CHAPTER 9
HUMAN LANDSCAPE USE ON THE SNAKE RIVER PLAIN, IDAHO

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ABSTRACT
Southern Idaho is an ideal setting for the study of prehistoric human landscape use. Obsidian sources are numerous on and near the Snake River Plain of Idaho, and it is common for the lithic assemblages of southern Idaho archaeological sites to be composed of up to 90% obsidian, a fact that holds true at site 10-BT-8. Obsidian source characterization suggests a large circulation range for the prehistoric people using site 10-BT-8, with strong emphasis placed on the American Falls obsidian source. Three other sources, Bear Gulch, Big Southern Butte and Browns Bench were also utilized. While American Falls is the most frequently used source throughout time, there is variability in the utilization of the other obsidian sources. The combination of obsidian source characterization and technological organization data from core tools, bifaces and proximate flake debitage support the model that the people that used 10-BT-8 over the last 3,000 years were utilizing both distant and local obsidian sources while moving over a wide area of southeastern Idaho.

INTRODUCTION

Southern Idaho is an ideal setting for the study of prehistoric human landscape use based on lithic technological organization and obsidian source characterization. Obsidian sources are numerous on and near the Snake River Plain of Idaho, and it is common for the lithic assemblages of southern Idaho archaeological sites to be composed of up to 90% obsidian. This paper will explore obsidian use and lithic technology on the Snake River Plain through the use of a case study site: 10-BT-8. While lithic technology at this site is characteristic of most mobile North American foragers (bifacial), the extreme distance of the obsidian sources most frequently utilized is not.

Located in a sheltered draw at the southern tip of the Lemhi Mountains in south-central Idaho, site 10-BT-8 was first recorded by the Idaho State College Museum in 1961, as part of Earl Swanson's Birch Creek Project (Figure 9.1). Based on three radiocarbon dates, 10-BT-8 appears to be Middle Archaic in age (approximately 2,990 B.P.) (Table 9.1). A total of six 1x1 meter units were test excavated by archaeologists from the Targhee National Forest during the summer of 1993. About 85% of lithic materials at the site is obsidian. The other 15% is composed of local chert, argillite and quartzite. Though excavated nearly 20 years ago, very little analysis has ever been performed on the assemblage from the 10-BT-8, and no comprehensive site report has been published.

The archaeology of site 10-BT-8 is important because it is located in an unusual place relative to many other excavated sites in southeastern Idaho. Most excavated sites in the region are located either south, on the Snake River Plain, or north, in the more mountainous Salmon River area. This site is unique in that it is located in the transition between these two areas. Additionally, most previous archaeological excavations in this area have focused on cave and rockshelter sites (Butler 1978). Open-air sites, such as 10-BT-8, have received little attention in Idaho archaeological research.

The purpose of this study was to explore two main questions about lithic technology at 10-BT-8. How does the lithic assemblage of 10-BT-8 reflect prehistoric human land use practices from the Middle Archaic to the protohistoric period? And how might these practices relate to the procurement of raw material and manufacture of tools?

BACKGROUND

Archaeologists frequently discuss lithic technological organization in relation to behaviors that optimize land use. Specifically, lithic technological organization is generally accepted to be embedded in complex human

Figure 9.1. Overview of 10-BT-8.

optimal foraging behaviors (Kelly 1995). Based on his ethnoarchaeological fieldwork among the Nunamiut people of North America, Binford first proposed embedded procurement, where lithic procurement is simply one aspect of a group's foraging behavior and mobility. In other words, raw material may often be obtained en-route to other resources (such as game) (Binford 1979; 1980). Gould, however, observed what might be termed direct procurement. In ethnoarchaeological work with Australian aboriginal people, Gould recognized that people did sometimes make special trips to obtain raw materials, but often for sacred reasons (Gould 1978).

