture conforms to greater regional trends in subsistence and settlement particular to the southern Plateau and the northern Great Basin. However, the influence appears to be a mix that is skewed toward the subsistence and settlement of Plateau groups while using the point types common to the Great Basin. Commonalities between the Midvale and the southern Plateau groups indicate at least some communication, but similarities of environment are also likely responsible, in particular the availability of anadromous fish resources. Although the WIABC was a development of the late phase Cascade of the Early Archaic, it is possible that the continuation of the complex indicates a shared heritage and constitutes a cultural bridge between populations on both sides of Hells Canyon.

Late Archaic Period (3500 to 500 BP)

The Late Archaic is fundamentally a continuation and intensification of the trends observed during the Middle Archaic. These trends include increased sedentism, fish and root crop resource reliance, large winter villages, year round village sites, and shift from Columbia Plateau to Great Basin influence, in terms of projectile point types. The period is also marked by the introduction of new technologies such as the bow and arrow and ceramics, both of which seem to have proliferated north from the Great Basin. Additionally, given the investigations in the Weiser, Payette and Boise River drainages, it is the period that is best represented by dated materials in study area.

The same time is also termed the Middle Prehistoric to Late Prehistoric (Roll and Hackenberger 1998), and incorporates part of the Tucannon phase and all of the Harder and Piqunin phases (Leonhardy and Rice 1970). The period is also analogous to Ames's Period III (date) and Meatte's Semi-Sedentary Foraging Period (1990).

This treatment of the Late Archaic is similar to that of Ringe and Holmer (1987) who define the end point of the period at 1,300 BP. Like the Middle Archaic, they define the Late Archaic based on the presence or absence of projectile point types. Principally, Bitterroot and Northern side-notched points disappear and Elko points become common, at least in the early portion of the Late Archaic (Ringe and Holmer 1987). Arnold (1984) also observed the arrival of pinto-like Great Basin points in Long Valley, which appear concurrently with small corner and side-notched points similar to those of the Harder phase (Leonhardy and Rice 1970).

The earliest arrow points found in the Owyhee uplands date to approximately 1,650 BP, however the more commonly accepted early date is about 1,500 BP, and Holmer states that it was the dominant weapon system by 1,350 (1986). Likely related to the widespread use of the bow and arrow, Elko, Eastgate, Desert Side-notched, and Rosesprings projectiles are common throughout the area, along with a wide variety of other tools (Meatte 1990; Plew 2000). Some suggest that the Eastgate and Rosesprings points evolved from Elko series points responding to the need of lighter projectile points for arrows (Kaberline 2004).

Bliss points also appear toward the end of the Archaic and are generally associated with riverine habitation sites principally along the Snake and Owyhee. However, Bliss points are also well represented in the Payette drainage. The excavations at the Big Falls Portage site (South Fork Payette) produced six Bliss points while work at the Rocky Canyon Site (Middle Fork Payette) located fourteen (Gallison and Reid 1993; Kaberline 2003). One of the Bliss points at the Big Falls Portage site tested positive for trout residue (Gallison and Reid 1993). The timing and range of Bliss points further supports the growing Great Basin influence on the cultural landscape of the Payette drainage (Reed 1990).

Although pit houses are increasingly common in the Plateau by the late Archaic (Ames et al. 1998), few have been located within Payette basin. Aside form the pithouses located along the Snake River to the south an d the pit house (possibly two) located near Montour, both of which date to the Middle Archaic, there is a lack of documented pithouses in the area (Green 1982; Artz 1983). However, there is good evidence of a marked increased in sedentism as expressed by large winter and year-round camps at major confluences such as those on the Payette, Weiser, and Boise rivers (Plew 2000). Arnold also notes that the Late Archaic represents the most intensive period of settlement in upper Long Valley (1984).

The use of anadromous fish resources increased significantly during the Late Archaic as evidenced by salmon remains in storage pits, and artifact assemblages biased toward fishing gear such as net sinkers, shuttles, and composite harpoon elements (Leonhardy and Rice 1970; Meatte 1990; Ames et al. 1998; Plew 2000). In addition to being the first systematic excavation in Idaho, Shellbach Cave on the Snake River, represents an impressive Late Archaic fishing gear cache (Plew 2000). Sappington's work at the Lydle Gulch site along the Boise River also located sophisticated fishing tools (1981c). Although these last two examples are slightly south of the Payette drainage, both are little more than a day's walk from Timber Butte and likely part of the same general technological trends. Unfortunately, there is little evidence of fishing activities on the upper reaches of the forks of the Payette. This is perhaps due to natural anadromous migration barriers such as Big Falls Portage on the South Fork Payette River, between Banks and Lowman, Idaho (Reed 1990; Gallison and Reid 1992, 1993; Reid and Gallison 1994).

Camas was also increasingly important to populations of the southeastern Plateau and northern Great basin (Meatte 1990; Ames et al. 1998; Plew 2000). Camas was also likely important to populations living near or visiting the Timber Butte area. Although Camas is no longer evident near the buttes having been eradicated by agriculture and grazing, a slide take by Dr. Lee Sappington shows an abundant growth of camas on the southeastern flanks of the buttes. This would make the obsidian source that much more attractive during spring months.

Although known by few examples, of particular interest is the continuation of burial practices with associated grave goods that appear to be an expression of the WIABC and the Midvale Complex. The burials located at Dry Creek Rockshelter include one female and one male and date to approximately 1,700 BP and 1,400 BP respectively. Although the female was not found with any associated artifacts, the male was interred with two stone knives, one possible net sinker, one bone bead, and one stone drill (Webster 1978). However, such burial practices could be a reflection of the general continent-wide trend of elaborate funerary rituals, perhaps incidental to increased sedentism.

Although ceramics have been dated to approximately 6,000 BP in the Owyhee uplands, they are typically dated to the last 1,000 years, and are generally dated to less than 700 BP (Ringe and Holmer 1987; Plew 2000). There are few known ceramics located within the Boise, Payette, or Boise River drainages with most area examples found closer to the Boise and Snake River. The type of ceramics generally found has been termed Shoshone ware (Plew 2000), and while a complete vessel has never been located, the form is characterized by a flat-bottomed, thick walled, flower pot-shape (Huntley and Plew 1981).

Ceramics of a different type also suggest a Fremont presence or influence in the northern Great Basin that may have spread as far as the Payette drainage (Butler 1980; Plew 2000; Meatte 1990). Termed Southern Idaho Plain by Plew in 1979 (2000), the type represents a slightly more refined version of Shoshone ware. The distinction of the two types and the possibility of Fremont influence was championed by both Plew and Butler (Meatte 1990) However, Plew's conclusions were based on work in southwestern Idaho and Butler's conclusions were based on work in southeastern Idaho (Meatte 1990). While the authors agreed on several points, the exchange of articles was mired in disagreements which clouded the issue. While it is clear that there was, at minimum, a late Archaic Fremont influence along the Snake River, the extent (geographically and culturally) remains a point of debate.

At the end of the late Archaic, inhabitants of the Payette River drainage were peripherally if not intimately connected to other regional populations across the northern Great Basin and the Southern Columbia Plateau. Roll and Hackenberger succinctly characterized Late Archaic inhabitants of the southern Plateau as being "locally adapted mountain populations", which tends to complicate the task of chronology recognition (1998).

The Contact Period – 500 to 100 BP

The contact period defines the beginning of extra-continent influence on the indigenous population of North America. Although the agents of this influence were most commonly European, peoples of other parts of the world were also present. This period generally begins with the arrival of Columbus on San Salvador Island (Bahamas) in 1492, although there is good evidence that he and his crew were not the first Europeans to have visited the new world. While based on a somewhat ethnocentric concept, this is also generally recognized as the division between historic and prehistoric. Others label this time as Period III (Ames et al. 1998), Late Prehistoric (Roll and Hackenberger 1998; Butler 1986; Ringe and Holmer 1987) and Equestrian Foragers (Meatte 1990). The contact period of this treatment is also analogous to the late Piqunin and entire Numipu phase of the eastern Plateau as defined by Leonhardy and Rice (1970). Regardless of the label, the time span commonly precedes or is inclusive to the further temporal division of Protohistoric, although it can fit in the broader notion of contact.

As a descriptor, Protohistoric describes the time between indirect (trade goods, infectious disease) and direct contact with non-native groups or individuals. The Protohistoric likely occurred throughout most of North America ranging from minutes to decades. The brevity of the span makes it exceedingly difficult to identify even in a professionally excavated context. Although it is an interesting manifestation, in the study area its elusive nature yields limited utility. In this region, the Protohistoric probably began with the introduction of the horse and sparse trade items some time after 1640 and ended with arrival of captains Lewis and Clark in 1805 (Ringe and Holmer 1987).

By the 1700s, the Northern Shoshone, Northern Paiute (Bannock), and Nez Perce had acquired horses through trade with Pueblo groups living around the Spanish settlements in New Mexico. The disbursement of horses was greatly accelerated by the Pueblo Revolt of 1680 (Shimkin 1986). At the time of contact, Native Americans of the area were fully horse-integrated, with a culture that only resembled precontact conditions.

The area around Timber Butte was inhabited or at least visited by Northern Shoshone and Northern Paiutes. Additionally, it would appear that Timber Butte was the southern extent of the Nez Perce territorial range and near the northeastern extent of Northern Paiute range, however, the Northern Paiute eventually moved westward with the adoption of the horse (Liljeblad 1957). The Northern Shoshone included Weiser and Boise area subgroups and seem to have enjoyed an area that extended further north into Long Valley (Murphy and Murphy 1986). The extent of these ranges is supported by ethnographic accounts of groups of Nez Perce camping in the vicinity of Warm Lake, and along Johnson Creek and the South Fork Salmon River (Steward 1938; Schwede 1966). Timber Butte being the southern extent of the Nez Perce is also supported by the distance and direction that Timber Butte material is documented to have traveled. This is seen in its proliferation to the north and southeast (Nez Perce and Northern Shoshone, respectively) and a lack of movement toward the west and southwest (Northern Paiute) (Sappington 1981c, Holmer 1997, Plager 2001). Of course, the movement of obsidian is dependant on a number of factors, including the local availability of viable tool stone, which is plentiful in central and eastern Oregon.

By 1800, the prevalent subsistence pattern was a high speed, horse-enabled version of what developed throughout the Archaic, allowing for the long-distance hunting trips that crossed the continental divide for bison. Still part of the seasonal round was the importance of harvesting camas and other plant resources. Also crucial to the economy was the interception of anadromous runs of salmon and steelhead at locations like Big Falls Portage (Reed 1990; Gallison and Reid 1994) and Dagger Falls (Torgler 1993). Catching fish involved spear, hook, and net technologies (Steward 1938).

In a naming convention that utilizes the names of important resources, the Shoshone of the Sawtooth area were known as *Tukudeka* or mountain sheep eaters, while other

Shoshone populations to the south and west were known as *Agaiduka* or salmon eaters, and *Kuenbeduka* or ground squirrel eaters (Steward 1938; Walker 1998).

In a 1980 article, Merle Wells documented a 1963 trip to Timber Butte to relocate Eagle Eye's grave with a number of his descendants. Although the trip may be responsible for the initial discovery of the Timber Butte obsidian source, it failed to recognize the significance of the discovery and it did little to document the source. However, he did produce a nice ethnohistory of the last non-reservation Native Americans to occupy the Timber Butte area (Wells 1980). The band was a small group that included Shoshone, Nez Perce, and at least one Anglo mountaineer that lived with the band. The band is known as Eagle Eye's band after the patriarch of the group. Eagle Eye had actually been in the area since the late 1860s and had managed to avoid entanglements, including the Sheepeater Campaign of 1879.

In 1888, it was reported in an article in the *Idaho Tri-Weekly Statesman* (now the *Idaho Statesman*) that the band consisted of 17 women and children, and three men. Several of the band were intermittently employed by the small sawmill in the area. An article of 1898 also reports the band population as twenty and states that the group has been there for twelve to fourteen years. Shortly after Eagle Eye's death (circa. 1898), the rest of the band relocated to the Fort Hall reservation (Wells 1980).

CHAPTER 5 – SURVEY AND DEBITAGE COLLECTION METHODS AND SOURCE AREA DESCRIPTIONS

Survey Methods

Most of the Timber Butte area was directly and indirectly surveyed during a 10-day period in November of 1998 (Figure 5.1 showing direct survey transects and source areas). Direct survey involved intuitively spaced pedestrian transects in wooded and open areas. The direct survey also examined the several ephemeral drainages that have their origin on the buttes. Indirect survey involved using binoculars to scan the adjacent slopes and ridges for surface exposures with even the smallest exposures readily visible at a significant distance. Source areas less than 0.5 meters wide and more than 1 km distant were easily located. Although all located surface expressions of Timber Butte obsidian were directly surveyed, most were initially located by indirect survey.

The survey began by examining the specific areas where naturally occurring obsidian was known to exist. This knowledge came from two sources: an account of a visit to Timber Butte by Merle Wells (1980), in which he detailed the existence of an "outcrop" near the top of the west butte (source area D), and the landowner who indicated the position of another area where an exposure of obsidian was roughly bisected by an access road (source area H). After recording these two locations, the survey systematically examined the various ridges that emanate from the buttes.

The surface exposures of the obsidian are found primarily on slopes and are the result of the erosion of a flow layer and the surrounding bedrock. The resulting formation is a talus that has no obvious flow face of origin. Some of the source areas are single accumulations of talus, suggesting a limited flow layer or one that has been completely eroded from the surrounding bedrock. Other source areas are composed of multiple streams of obsidian that emanate from either numerous adjacent flow layers or various exposures of the same flow layer. Slopes on which primary deposits of the obsidian can be found range from 0 (source area D) to almost 45 degrees (source areas A, G, and F).

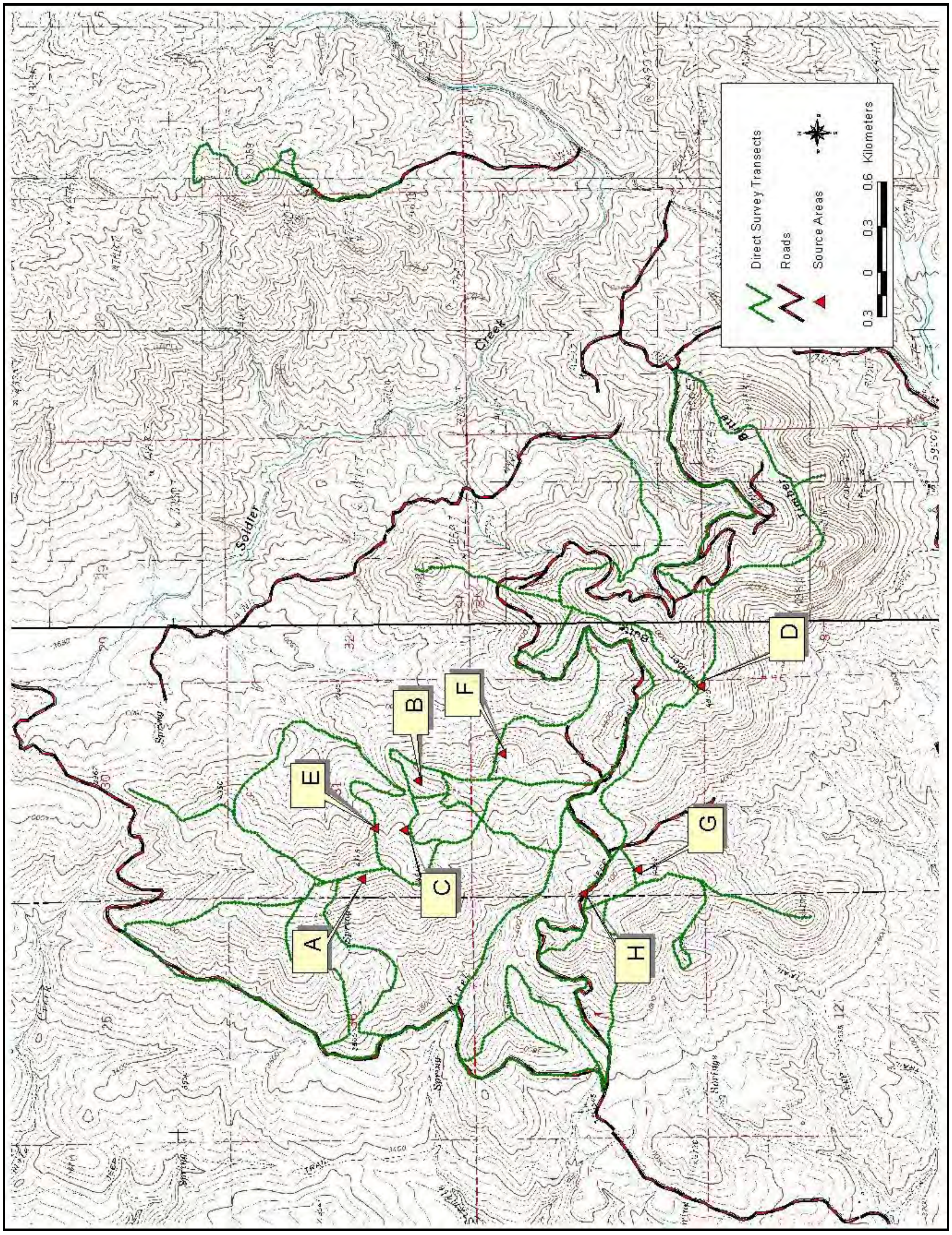

Figure 5.1: Timber Butte area showing direct survey transects, roads, and source area locations

After locating a total of eight surface exposures in the first four days of the survey effort, the remaining time was spent surveying portions of the wooded and heavily vegetated area of and around the buttes. This also included the survey of a rhyolitic point to the east where additional small obsidian fragments were located. None of the material found on the point was of a size or quality suitable for stone tool production.

Obsidian of the various source areas, in its unaltered form, is commonly in fragments no more than 15 cm through the long axis. However, it is not unusual to find pieces that are more than 20 cm long and 10 cm thick. Many fragments exhibit a patina from surface exposure, cortex related to the formation of the glass, and a cortex reflective of advanced chemical weathering. Both the formational cortex and the hydration patina are only a minor impediment to reduction. However the advanced chemical weathering cortex yields a relief of up to 12 mm and limits possible platforms for effective removal of the layer (Chapter 2 and Appendix A).

It is possible that larger pieces of obsidian might be found closer to a given flow face, and that subsurface exploration could reveal such material, although this possibility was not explored. No evidence of subsurface quarrying was observed at any of the source locations. All source areas, regardless of the hospitality of adjacent ground, were surrounded by debitage. Curiously, more accommodating flat ground, such as adjacent saddles, were often nearly devoid of debitage.

Global Positioning System and Geographic Information System Data

The locations of all source material areas, surface sample units, collected artifacts, and survey transects were recorded by a Garmin III Global Positioning System (GPS) unit. Figures were composed using ESRI ArcView Version 3.3, with all collected geographic information system (GIS) data projected according to the North American 1927 (NAD 27) datum. Additionally, calculations of polygon areas and line segment lengths were accomplished through ArcView 3.3.

All of the figures detailing the location of obsidian source areas, surface sample units, and collected artifacts are coded using the same colors and symbols. Source areas are symbolized by either orange-filled polygons or orange-outlined polygons with no fill and are designated A-H. Surface debitage sample units are blue-filled dots and collected artifacts are red-filled dots with both designated numerically. Each source area or cluster of source areas is represented by two figures. One uses the background of a USGS digital raster graphic (DRG) quadrangle map while the other uses a digital orthographic quad. Both the DRGs and digital orthographic quadrangles were acquired from the Idaho State Department of Lands GIS data server. Although all of the point and polygon data are represented on both figures, it is labeled only on the DRG figures.

Description of Source Areas

In total, eight surface expressions (source areas) of Timber Butte obsidian were located. Some of the source areas occupy a large footprint while others are small, isolated surface expressions. The source areas were labeled arbitrarily. Table 5.1 lists the eight source areas along with corresponding area values in square meters and acres. The acreages and corresponding polygons encompass the primary deposits and the adjacent sparse scatter of viable raw material.

Table 5.1: Source Areas and Corresponding Footprint

Source Area Designation	Area – Square Meters	Area - Acres
A	96,489	23.8
B	19,105	4.7
C	7,548	1.8
D	14,645	3.6
E	263	0.07
F	757	0.19
G	224	0.06
H	2,351	0.5
Totals	**141,386**	**34.9**

Areas A, B, C, and E

This cluster of surface expressions is at approximately the same elevation (1,340 meters/4,400 feet above mean sea level) and represents the largest area of quality obsidian (Figure 5.2 and 5.3). Eight of the fifteen collected surface artifacts were located in the immediate area. Area A is by far the largest of all surface expressions with a total area of 96,489 m^2. Areas B and C appear to be what remains of a single deposit after being bisected by the erosion of an intermittent, unnamed stream. Although Area E is proximal to Area E and is likely part of the same initial deposit, it received a separate designation due to its isolation from the other expressions. Although most of the available raw material is found on slopes, Areas A and B continue onto the flat ridge tops.

Area D

Located on the more western of the two buttes, it is the surface expression that likely led to the name of the source (Figures 5.4 and 5.5). Although it occupies a relatively large area, the material is scattered and in smaller fragments than Areas A and B. However, large amounts of debitage are present and 5 of the fifteen collected artifacts came from the vicinity. It is possible that the larger clasts have been exhausted, or larger fragments are available subsurface. The expression is on functionally level ground and offers good views to the south and west. This is the area that was first documented by Merle Wells and is believed to be the location of Eagle Eye's grave.

Area F, G, and H

While Area H offers material in quantity and quality, Areas F and G are small, single streams of talus on exceptionally steep slopes (Figures 5.6 and 5.7). Area H is bisected by a road that accesses the buttes from the land owner's residence. Although there is debitage present adjacent to these areas, they do not appear to have been utilized to the same extent as Areas A, B, C, and D. Only two of the artifacts collected were located near this source area.

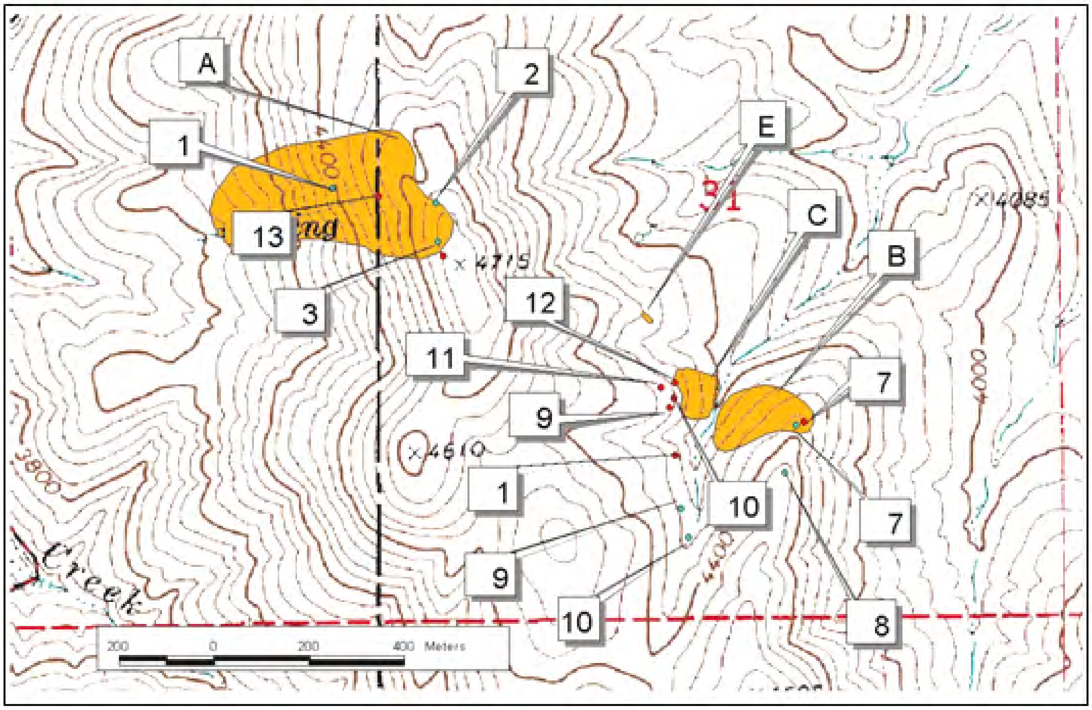

Figure 5.2: Source Areas A, B, C, and E with locations of surface artifacts and debitage sample units as displayed on a USGS Quad background