Raw material preference, distance between sources and optimization of toolkit (e.g. bifaces vs. cores) are all important factors to consider in terms of landscape utilization (Andrefsky 1994). A single forager, or even band of foragers, is physically capable of carrying only so much stone. Therefore, foragers optimized the utility and portability of the materials contained in their toolkits (Kuhn 1994, Beck et al. 2002). Frequently, this toolkit optimization is interpreted to correlate with an increased use of biface technology, as bifaces are frequently employed as the most efficient way to transport raw material over long distances. Bifaces are also considered an all-purpose tool for foragers, thus their presence may reduce the need to carry many different types of tools (Kelly 1988, Andrefsky 2005). Therefore, a highly mobile group would be expected to use biface technology more frequently than a more sedentary group (Kelly 1998, Parry and Kelly 1987, Surovell 2009). This analysis assumes raw material is procured directly, not through trade.

In general, bifaces are not only frequently used, but are also more highly curated when raw material sources are scarce or of poorer quality (Kelly 1988; Andrefsky 2005, 2006). In addition to size and weight, the extent of biface reduction may be determined through the observation of cortex amount, number of flake scars, and thickness of the biface. A much-reduced biface may indicate curation over long distances and/or periods of time.

Closely related to traveling distance is the subject of the construction of a mobile forager's raw material "toolkit." When a foraging group lacks continuous access to a raw material source, they are expected to modify cores in such a way as to maximize the utility of the raw material. In contrast, core technology is more frequently used as a group becomes more sedentary (Parry and Kelly 1987). Bifaces are frequently employed as the most efficient way to transport raw material over long distances. Recently, Surovell (2009) has suggested that while formal tools (such as bifaces) and flake blanks are

Table 9.1. Radiocarbon dates from 10-BT-8 (corrected).

Unit	Level	Date
O-W29	13	2990 +/- 120 B.P.
O-W29	14-16 (Hearth Feature)	2930 +/- 160 B.P.
S64-W132	7	100.3 +/- .9 B.P.

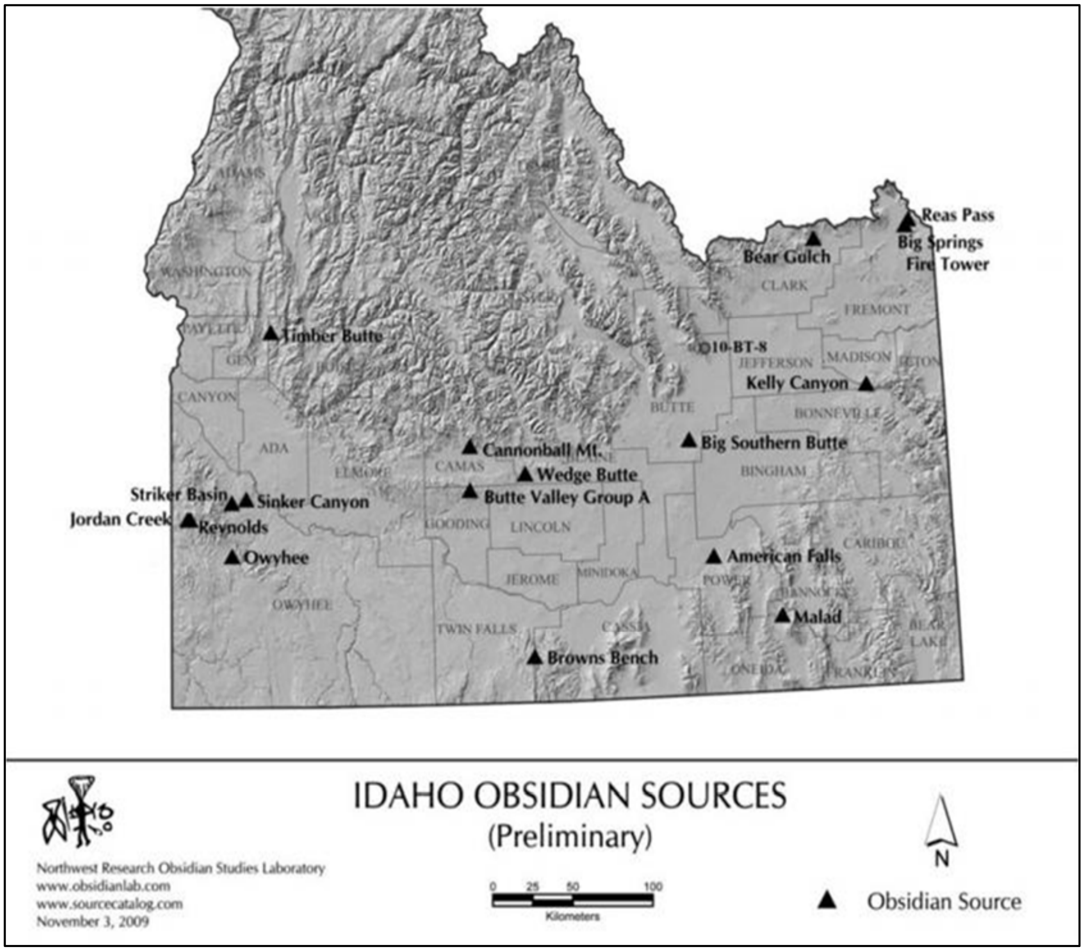

Figure 9.2. Location of 10-BT-8 relative to Idaho obsidian sources. From Northwest Research Laboratory, www.obsidianlab.com.

frequently transported long distances, core tools are not. Core tools that have been “exhausted” are often very small in size, and are no longer suitable for the removal of flakes. It should be noted, however, that availability of raw material may influence core size. More readily available raw material may lead to larger sized core tools at archaeological sites (Andrefsky 1994, 2005).

Flakes may also indicate type of technology. In an experimental study, Tomka (1989) found that complex (or faceted) platforms were found in greater frequency among debitage reduced from bifaces rather than core tools. The presence of a flat platform often indicates reduction from a unidirectional core tool. Complex platforms often exhibit angular facets and many small flake scars. Sometimes complex striking platforms have been modified further through abrasion or rubbing. Abraded and complex platforms are often interpreted to indicate greater preparation in reduction and are frequently associated with the use of biface technology (Andrefsky 2005).

Further, the amount of dorsal cortex left on a flake or biface is generally accepted to indicate the stage of reduction. It is assumed that as a cobble is reduced, the cortex will be removed first. This means that there is generally more cortex present during earlier stages of reduction than in later stages of reduction (Odell 1989). In an experimental study of biface reduction, Maudlin and Amick (1989) observed that nearly all cortex is removed from the biface halfway through the reduction process.

I expected the majority of obsidian at 10-BT-8 to be from Big Southern Butte because it is the closest obsidian source to this site (Figure 9.2). Holmer (1997) found that throughout all time periods in southeastern Idaho, people seem to utilize the nearest available obsidian source. Plew 1986 has also suggested that the warming and drying that occurred during the Early Archaic forced people living on the Snake River Plain to seasonally travel north into the mountains in pursuit of game (Plew 1986; 2008). Plew suggests that during the Middle to Late Archaic, highly mobile people were travelling from the Snake River Plain into surrounding mountains to hunt, then returning to the plain after the conclusion of hunting trips.

RESEARCH DESIGN

Given that the closest known source of obsidian (Big Southern Butte) is 50km from 10-BT-8, I proposed that obsidian was brought into the site in easily transported, efficient packages such as bifaces and not cores or nodules. 101 obsidian tools and flakes were geochemically sourced by Northwest Obsidian Research Laboratory using a Thermo Electron QuanX EC energy-dispersive X-ray fluorescence (EDXRF) spectrometer. I selected artifacts to achieve as representative a sample across artifact types and stratigraphic levels as possible.

I chose to quantitatively analyze all informal and formal tools from 0-140 cm (levels 1-14) in all of the six test units excavated at site 10 BT 8 and examined debitage from 0-140cm three of the six units. Artifacts were only analyzed from the levels 1-14, as the oldest radiocarbon date (2,990 B.P.) was taken from level 14, or above. This allowed for reasonable relative dating.