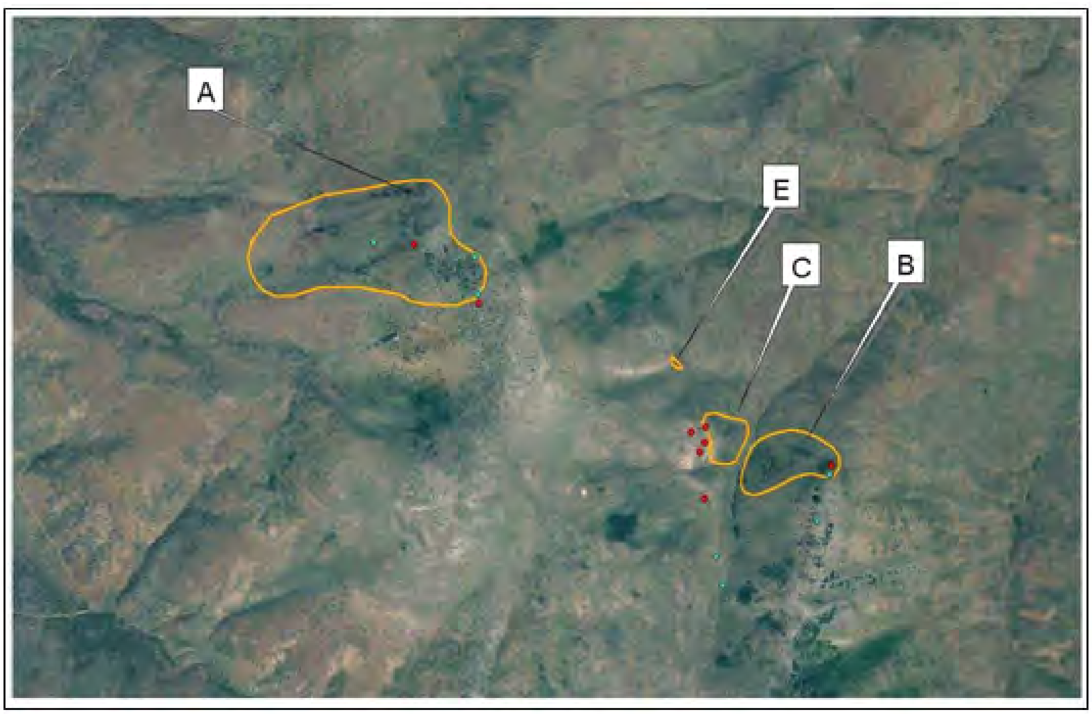

Figure 5.3: Source Areas A, B, C, and E as displayed on a DRG background

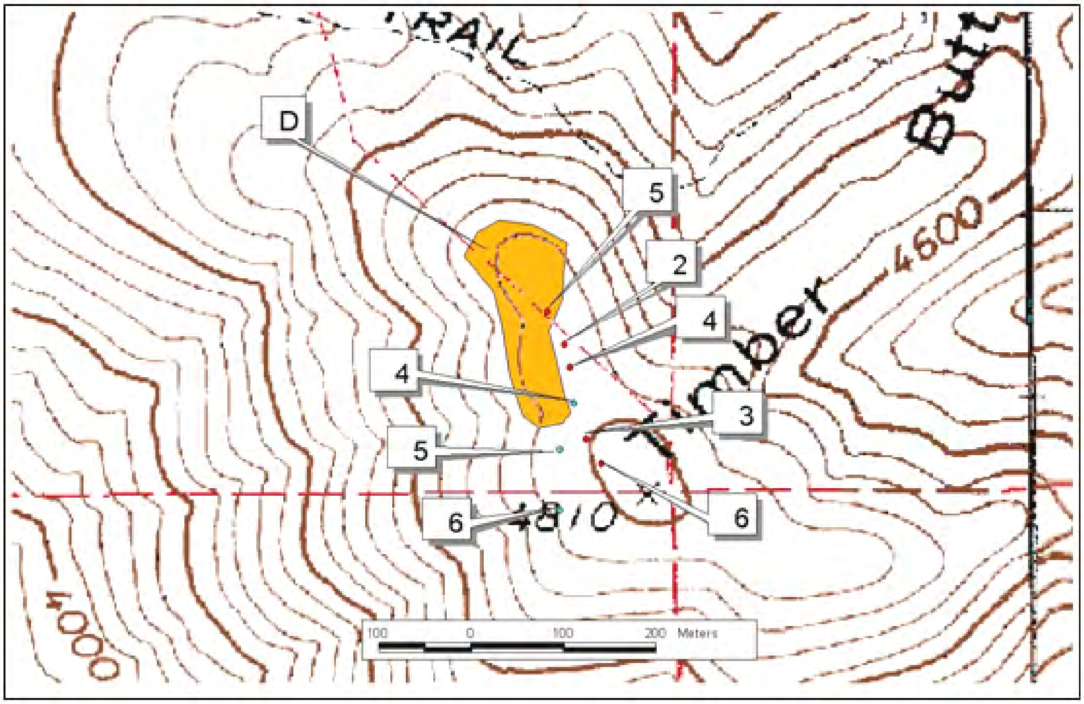

Figure 5.4: Source area D with locations of surface artifacts and debitage sample units as displayed on a USGS Quad background

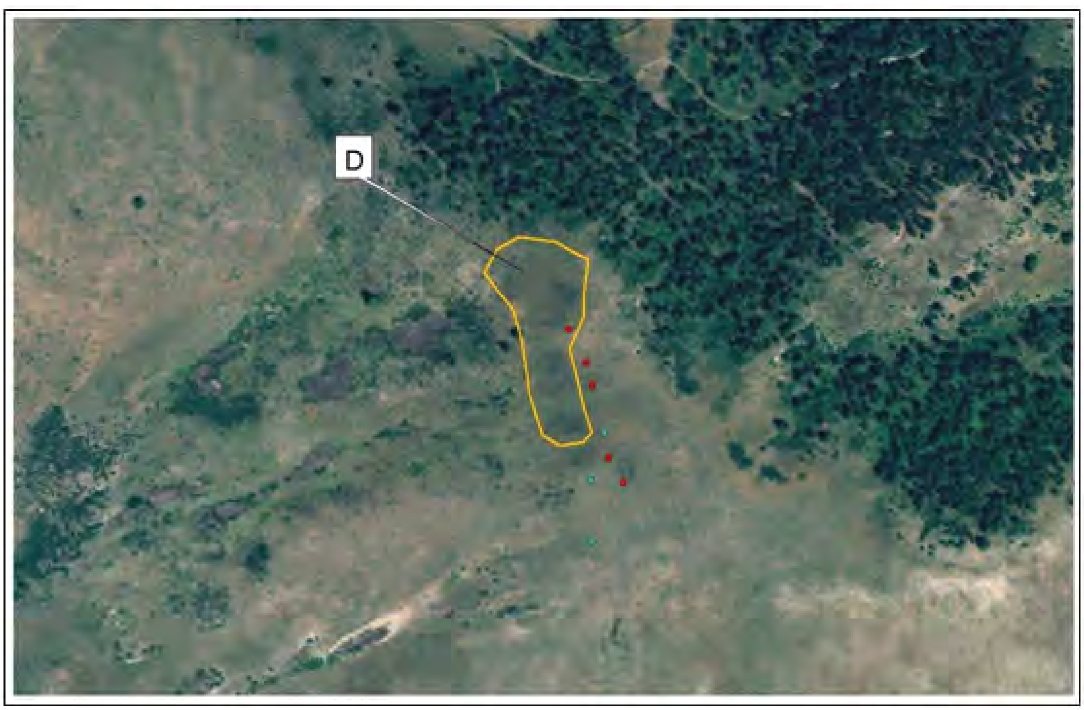

Figure 5.5: Source Area D as displayed on a DRG background

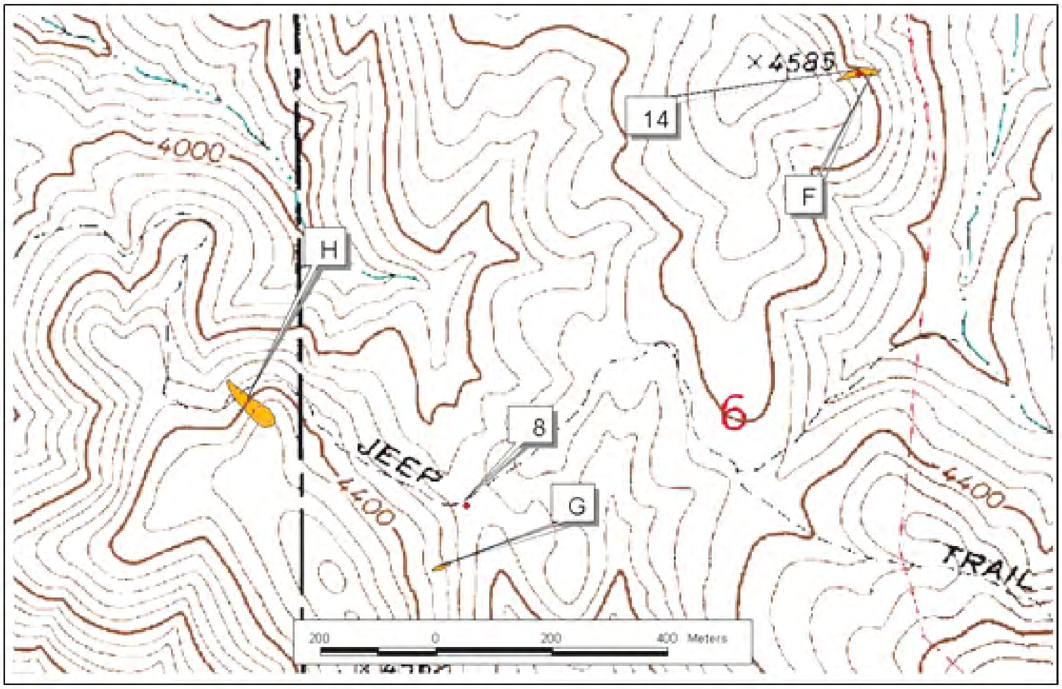

Figure 5.6: Source areas F, G, and H with locations of surface artifacts and debitage sample units as displayed on a USGS Quad background

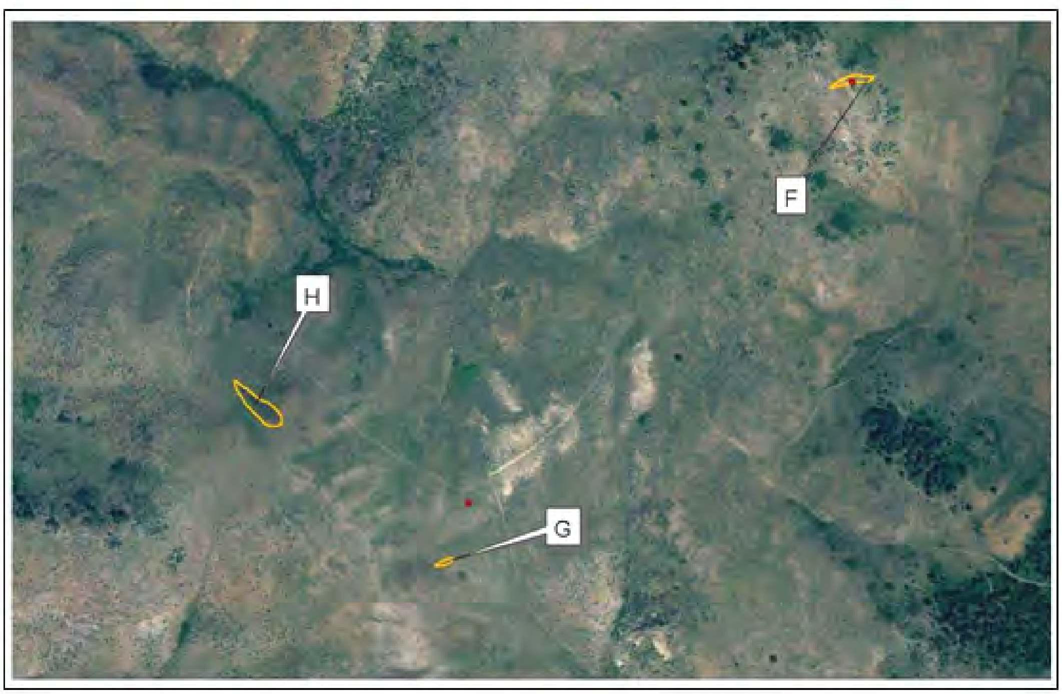

Figure 5.7: Source areas F, G, and H as displayed on a DRG background

Collection Methods

Raw Material Samples for Sourcing

As one of the primary goals of this project was to chemically characterize the source from primary deposits, samples of each surface expression were collected. The samples were then prepared and sent to the Northwest Obsidian Laboratory for sourcing. The results of the sourcing work are addressed in Chapter 7.

Surface Debitage Collection Units

Surface debitage and core samples were collected at ten locations near the surface expressions. As the debitage and core samples were collected with the hope that analysis would yield some suggestion as to what types of tools were being produced at the source areas, the selection criterion was for areas having a high surface concentration of debitage. Research questions regarding identification of specific reduction areas would have employed a different selection process and would require a far larger sample than was possible for this effort.

Once an area was selected, steel spikes and orange construction line was used to demarcate a 50 cm X 50 cm square (Figure 5.10). After the sample area was defined, all observable debitage was collected off the surface, bagged and labeled, leaving fragments that were partially subsurface. To account for the small fragments that may have been missed by the surface collection and to get an idea as to the extent of cultural fill in the first 10 cm of deposits, a coring tool was used to remove an 8 cm diameter by 10 cm plug from within the collection unit. While still in the tool, the sample was faced with a trowel before being removed and bagged separately. The volume of each core sample was 439.8 cm^3 and represents 1.7% of a 50 x 50 x 10 cm test unit. In a few instances, the first area chosen for the core sample represented an impediment to reaching the 10 cm depth and was repositioned within the surface sample unit.

Because the surface debitage was removed before the core sample was taken, the surface count effectively robbed the flakes that may have been on top of the core sample, thereby

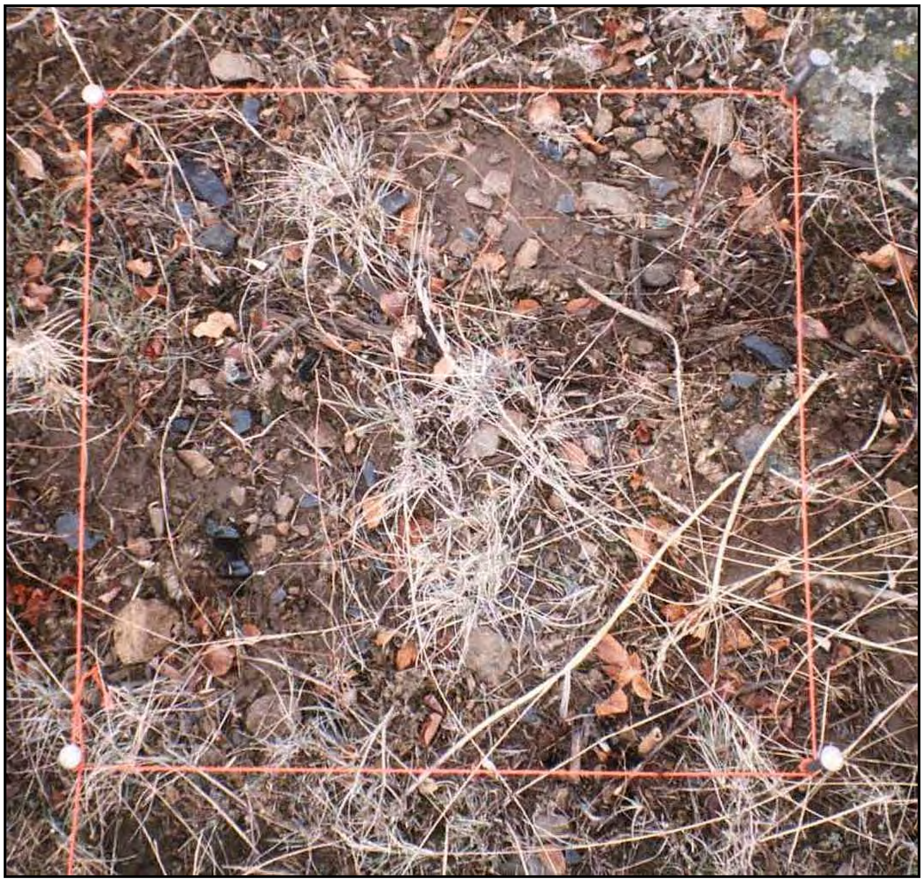

Figure 5.10: Example of 50 x 50 cm Surface and Core Debitage Sample Unit

reducing the core count. Like the percentage of the core sample volume, the area of the core sample also represents 1.7% of the surface collection unit. Given the flake totals generated by the surface units, at most only three flakes would need to be added to the core counts. Because the images of the surface sample units appear functionally similar, only one is pictured in this chapter (Figure 5.10). Appendix B contains images of all the surface sample units.

Artifact Collection

During the course of survey and sample collection, fifteen artifacts were collected off the surface. Most were located immediately adjacent to source areas A, B, C, and D. Each was located using a GPS and bagged separately. An analysis of the artifacts will aid in the analysis of the debitage samples. Appendix D contains images of all the collected artifacts.

CHAPTER 6 – ARTIFACT AND DEBITAGE ANALYSIS

Artifact Analysis

During the course of the survey of the buttes, fifteen artifacts were collected. With the exception of one semi-conical flake core, all are large quarry bifaces that were broken during various stages of production. They were examined to aid in defining the debitage categories that were used in the analysis of the surface and core debitage samples. Table 6.1 lists the artifacts by number and various measurements. As none of the quarry bifaces are complete, measurements were taken according to the perceived axes of the individual artifacts. As such, values of length, width and thickness are of little value beyond

Table 6.1: Artifact Metrics and Stage by Artifact Number

Artifact Number	Weight (g)	Length (mm)	Width (mm)	Thickness (mm)	Length of longest flake scar (mm)	Stage
1	14.7	40.1	38.2	10.0	19.6	Late
2	22.4	50.9	44.4	11.3	29.0	Late
3	115.1	113.4	48.0	24.8	32.9	Early
4	36.2	73.3	41.6	12.7	36.6	Early
5	25.0	45.3	46.6	14.6	22.3	Early
6	41.9	53.3	53.2	18.7	38.3	Early
7	19.9	41.0	39.4	13.5	42.3	Early
8	51.7	59.0	52.7	22.4	39.3	Early
9	4.5	30.7	28.1	6.5	16.3	Late
10	16.8	45.86	43.2	9.5	11.5	Early
11	57.6	55.7	65.9	21.2	48.0	Early
12	41.4	53.7	46.5	17.4	32.4	Early
13	148.3	90.9	53.8	35.9	56.2	Not Applicable
14	98.3	71.9	60.2	24.6	42.9	Early
15	12.7	40.4	32.4	13.9	28.8	Early

simple comparison, although in a few instances enough of the biface is present to make some evaluation of width to thickness ratios. For the purpose of the debitage analysis, the most valuable measurement is the length of the longest flake scar. Depending on the stage of the bifaces, the length of the flake scars corresponds to the debitage produced during the same stage. Appendix D contains images of all fifteen collected artifacts.

Artifact Descriptions

Artifact 1 is the distal or proximal portion of a typical late stage quarry biface and was found between source areas B and C (Figure 5.4). It was broken during manufacture through an end shock fracture. The terminal fracture, as well as several flake scars, reveals small ashy inclusions and no cortex remains.

Artifact 2 is the distal or proximal end of a late stage quarry biface and was located south and east of source area D (Figure 5.6). Like Artifact 1, it was broken during manufacture by an end shock fracture, although it is slightly less refined. There is no remaining cortex, but there is a large ashy inclusion on one face.

Artifact 3 is a whole, early stage quarry biface that was found near the southern end of source area D (Figure 5.6). There is one small patch of cortex remaining and several thick areas with significant battering on the adjacent platforms. This suggests that the knapper had some difficulty thinning the piece, although it is not certain why it was discarded and not taken to completion.

Artifact 4 is the end portion of an early stage quarry biface that was also found near source area D (Figure 5.6). One face shows opportunistic flaking and a small patch of cortex while the other side is slightly further along with even thinning flakes along one margin. This piece was also broken during manufacture with no hint to any internal flaws that might have aided in the break.

Artifact 5 is an end fragment of an early stage quarry biface that was broken during manufacture and found near source area D (Figure 5.6). No cortex remains and one face is further along than the other, although both are still early stage.

Artifact 6 is the last of the quarry biface fragments found near source area D (Figure 5.6). It is the proximal or distal end of what would have been a sizable biface. It is in an early stage of production and has small amounts of cortex on one face and the adjacent margin. It was broken through a misplaced blow instead of by end shock.

Artifact 7 is yet another early stage quarry biface that was broken by a perverse fracture. It was found near surface sample 7 near the east edge of source area B (Figure 5.4). While large flake scars remain, the platforms have been erased by subsequent work. There is a line of step fractures along one margin.

Artifact 8 is an early stage quarry biface that was found on the edge of a saddle north of source area G (Figure 5.8). It appears to have been broken during manufacture, although it is difficult to determine as additional flakes have been removed from the terminal fracture. There are several patches of cortex on both faces and margins.

Artifact 9 is the tip of a late stage biface that was found just west of source area C (Figure 5.4). One margin is comparatively steep and flake scars reveal small ashy inclusions. It was broken during manufacture by the presence of a large inclusion, no cortex remains, and there are several small step fractures on one face.

Artifact 10 is the midsection of an early stage biface and was also found just west of source area C (Figure 5.4). Unlike the other early stage bifaces, this piece was adapted from a large flat flake with evidence of both dorsal and ventral scars still present. It was broken during manufacture on both ends. Additionally there is a line of flake scars along one of the snapped edges that might be an attempt at a recovery geared toward a different implement.

Artifact 11 is a quarry biface that is difficult to orient due to how early it was broken during manufacture. It has a few small patches of cortex and was located west of source area C (Figure 5.4). Flake scars are opportunistic rather than patterned and there are numerous step fractures on one face.

Artifact 12 is functionally the same as artifact 11 with the exception that is has multiple step fractures on both faces and crushed margins due to stubborn platforms (Figure 5.4).

Artifact 13 is a semi-conical flake core and is unique among the collected artifacts. It was found in the talus of source area A (Figure 5.4). The top of the core is almost completely cortical and the flake scars originate from well-prepared platforms. The ridges where flake scars meet are dulled and abraded, although it is unclear if this was anthropogenic or a result of creep and trampling. It is by no means exhausted, with numerous flakes waiting to be detached.

Artifact 14 is an early stage biface that was located near source area F (Figure 5.4). There is a small amount of cortex on one face while on the other face flaking revealed a large internal flaw that led to the terminal fracture. Curiously, the flaw resembles the advanced chemical weathering cortex observed on some fragments (Figure 2.6) and may have been rotting from the inside out.

Artifact 15 is an early stage biface that was collect along with the surface debitage of surface sample unit 3 (Figure 5.4). It has cortex on one face and appears to have broken due to end shock. There is at least one outré passé flake scar on one face.

Artifact Summary

By far, the majority of the quarry biface and biface fragments collected at the various source areas are late stage. Most exhibit some cortex and a few have cortex on both faces. This suggests that the reduction sought to produce a single biface from a single fragment of raw material, although this is not to say that debitage produced could not have been used for the production of other tools. Most of the bifaces were broken during manufacture by either perverse breaks or breaks related to internal flaws in the material. The longest flake scar on the late stage biface fragments (n=3) averages 21 mm while the longest flake scar on the early stage bifaces (n=11) averages 29 mm.

Brief Debitage Analysis Overview

Debitage is the waste lithic material (flakes and shatter) that is created incidental to stone tool production. Typically, the production of one formed tool (quarry biface, projectile point or scraper) can produce hundreds of pieces of debitage. As a result, debitage is the most abundant artifact type found on prehistoric archaeological sites throughout the Southern Plateau and Northern Great Basin culture areas. In fact, debitage is often the only artifact type present. For the purpose of this treatment, the terms debitage and flake will be used synonymously.

In the early days of archaeology, debitage was not seen as particularly reflective of behavior in any meaningful way. As a result, debitage was often discarded without examination. The effect was to discount the largest, if not only, potential source of information about lithic technology.

In the late 1960s and early 1970s, individuals, such as Don Crabtree, Francois Bordes, and Gene Titimus (along with many others), began experiments to replicate artifacts from the archaeological record. They used aboriginal raw materials and tools, along with ethnographic accounts, in an attempt to recreate and understand process as well as product. Through these studies, and the examination of the debitage produced, it was observed that debitage could vary significantly depending on a number of factors. Some of these factors include reduction techniques, raw materials, and the desired end product (Whittaker 1994).

These observations validated debitage analysis as having the potential to reveal valuable insight to past cultures. This started a flurry of studies followed by related articles in the academic press that continues today. Although methods of debitage analysis have been significantly refined in the last twenty years, there will never be a single approach, and the appropriate approach will vary according to the research questions.

The examination of debitage and the stone tools produced has led to a description of the process in terms of stages (Callahan 1979), although others see a continuum and insist the stages are a product of the examination. At minimum, stages have become an "analytical convenience" (Shott 1994). These stages typically begin with coarse work, using a large percussor that produces relatively larger pieces of debitage. The final stages, depending on the desired end product, can involve a smaller percussor or pressure flaking to effect the final shaping and sharpening, producing much smaller flakes. Although there are some exceptions, large flakes are associated with early stage reduction while smaller flakes are associated with late stage reduction. In addition to differences in size, flakes produced at different stages can possess different attributes, such as presence or absence of cortex, single or multiple dorsal flake scars, simple or complex platforms, and the presence or absence of platforms. Flakes can also vary depending on the method of their detachment, although not all pressure flakes are removed by pressure and not all bifacial thinning flakes are produced with soft hammer percussion (Byram 1998; Bradbury and Carr 1999).

The analysis of debitage has taken three basic approaches: classification according to size grades, classification by flake attributes, and a combination of both size and flake attributes (mass analysis). Early on, a method that recognized three stages (primary, secondary, tertiary) on the merit of size and the presence or absence of cortex was commonly used. Although this method can yield some information, it is basically limited to defining activity areas of manufacturing or maintenance. Despite its limitations, the method is still commonly used, particularly in cultural resource management (CRM) Section 106 compliance reports.

Methods of analysis using size attributes can offer some reasonable conclusions, but they have also been criticized for several reasons: analysis based on size is particularly hindered given the size of the source material fragments, the possible overlap of size distribution between different reduction techniques, the mixing of many reduction events/techniques in site context, and small flakes tend to dominate all stages of various reduction techniques (Ahler 1989; Shott 1994; Byram 1998; Bradbury and Carr 1999; Root 2004).

Small nodules of raw material have a higher surface area to volume ratio, so one would expect a higher amount of cortical material (Sappington 1984). Additionally, a reduction technique that produces one bifacial core per mass of raw material would also be expected to produce proportionally more cortical material than a technique that has the potential to make multiple bifaces from a given mass of raw material. Also, reduction techniques that seek to preserve raw material could produce flakes in different proportions than techniques having the availability of functionally limitless raw material.

There have also been criticisms of analysis methods that concentrate on flake morphology attributes. Cotterell and Kamminga point out that not all human produced flakes have the typical conchoidal attributes and not all ecofacts are lacking in the same attributes, further complicating the task of separating the cultural from the non-cultural (1987).

Root (2004:69) states that "though cortex characteristics vary with the technology and place in the reduction sequence, it is not possible to reliably infer the place of an individual flake in a reduction sequence based solely on the relative amount of cortex on its exterior surface." These concerns appear particularly important to reduction strategies employed at Timber Butte given the relative small size of raw material and the presence of cortex commonly observed on discarded quarry bifaces.

Sullivan and Rosen (1985) developed one of the earlier and popular methods based on technological categories. Although the method was demonstrated as suggestive to particular reduction techniques, it was revealed as unreliable (Prentiss 1998). Additionally, the morphological attributes of flakes can be altered from their original form by activities such as trampling and plowing that could render their classification meaningless.

Yet another methodological approach, mass analysis, uses a system of detailed coding according to size and some attributes and is capable of a reliable analysis in terms of size, but can ignore some variation in flake attributes (Shott 1994)

Debitage Sample Processing

With a surface and core debitage sample for each of the ten sample units, a total of twenty debitage samples were collected. The surface samples were screened through 1/8th inch stainless hardware cloth in an attempt to eliminate some of the size bias that may have been introduced by the collection process. Surface samples were then cleaned with a dry brush, rebagged and labeled.

The core samples were basically plugs of soil that needed to be dissolved and separated from the debitage. The samples were soaked in a solution of water and sodium (hexa) metaphosphate [$(NaPO_3)_{13}$], the principal active ingredient of Calgon™ brand bath salts (Neumann and Sanford 1998). The sodium (hexa) metaphosphate bonds to the dirt and allows it to be readily rinsed away. It is an effective, non-marring and economical means of cleaning large samples. The samples were then rinsed using the same 1/8th inch stainless hardware cloth in order to define the same lower-end size range as the processed surface samples. After the core samples dried, they too were rebagged and labeled.

Debitage Analysis Methods

Research Questions

The goal of the debitage collection and analysis was to ascertain what types of tools were being produced at the various Timber Butte source areas. Given that the samples were limited to the first 10 cm of cultural fill, observations can be drawn only regarding the most recent use of the source. As quarry bifaces of various stages (fragments and complete) were the dominant artifact type observed during the survey, the research question became to confirm or deny that quarry bifaces were the primary product of recent reduction at the source. In order to answer the question, a debitage analysis was designed that would be responsive to debitage types typically associated with biface production. As this research question is similar to one used by Yohe in determining a shift in biface technology at the Rose Springs site (1998), the flake categories employed by this analysis are modeled after those used in his analysis. In an examination of the Bodie Hills obsidian source in California, Singer and Ericson conducted a similar analysis of debitage that was also partially based on the predominance of large, quarry bifaces (1977). They used replication experiments and a size-grade debitage analysis that was not documented in terms of morphological flake attributes (Singer and Ericson 1977). The Bodie Hills source areas are described as remarkably similar to the Timber Butte source areas and study yielded interesting results regarding the ratio of flakes per biface produced, as documented. Unfortunately, as documented, their method of debitage analysis is not applicable to the present research question.