I developed two land-use hypotheses for 10-BT-8. The first related to Holmer's (1997) assertion that people utilized the nearest obsidian sources, and rarely traveled further to procure material. This pattern relates to the idea that people were traveling from the plain to the mountains to hunt during the Archaic I would expect biface technology to be used in this case, as the closest source is 50km away.

The second hypothesis has people ranging over a larger area, procuring material from more diverse sources. Biface technology would still be expected, but greater reduction would be expected due to longer travel, and possible longer curation (Kelly 1988; Parry and Kelly 1987).

RESULTS

Obsidian Sourcing

If distance to the source were the only variable affecting the amounts of obsidian at 10-BT-8, I expected Big Southern Butte to be the most frequent in the assemblage. Surprisingly, the results of obsidian sourcing showed that obsidian from the distant American Falls source was the most prevalent at the site (Table 9.2). The closest obsidian sources, Bear Gulch and Big Southern Butte, were present in the sample, but in much smaller numbers. Browns Bench was represented by only one artifact. In fact, observed frequencies were nearly opposite of what might be expected based on Holmer's 1997 study.

Table 9.2. Obsidian sourcing results.

Source	Distance from 10-BT-8	Cardinal Direction	Relative Expected Frequencies (%)	Observed Frequencies (%)
Big Southern Butte	50 km	South	80	7.92
Bear Gulch	100 km	Northeast	12	11.88
American Falls	125 km	South	8	79.21
Browns Bench	180 km	Southwest	0	0.99