Flake Categories

Individuals specializing in debitage analysis have defined a variety of debitage categories that were developed, not only through examining aboriginal debitage assemblages, but also through replication experiments. Some of the flake types are easily distinguished, while others are more difficult to recognize. This inventory used a minimal set of ten flake types. Although replication experiments were not a part of this analysis, Yohe used replication experiments to aid in the formulation of the flake categories upon which this analysis is based (1998). All flakes were classified to one of the ten attribute-based categories described below.

1. Completely Cortical - These flakes are the first removed in a reduction sequence not based on flakes produced from a large mass and are completely cortical on the dorsal side. Decortication flakes are typically found in higher frequencies close to the source of raw material that fall off with distance. Completely cortical decortication flakes are commonly larger than flakes represented by subsequent stages of reduction. However, flake size is ultimately constrained by the raw material.

2. Partially Cortical, Simple – These flakes are also produced during the initial decortication, but are not completely cortical on the dorsal side. The dorsal surface must have some cortex, can have one or two flake scars, and the platform has one or two facets. Like completely cortical flakes, the flakes of this category are associated with the initial stages of reduction and are generally larger than the flakes of subsequent stages.

3. Partially Cortical, Complex – This category is similar to partially cortical simple, although there must be more than three dorsal flake scars and the possibility (but not requirement) of more platform facets. Flakes of this category are associated with early reduction stages and biface production.

4. Partially Cortical, Platform Absent – Although the presence of cortex suggests that these flakes are produced in the early stage, because of the lack of a platform, less can be said about the reduction strategy.

5. Non-Cortical, Simple – These flakes are non-cortical, can have one or two flake scars, and have one or two platform facets. They are associated with later core reduction or early biface production. However, during the analysis this turned out to be a broad category in terms of size, making the connection to a particular stage more tenuous.

6. Non-Cortical, Complex – This category is similar to non-cortical simple, although there must be more than three dorsal flake scars and the possibility (but not requirement) of more platform facets. Flakes of this category are associated with later reduction for bifaces and multidirectional cores. Also like non-cortical, this category represented a wide size range.

7. Non-Cortical, Platform Absent- This category is a catchall for non-cortical flake fragments lacking a platform, regardless of the number of dorsal flake scars. Although they are associated with later core reduction, they can be produced during various reduction (other than biface) strategies. Flakes of this category differ from shatter in that they possess two roughly flat parallel or curvilinear faces.

8. Bifacial Thinning, Early Stage – These flakes are specialized toward the early process of bifacial core thinning. They are generally thin, flat and wide, have numerous platform facets and/or dorsal flake scars. The dorsal surface can also posses step fractures and high spots. These flakes can be suitable for the production of other stone tools.

9. Bifacial Thinning, Late Stage – These flakes are functionally similar to early stage bifacial thinning flakes but are generally thinner, flatter, and lack evidence of removed steps and other imperfections. As late stage bifacial thinning flakes are identical to the flakes removed from the bifacial core (used as expedient flake tools or further reduced into other tools), it is possible that such flakes are transported away from the reduction area for use elsewhere.

10. Shatter - This category encompasses raw material fragments that do not exhibit characteristics typical of intentionally produced flakes, but were indirectly created through reduction. Given the lack of flake attributes, it can be difficult to distinguish shatter from non-anthropogenic material with the determination somewhat dependent on context. Shatter is typically produced during all stages of reduction, but particularly during initial percussion.

Resulting Data

Initially, all surface and core samples were sorted according to the established debitage categories. The count and weight of each category was recorded on an individual computation sheet that has both surface and core sample data. From these values it was possible to generate percentages by count and weight for each category as well as the average weight per flake for each category. The ten tables produced were then distilled to four tables that represent flake totals and averages by category for surface samples, flake totals and averages by category for core samples, weights and averages by category for surface samples, and weights and averages by category for core samples (Tables 6.2, 6.3, 6.4, and 6.5). The individual sample computation sheets can be found in Appendix C.

In turn, tables 6.2 through 6.5 were distilled to two tables that compare and rank the flake count percentages by category between the surface and core samples of all collection units and the weight percentages by category between the surface and core samples for all collection units (Tables 6.6 and 6.7).

Table 6.2: Flake Totals for Surface Collection Units

Debitage Class	Surface Collection Units										Total	Averages by category	Percentage by average
	1	2	3	4	5	6	7	8	9	10			
Cortical	10	16	11			1	4	15	1	2	60	6	4.4 %
Partially Cortical, Simple Platform	15	22	7		2	2	7	18	4	6	83	8.3	6.1 %
Partially Cortical, Complex Platform	14	10	6		2	1	8	14	3	7	65	6.5	4.8 %
Partially Cortical Platform Absent	6	8	6	1	3	4	18	15	4	5	70	7	5.2 %
Non-Cortical Simple Platform	17	36	20	3	5	12	28	19	21	16	177	17.7	13.2 %
Non-Cortical Complex Platform	8	19	18	3	6	8	21	23	16	23	145	14.5	10.8 %
Non-Cortical Platform Absent	21	40	34	12	23	35	41	55	28	58	347	34.7	25.8 %
Early Stage Bifacial Thinning	2	5	6	1	2	3	6	7	2	4	38	3.8	2.8 %
Late Stage Bifacial Thinning	12	11	11	1		7	11	19	11	8	91	9.1	6.7 %
Shatter	22	41	27	6	10	7	45	62	22	28	270	27.0	20.1 %
Totals	127	208	146	27	53	80	189	247	112	157	1,346	134.6	100 %

Table 6.3: Flake Totals for Core Collection Units

Debitage Class	Core Collection Units										Total	Averages by category	Percentage by average
	1	2	3	4	5	6	7	8	9	10			
Cortical	2	7	1			2	2	4			18	1.8	1.2 %
Partially Cortical, Simple Platform	5	3	1		1	6	4	7			27	2.7	1.9 %
Partially Cortical, Complex Platform	1	3	1		3	4	4	6			22	2.2	1.5 %
Partially Cortical Platform Absent	3	2	1	1	2	4	4	7		5	29	2.9	2.0 %
Non-Cortical Simple Platform	50	57	21	2	31	29	50	40	12	8	300	30	21.5 %
Non-Cortical Complex Platform	12	17	15	2	11	12	17	17	3	3	109	10.9	7.8 %
Non-Cortical Platform Absent	67	35	48	2	37	45	57	43	26	7	367	36.7	26.4 %
Early Stage Bifacial Thinning	2	1	1			1	1	4	1		11	1.1	0.07 %
Late Stage Bifacial Thinning	1	2	2		2	6	5	15	2		35	3.5	2.5 %
Shatter	85	45	34	3	40	40	68	134	13	10	472	47.2	33.9 %
Totals	228	172	125	10	127	149	212	277	57	33	1,390	139	100 %

Table 6.4: Weights by Flake Category for Surface Collection Units

Debitage Class	Surface Collection Units										Total	Averages by category	Percentage by average
	1	2	3	4	5	6	7	8	9	10			
Cortical	286.2	135.4	15.1			18.5	27.7	89.2	11.3	3.1	586.5	58.6	25.3 %
Partially Cortical, Simple	52.7	98.5	6.4		13.6	0.8	10.2	61.5	0.6	2.9	247.2	24.7	10.5 %
Partially Cortical, Complex	177.0	82.3	22.4		3.0	2.2	19.3	36.6	7.5	55.3	405.6	40.5	17.4 %
Partially Cortical Platform Absent	19.5	24.0	1.3	0.7	0.6	5.8	23.6	27.6	8.0	13.2	124.3	12.4	5.2 %
Non-Cortical Simple	3.7	6.6	19.5	0.2	0.9	1.2	4.4	8.7	4.0	4.3	53.5	5.3	2.3 %
Non-Cortical Complex	62.9	9.0	12.0	1.6	2.8	4.1	17.2	14.4	25.9	17.9	167.8	16.7	7.2 %
Non-Cortical Platform Absent	40.6	24.9	17.4	4.0	10.7	11.2	28.7	39.6	15.9	46.9	239.9	23.9	10.4 %
Early Stage Bifacial Thinning	22.0	18.0	26.3	3.7	11.6	18.1	33.9	19.6	5.6	29.5	188.3	18.8	8.2 %
Late Stage Bifacial Thinning	27.2	21.7	27.2	1.7		11.8	15.8	15.9	12.0	15.4	148.7	14.8	6.4 %
Shatter	19.6	24.7	12.9	2.4	3.3	1.7	18.3	26.8	7.2	19.0	135.9	13.5	5.8 %
Totals	711.4	445.1	160.5	14.3	46.5	75.4	199.1	339.9	98.0	207.5	2297.7	229.7	100 %

Table 6.5: Weights by Flake Category for Core Collection Units

Debitage Class	Core Sample Units										Total	Averages by category	Percentage by average
	1	2	3	4	5	6	7	8	9	10			
Cortical	15.9	12.4	11.6			0.4	1.1	2.2			43.6	4.3	12.7 %
Partially Cortical, Simple Platform	0.3	2.0	0.3		0.2	7.2	1.1	7.2			18.3	1.8	5.3 %
Partially Cortical, Complex Platform	1.0	17.9	1.4		0.3	4.1	19.2	15.9			59.8	5.9	17.5 %
Partially Cortical Platform Absent	3.7	1.7	1.7	0.2	1.7	1.8	3.1	2.7		0.2	16.8	1.6	4.7 %
Non-Cortical Simple Platform	2.0	2.3	1.0	0.1	1.0	1.0	3.3	2.2	0.4	0.2	13.5	1.3	3.8 %
Non-Cortical Complex Platform	2.7	2.3	1.1	0.1	1.4	1.5	10.1	6.4	0.4	0.5	26.5	2.6	7.7 %
Non-Cortical Platform Absent	3.7	3.3	5.9	0.1	2.4	4.3	8.5	6.6	0.8	0.8	36.4	3.6	10.7 %
Early Stage Bifacial Thinning	19.1	1.7	4.6			3.9	4.9	5.1	2.2		41.5	4.1	12.2 %
Late Stage Bifacial Thinning	1.5	2.2	5.4		2.1	10.1	6.1	6.6	1.5		35.5	3.5	10.4 %
Shatter	7.2	7.2	3.6	0.3	5.5	2.5	5.9	10.6	2.0	0.3	45.1	4.5	13.3 %
Totals	57.1	53.0	36.3	0.8	14.6	36.8	63.3	65.5	7.3	2.0	336.7	33.6	100 %

Table 6.6: Core and Surface Flake Count Percentage and Rank Comparison

Debitage Class	Core Sample Average Flake Count Percentages	Core Average Count Rank	Surface Sample Average Flake Count Percentages	Surface Average Count Rank
Cortical	1.2 %	9	4.4 %	9
Partially Cortical, Simple Platform	1.9 %	7	6.2 %	6
Partially Cortical, Complex Platform	1.5 %	8	4.8 %	8
Partially Cortical Platform Absent	2.0 %	6	5.2 %	7
Non-Cortical Simple Platform	21.5 %	3	13.2 %	3
Non-Cortical Complex Platform	7.8 %	4	10.8 %	4
Non-Cortical Platform Absent	26.4 %	2	25.8 %	1
Early Stage Bifacial Thinning	0.07 %	10	2.8 %	10
Late Stage Bifacial Thinning	2.5 %	5	6.7 %	5
Shatter	33.9 %	1	20.1 %	2
Totals	100 %		100 %	

Table 6.7: Core and Surface Weight Percentage Rank and Comparison

Debitage Class	Core Sample Average Weight Percentages	Core Average Weight Rank	Surface Sample Average Weight Percentages	Surface Average Weight Rank
Cortical	12.7 %	3	25.3 %	1
Partially Cortical, Simple Platform	5.3 %	8	10.5 %	3
Partially Cortical, Complex Platform	17.5 %	1	17.4 %	2
Partially Cortical Platform Absent	4.7 %	9	5.2 %	9
Non-Cortical Simple Platform	3.8 %	10	2.3 %	10
Non-Cortical Complex Platform	7.7 %	7	7.2 %	6
Non-Cortical Platform Absent	10.7 %	5	10.4 %	4
Early Stage Bifacial Thinning	12.2 %	4	8.2 %	5
Late Stage Bifacial Thinning	10.4 %	6	6.4 %	7
Shatter	13.3 %	2	5.8 %	8
Totals	100 %		100 %	

Observations

In total, 2,736 individual flakes were examined and classified. The combined weight of all surface and core samples is 2,634 g. If 50x50x10 cm units had been excavated at each of the surface samples, it is projected that more than 79,000 flakes would have been recovered.

There is a strong similarity between the surface and core flake count percentages according to category. Between surface and core percentages, six of the categories share the same rank with the remaining four categories off by only a value of one. This suggests a similarity in the proportions of the different flake types between the surface and the first 10 cm of cultural fill. Curiously, the comparison of the surface and core weight percentages did not have the same rank correlation. This suggests a slight size bias in the sampling procedure perhaps related to the collection of all surface debitage prior to the collection of the core sample.

As would be expected at a source area, there is a high percentage of cortical debitage. With the four cortical flake categories collapsed, completely or partially cortical material accounts for twenty percent of the surface collected materials. Oddly, only six percent of the core debitage was classified as cortical or partially cortical. This percentage is curiously low because the average surface and core weight percentage values are reasonably close at 58 and 40 percent, respectively.

The collapsed non-cortical categories compare more favorably than the cortical categories with an average surface count percentage of 49 percent and an average core count of 55 percent. Additionally, the average weight values are more comparable at 19 percent for the surface debitage and 22 percent for the core.

The number of late and early stage bifacial thinning flakes is well below what was expected given that quarry bifaces are the most commonly observed artifact at the source areas. The percentage of debitage attributable to the bifacial thinning categories is 9 % for surface samples and 2% for core samples. Although lower than expected, the average weight values are more similar with 14 percent for surface samples and 22 percent for core samples. While surface debitage being collected prior to taking the core samples could account for some of the difference between the category counts, it cannot account for the lower than expected numbers. There are a few possible explanations for these results: despite the commonality of the quarry bifaces at source areas, they were not produced in quantities sufficient to be recognizable in the debitage collections, the various surface samples did not fall within areas of bifacial core production, or as bifacial thinning flakes are functionally the ideal product of bifacial cores, they were transported away from the reduction areas for potential modification into various other tool types. Flakes classified as non-cortical platform absent could be fractured bifacial thinning flakes, which if detectable and included could elevate the percentage to an expected level. However, given the existing data there is no way to determine which of these options is correct (if at all). The transportation of bifacial thinning flakes away from the source is the answer most congruent with the unique and proximal relationship to quarry bifaces adjacent to source areas.

It should be noted that these are preliminary observations rather than conclusions given the relatively small samples and the calculations employed. Averages are a relatively simple analysis and the rule of meaningful measures was occasionally suspended in order to retain a value. Further statistical analysis would likely yield additional information about the relationship between flake categories and flake weights as well as surface and subsurface debitage.

CHAPTER 7 – TIMBER BUTTE OBSIDIAN SOURCE CHARACTERIZATION

Source Characterization and the Timber Butte Source

The chemical characterization of obsidian sources began in the late 1950s and was underway before an ideal examination and standardization of the process was addressed. Probably due to the enthusiasm for data this new tool could provide, results were accepted without critical scrutiny (Hughes 1984). With so few known sources, the analysis of samples is particularly difficult because constituent elements that do not vary much between sources become noise to the elements with meaningful variance. Additionally, statistics that do not discard the non-variant elements seek to assign all unknowns to known sources by means of the closest fit possible. Although this was a popular, widely used method, it may have been responsible for incorrect assignments (Hughes 1984).

There were additional problems with early sourcing work and methodology. Most of the sourcing work between 1967 and 1974 was done at a single lab, with no real competition to confirm or invalidate results (Hughes 1984). Basically, obsidian characterization was in its infancy, and practitioners were finding and correcting sources of inaccuracy.

Geochemical source identification began in Idaho with the efforts of Earl Swanson in the late 1960s. Samples were processed by Neutron Activation Analysis (NAA) at the University of Michigan (Holmer 1997). In the late 70s Sappington began a comprehensive regional inventory of obsidian sources across southern Idaho and adjacent states and provinces (Holmer 1997). He began reporting the results of this work in 1981 (Sappington 1981a, 1981b, 1981c). Sappington's stated objectives were to locate, describe, and characterize known and unknown obsidian sources, and to determine the significance of the sources to aboriginal economies (1981a). Through these efforts, Sappington was directly responsible for initiating interest in the Timber Butte source. In an examination of obsidian artifacts from the Lydle Gulch site (near Boise) Sappington demonstrated that twenty different obsidian sources were utilized, with Timber Butte material in the vast majority (1981c). However, in keeping with the accepted methods of the time, the analysis used a posterior probability F-statistic that must make a "best fit" assignment of all samples to a source in the known sourcing universe, even if the true source is unknown (Plager 2001; Hughes 1984; Sappington 1981a, 1981c). As a result, there may have been errors in the source assignments. However, it should be noted that all "correct" assignments are derived from statistical analysis and can only suggest a probability of an accurate assignment (Hughes 1984).

However, these possible inaccuracies have to do with assigning an artifact to a source, not with defining a source. Provided there is little variation of the constituent elements within a source, it can be characterized by a raw count. If there is considerable variation of constituent elements within a single source, it is then necessary to employ statistics to recognize the possible number of fingerprints. Although sources that are geographically proximal, despite having several discernable chemistries, can be functionally clustered as a single source area.

In the case of Timber Butte obsidian, the source was originally characterized using samples from secondary deposits. This was due largely to restrictions of the land owner. The geographic extent of primary deposits was not known and primary deposit samples were not subjected to characterization analysis. And although the source was accurately characterized, there remained the possibility that Timber Butte could represent more than one distinct chemistry, possible accounting for an unknown.

In 1980, Merle Wells made a visit to Timber Butte source area D and described it in a subsequent article (Wells 1980). Although the article provided a good history of the last band of non-reservation Native Americans to occupy the general vicinity (Eagle Eye's Band), it did little toward the documentation of south central Idaho's most significant obsidian source.

Timber Butte Utilization in Southern Idaho

Although a number of individuals have worked on the range of Timber Butte obsidian use (Reed 1985; Sappington 1981a, 1981c, 1984; Holmer 1997), Plager recently produced the most current and definitive study. In her examination of 2,607 artifacts from sites in southern Idaho, it was discovered that Timber Butte obsidian is the predominant obsidian representing 46.3 percent of all artifacts analyzed (2001). However, Plager points out that this could be the result of a higher sampling rate, reflective of where most sourcing work has been performed (Plager 2001). Of particular importance is the 3.6 percent of analyzed artifacts (n=95) that could not be assigned to a known source. This means that there are still unknown or poorly defined sources that were utilized in southern Idaho. Additionally, her work with the existing data shows a distribution of Timber Butte obsidian that is functionally concentrated in the Payette River drainage (Plager 2001).

Source Characterization Methods

Primary deposit samples from the eight identified source areas were submitted along with primary context samples from a site 10 GM184 (Chapter 2) to the Northwest Research Obsidian Studies Laboratory (NROSL) in Corvallis, Oregon. The samples were prepared according to the requirements of the lab. The following is taken directly from the NROSL website and is a description of the analysis method used in sample characterization (NROSL 2006). The results of the analysis are found in Table 7.1.

> Analysis of samples for different trace element concentrations (Ti, Mn, $Fe_2O_3^T$, Zn, Ga, Rb, Sr, Y, Zr, Nb, and Ba) is completed using a Spectrace 5000 energy dispersive X-ray fluorescence spectrometer. The system is equipped with a Si(Li) detector with a resolution of 155 eV FHWM for 5.9 keV X-rays (at 1000 counts per second) in an area 30 mm2. Signals from the spectrometer are amplified and filtered by a time variant pulse processor and sent to a 100 MHZ Wilkinson type analog-to-digital converter. The X-ray tube employed is a Bremsstrahlung type, with a rhodium target, and 5 mil Be window. The tube is driven by a 50 kV 1 mA high voltage power supply, providing a voltage range of 4 to 50 kV.
>
> Peak intensities for the above elements are calculated as ratios to the Compton scatter peak of rhodium, and converted to parts-per-million (ppm) by weight using linear regressions derived from the analysis of

> twenty rock standards from the U.S. Geological Survey, the Geologic Survey of Japan, and the National Bureau of Standards. The analyte to Compton scatter peak ratio is employed to correct for variation in sample size, surface irregularities, and variation in the sample matrix.

The samples were split and also submitted to the Geochemical Research Laboratory (GRL) in Portola Valley, California. The following is taken directly from the GRL website and is a description of the analysis method used in sample characterization (GRL 2006). The results of the analysis are found in Table 7.2.

> Non-destructive quantitative analyses of obsidian are performed at Geochemical Research Laboratory (GRL) on a QuanX EC (Thermo Electron Scientific Instruments Corporation) energy dispersive x-ray fluorescence (edxrf) spectrometer. X-ray spectra are acquired and elemental intensities extracted for each peak region of interest, after which matrix correction algorithms are applied to specific regions of the x-ray energy spectrum to compensate for inter-element absorption and enhancement effects. Following these corrections, intensities are converted to concentration estimates by employing least-squares calibration lines established for each element from analysis of up to 30 international rock standards certified by the U.S. Geological Survey, the U.S. National Institute of Standards and Technology, the Geological Survey of Japan, the Centre de Recherches Petrographiques et Geochimiques (France), and the South African Bureau of Standards.
>
> Trace element measurements are expressed in quantitative units (i.e. parts per million [ppm] and/or weight percent composition [%]), and matches between unknowns (i.e. archaeological artifacts) and known geologic obsidian chemical groups are made on the basis of correspondences (at the 2-sigma level) in diagnostic trace element concentration values (typically ppm values for Rb, Sr, Y, Zr, Nb and, when necessary, K, Ca, Ba, Ti, Mn and Fe2O3T) or Fe/Mn ratios.

Table 7.1: Results of Northwest Research Obsidian Studies Laboratory Timber Butte

Northwest Research Obsidian Studies Laboratory

Results of XRF Studies: Timber Butte Area Obsidian Samples, Gem County, Idaho

	Specimen		Trace Element Concentrations												Ratios		
Sample Locale	No.	Catalog No.		Zn	Pb	Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	$Fe_2O_3^T$	Fe:Mn	Fe:Ti	Artifact Source/Chemical Type
Timber Butte	1	Area A		58	36	192	18	41	62	38	158	571	35	0.35	7.0	77.2	Timber Butte
			±	7	3	3	7	3	7	1	95	47	12	0.11			
Timber Butte	2	Area B		58	30	190	16	41	59	36	237	757	31	0.50	6.8	70.9	Timber Butte
			±	7	3	3	7	3	7	1	95	48	12	0.11			
Timber Butte	3	Area C		61	38	194	18	46	62	36	215	734	54	0.50	7.0	77.4	Timber Butte
			±	6	2	3	7	3	7	1	95	48	12	0.11			
Timber Butte	4	Area D		58	34	192	19	44	61	37	236	775	38	0.49	6.6	70.9	Timber Butte
			±	6	2	3	7	3	7	1	95	48	12	0.11			
Timber Butte	5	Area F		52	36	192	17	47	58	34	236	782	46	0.50	6.6	71.5	Timber Butte
			±	6	2	3	7	3	7	1	95	48	12	0.11			
Timber Butte	6	Area H		62	37	196	18	43	60	37	225	706	40	0.47	7.0	70.7	Timber Butte
			±	6	2	3	7	3	7	1	95	48	12	0.11			
10-GM-184	7	10-GM-184		62	31	184	18	42	60	36	174	639	44	0.38	6.6	75.9	Timber Butte
			±	6	3	3	7	3	7	2	95	48	12	0.11			
RGM-1	RGM-1	RGM-1		35	21	157	111	26	225	11	1558	266	780	1.86	72.6	38.4	RGM-1 Reference Standard
			±	6	3	3	7	3	7	1	97	47	13	0.11			

Table 7.2: Results of Geochemical Research Laboratory Timber Butte Sample Analysis

Cat. Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Fe/Mn
Area A	nm	nm	177	13	43	48	33	5	263	791	.61	7
		±4	±3	±3	±4	±3	±10	±12	±10	±.02		
Area B	nm	nm	190	15	45	49	35	15	217	881	.66	7
		±4	±3	±3	±4	±3	±10	±12	±10	±.02		
Area F	nm	nm	172	13	39	47	34	19	266	758	.56	7
		±4	±3	±3	±4	±3	±10	±12	±10	±.02		
Area G	nm	nm	189	16	43	46	34	29	233	839	.63	7
		±4	±3	±3	±4	±3	±10	±12	±10	±.02		
Area H	nm	nm	179	16	42	46	34	20	235	837	.64	7
		±4	±3	±3	±4	±3	±10	±12	±10	±.02		
10-GM-184	nm	nm	183	15	43	45	34	10	219	880	.67	7
		±4	±3	±3	±4	±3	±10	±12	±10	±.02		

All are classified as Timber Butte

U.S. Geological Survey Reference Standard

RGM-1	nm	nm	153	107	25	216	8	809	1591	278	1.87	nm
(measured)					±4	±3		±3	±4	±3	±10	±24
			±10	±.02								

Results

Even with source areas separated by more than five kilometers, the Timber Butte obsidian source is represented by a single, distinct chemistry. To the extent that the source has been mapped and sampled, it is not responsible for any unknown sources.

There is anecdotal evidence for additional obsidian sources in the Timber Butte area, although given the known distribution of the source and the distances that pyroclastic flows can travel, they could also share the same chemistry. However, small clasts of raw material found throughout the buttes were not subjected to sourcing analysis, and could produce a distinct chemistry, although it is doubtful that the smaller clasts would have been utilized given the availability of larger pieces of raw material at any of the eight source areas.

CHAPTER 8 - CONCLUSIONS

Timber Butte Survey

Local and regional archaeologists have known of the Timber Butte source for approximately thirty years. However, during this time, the source was incorporated into the archaeological context based on incomplete information. Nothing was known about the geographic extent or availability of the raw material. Nor was anything known about reduction areas immediately adjacent to the source areas. Because samples were collected from a secondary depositional context, it was assumed that the source represented only small clasts that would require a specialized reduction strategy. It was not until 1980 that Merle Wells documented the existence of an "outcrop" on the eastern butte (Wells 1980). Much of the data's shortcomings were due to Timber Butte residing on well-marked private property, owned by a man understandably reluctant to permit access.

I was fortunate enough to gain access for a period of almost two weeks, during which time I mapped the source areas and collected raw material samples for chemical characterization and debitage samples and artifacts for analysis.

As a result, the geographic extent is now known and has been documented for use by other researchers. Additionally, tentative observations have been drawn from the debitage analysis and the matter of chemical characterization has been settled.

Timber Butte Utilization, Geographically and Chronologically

The Timber Butte obsidian source is well represented at sites in southwestern Idaho along the Payette, Snake, Boise, and Weiser rivers, although frequency drops off sharply on the south side of the Snake River (Sappington 1984; Reed 1985; Plager 2001). The source was used as early as ten thousand years ago as evidenced by the Clovis point found on the western shore of Cascade Reservoir and the Haskett point from Redfish Overhang (Sargeant 1973; Peterson 2006 personal communication).

Although the source appears to have been used continually since its discovery, sites south of the source lack a depth beyond more than six thousand years ago (Ames 1982; Gallison and Reid 1992, 1993; Reid and Gallison 1994; Reed 1990; Plew et al. 1994). Ames offers several possibilities for this, including sampling error, geologic agents have destroyed such sites, and the area was relatively uninhabited before 6,000 years BP (1982:86).

Debitage and Artifact Analysis

This effort collected and examined more than 2,700 flakes from ten sample areas. Although it is evident from the location of numerous quarry bifaces near the source areas that bifacial flake cores were being produced at Timber Butte in the recent past, the paucity of bifacial thinning flakes in the debitage samples did not substantiate the observation. While there are several possible explanations, none can be conclusively demonstrated with the existing data. All of the quarry bifaces collected were broken at various stages of reduction by either perverse fractures or breaks related to internal flaws in the stone.

Timber Butte Chemical Sourcing

The Timber Butte source is represented by eight source areas, although several are found in clusters that were likely treated as a single area. All eight source areas, along with an additional primary deposit of obsidian nodules that appear to have been produced and transported by a pyroclastic flow, share a single, distinct chemistry. This amounts to a confirmation of previous work based on samples collected from a secondary depositional context. However, as long as there are unknowns, it remains possible that the rhyolitic volcanism that produced the glass could have produced other nearby deposits having different chemistries. There is anecdotal evidence for obsidian sources near the ghost town of Pearl, Idaho, and along U.S. Highway 55 near the town of Gardena, Idaho.

In Sum

Although the question regarding what types of stone tools were being produced at Timber Butte in the recent past was not settled conclusively, the source areas were mapped and definitively characterized. This effort was a broad, first step that will help guide future research at the Timber Butte source areas.

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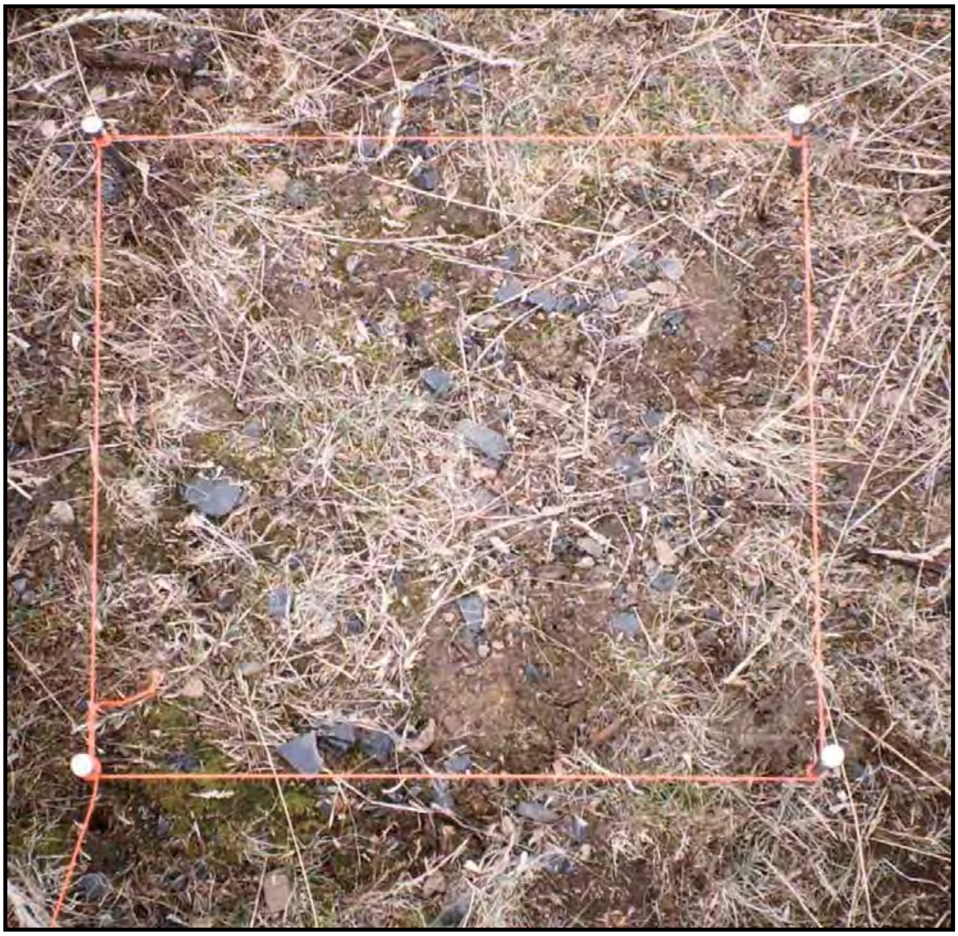
APPENDIX A
Surface Collection Unit Figures



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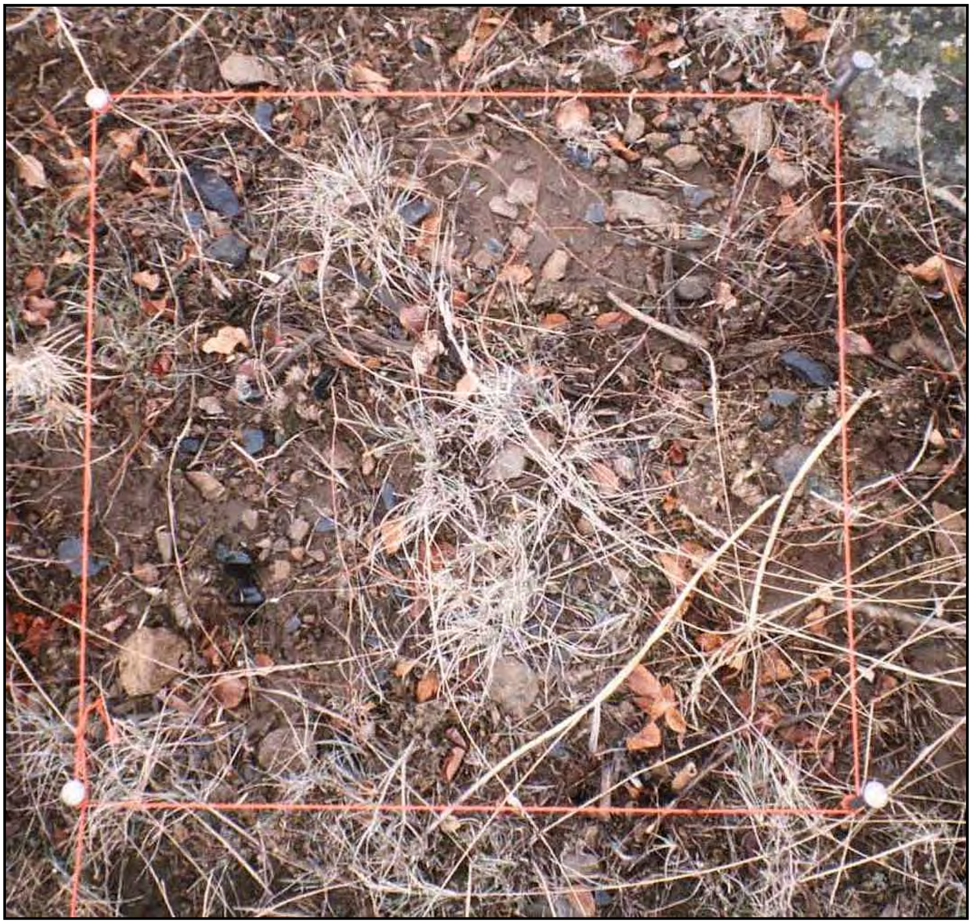

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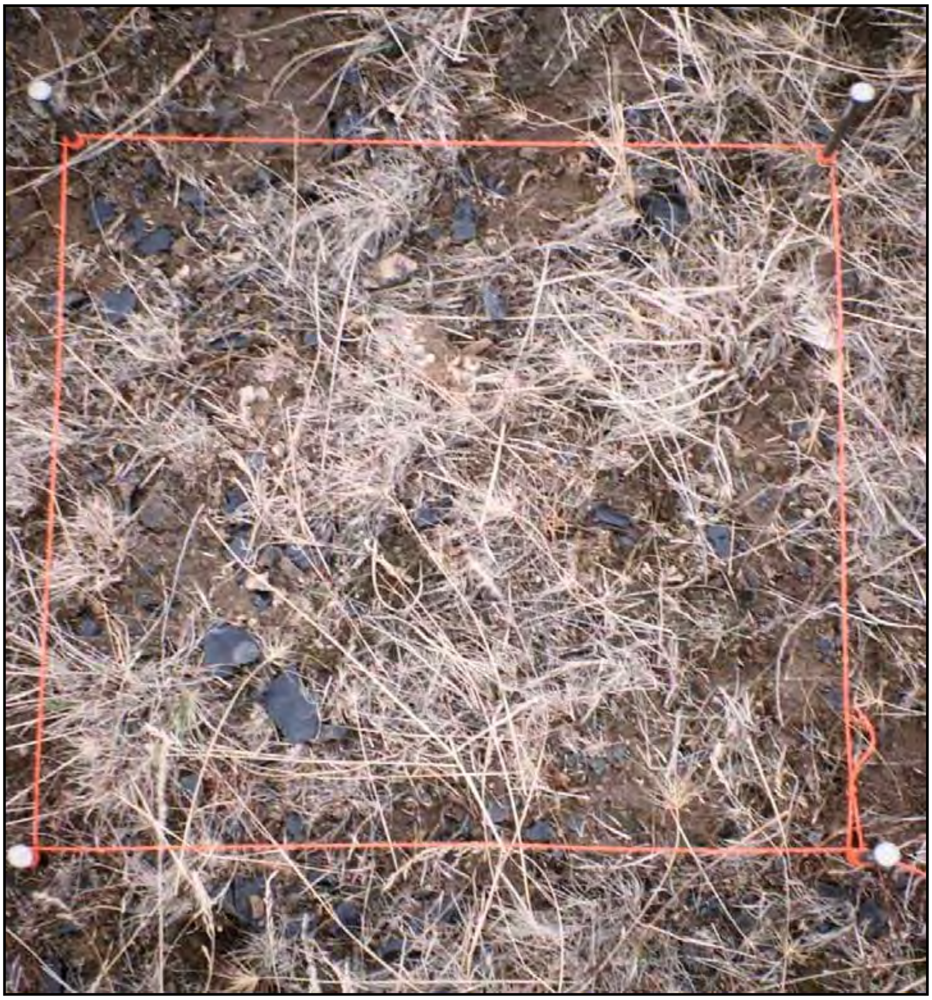

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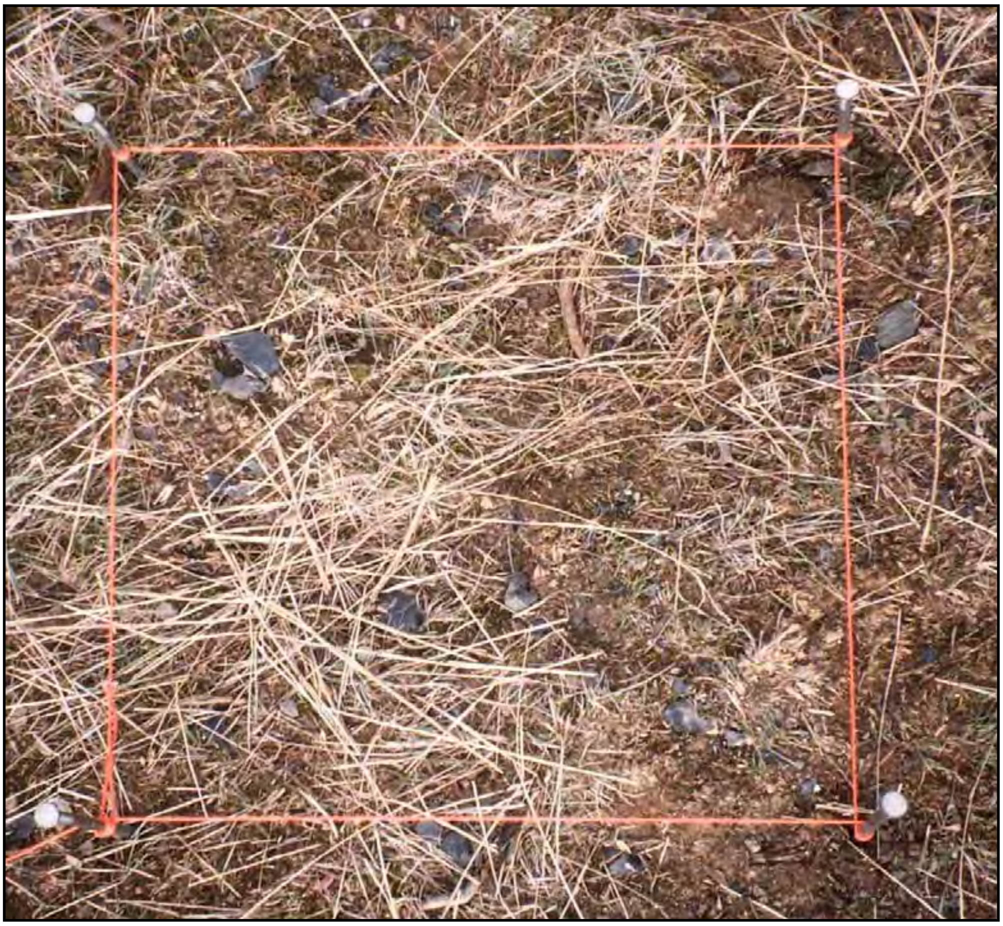

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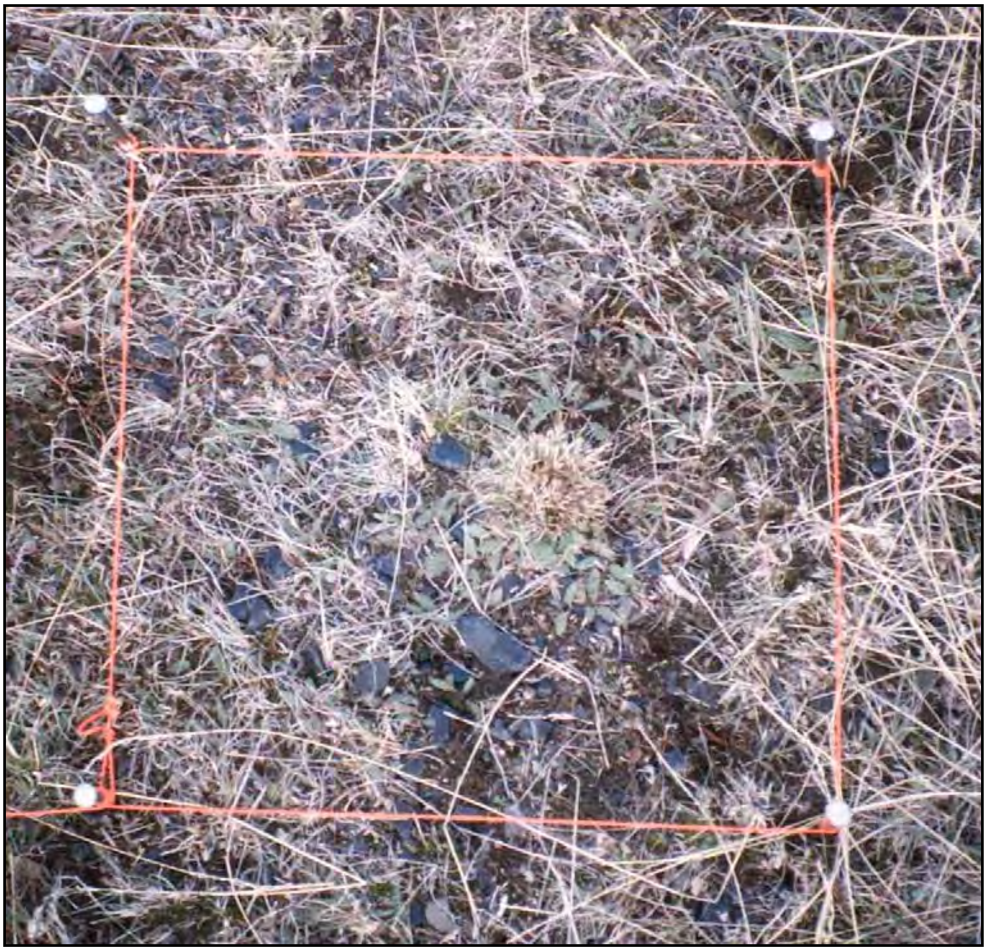


Surface Debitage Sample Unit Number 7

Surface Debitage Sample Unit Number 8

Surface Debitage Sample Unit Number 9

Surface Debitage Sample Unit Number 10

APPENDIX B

Material Samples and Source Area Close Up Figures

Two views of a unaltered raw material sample exhibiting advanced weathered cortex.

Side view of sample from previous page (B-1) showing topography of advanced weathering cortex. Note stratigraphy of bubble layers in contiguous peaks.

Two views of a unaltered raw material sample exhibiting formational cortex and mild weathering.

Two views of a unaltered raw material sample exhibiting formational cortex and mild weathering.

Close up view of raw material in talus of source area A.

Close up view of raw material in talus of source area G

Close up view of material at source area D

Close up of material at source area A

View of small, unusable material fragments south of source area D

APPENDIX D

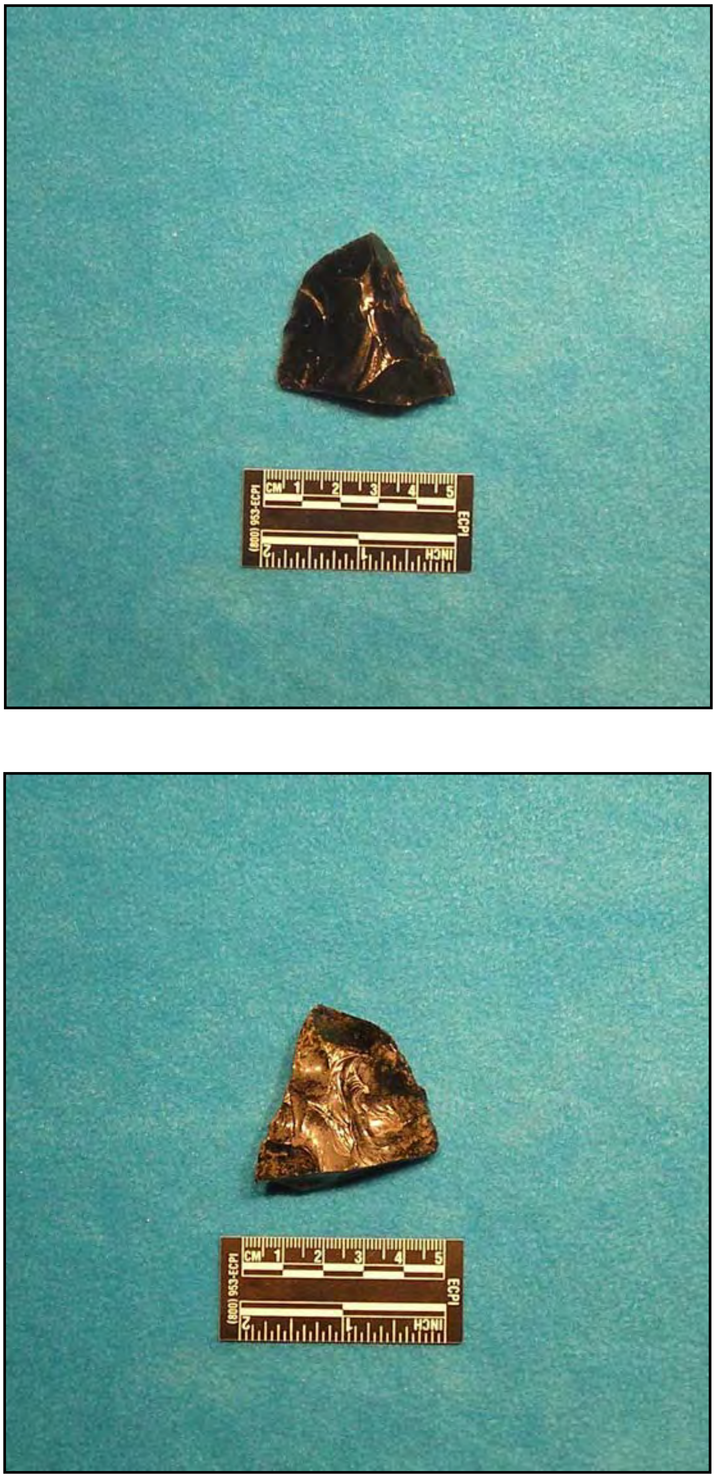
Collected Artifact Figures

Artifact Number 1. Late stage quarry biface fragment located between source areas B and C

Artifact Number 2. Late stage quarry biface fragment located south and east of source area D

Artifact Number 3. Early stage quarry biface found near south end of source area D

Artifact Number 4. Early stage quarry biface fragment found neat source area D

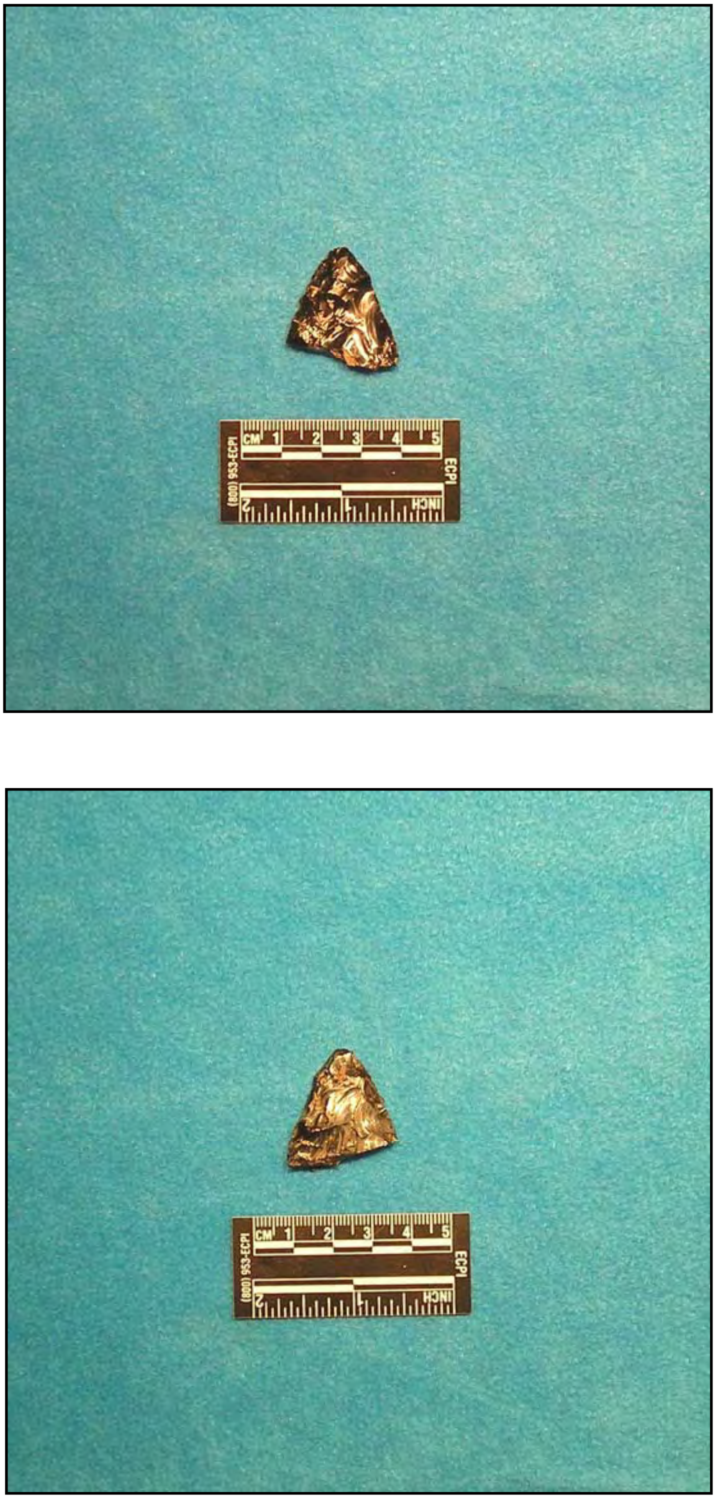


Artifact Number 5. Early stage quarry biface fragment found near source area D

Artifact Number 6. Early stage quarry biface fragment fund
near source area D

Artifact Number 7. Early stage quarry biface fragment found near the east edge of source area B

Artifact Number 8. Early stage quarry biface fragment found on saddle north of source area G



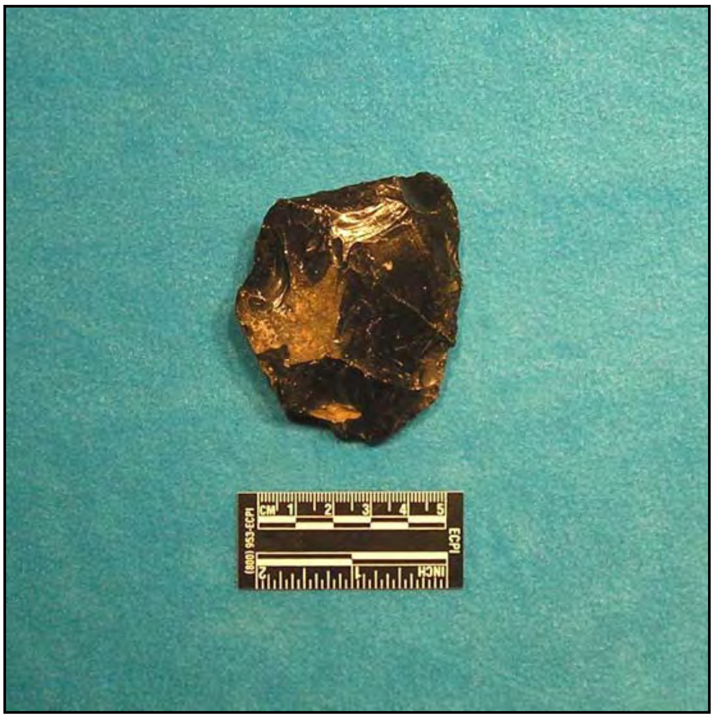
Artifact Number 9. Late stage quarry biface fragment found just west of source area C

Artifact Number 10. Early stage quarry biface fragment or modified flake found just west of source area C

Artifact Number 11. Early stage quarry biface fragment found near source area C

Artifact Number 12. Early stage quarry biface fragment found near source area C

Artifact Number 13. Semi-conical flake core – located mid slope in talus of source area A.



Artifact Number 14. Early stage quarry biface fragment located near source area F

Artifact Number 15. Early stage quarry biface fragment that was discovered in the surface sample collection of surface sample unit 3

APPENDIX E

Study Area Overview and Source Area Figures

View up-slope at Area A at 80°

View up-slope, talus of area A, mid slope

Material on surface at source Area D, view at 80°

Northeast side of more western Butte, view at approximately 250°

View of source areas C and E from area B at roughly 270°

View of source Area B from upper part of area C taken at roughly 75°

View toward Shafer Butte (due south) from saddle east of source area G

View of southwest side of Buttes at approximately 50°

View down slope of source Area H from road cut that bisects source area.

View of eastern Butte at 310°