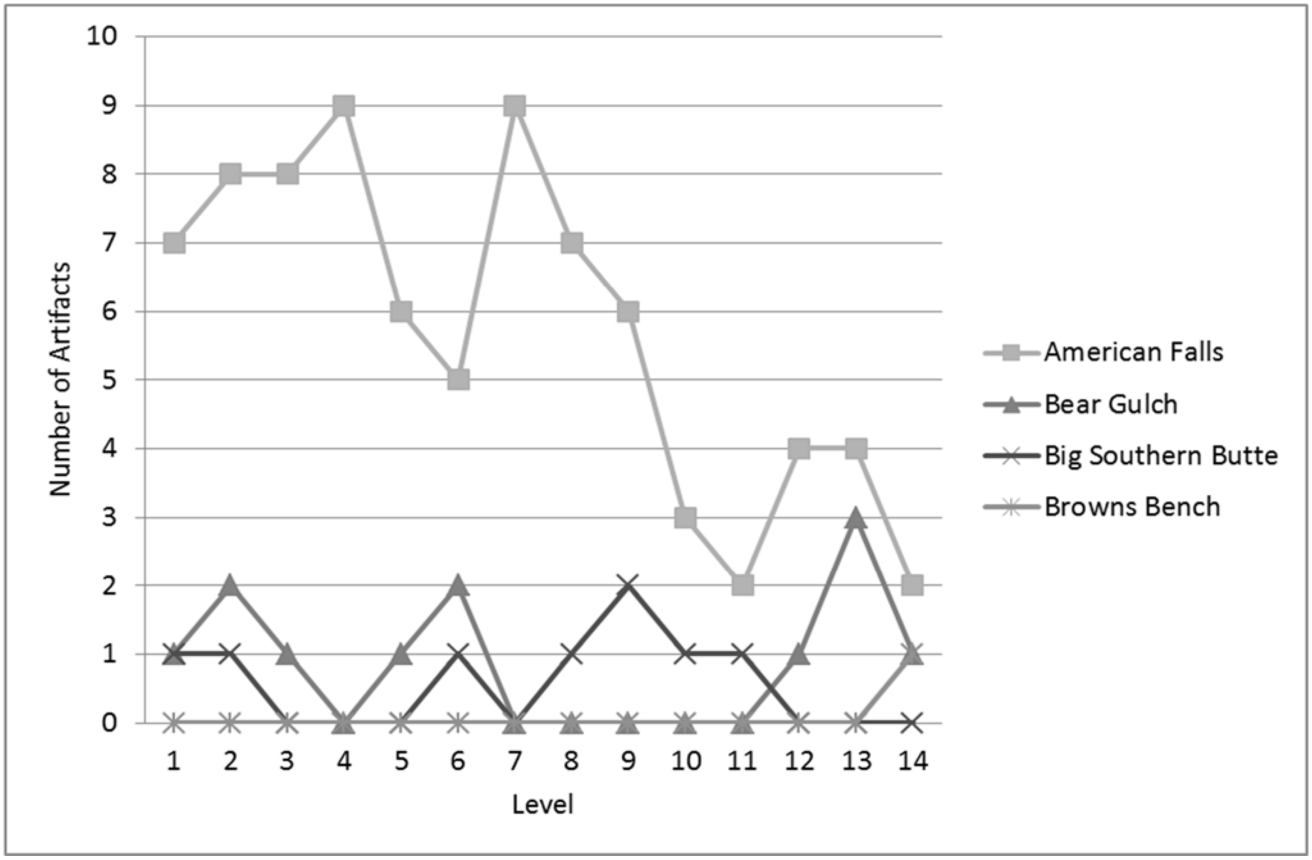

Figure 9.3 Obsidian sources by level (all artifact types).

Obsidian from the oldest levels (12-14), shows a slight increase in American Falls obsidian, though its frequency does not match that of the most recent use period (Figure 9.3). Additionally, Bear Gulch obsidian nearly matches the frequency of American Falls, with the complete absence of Big Southern Butte obsidian. The only artifact sourced to Browns Bench, the most distant source utilized at 10-BT-8, occurs in level 14. The lack of any local source and the higher frequency of more distant sources suggest an extremely wide range of movement. Obsidian in levels 7-11 shows a marked decrease in the frequency of American Falls obsidian. There is an increase in Big Southern Butte obsidian and the complete absence of obsidian from the Bear Gulch source. This suggests a contraction in the overall range of landscape use. The lack of Bear Gulch obsidian indicates that little, if any emphasis is placed on utilization of the area to the northeast of 10-BT-8. It seems people were utilizing Big Southern Butte more frequently. Obsidian in levels 1-6 is characterized by high frequencies of the American Falls source, accompanied by much lower frequencies of the Big Southern Butte and Bear Gulch obsidian sources. This suggests broad movement across southeastern Idaho, but strong ties to the American Falls area.

LITHIC TECHNOLOGY

Given the results of the obsidian sourcing analysis, I expected to see several things in the lithic technology of 10-BT-8. First, because of distance, it would be more likely that any obsidian core tools would be from a source nearer to 10-BT-8 than American Falls: most likely Big Southern Butte. Additionally, core tools made of local materials (chert) would be expected to be overall larger than any transported obsidian core tools.

Secondly, there should be a relatively high proportion of nonhafted bifaces to core tools at site 10-BT-8. While all four obsidian sources present in the assemblage may be distant enough to require biface technology, I would expect nonhafted obsidian bifaces from more distant sources (American Falls, Bear Gulch, Browns Bench) to be relatively smaller in size and of late reduction stages. Third, the platform types of proximal flakes should reflect biface technology. In this case, I would expect few cortical or flat platforms, but a dominance of complex platforms, indicating the transport and retouching of more complete tools. Fourth, the amount of dorsal cortex on proximal flakes should be low. In particular, the farther the obsidian source from 10-BT-8, the less dorsal cortex should be present. Last, the apparent high mobility of the people using 10-BT-8 should also be reflected in high diversity of obsidian source in the hafted biface assemblage.

Core Tools

Core tools are not numerous at site 10-BT-8. All three of the obsidian core tools had an original provenience of the American Falls obsidian source (Table 9.3). Four other core tools were of presumed local yellow chert (based on my own familiarity with the area). The obsidian core tools were highly utilized. Overall, the weights of the chert core tools are larger than that of the obsidian core tools, supporting the fact that most chert was likely procured near to 10-BT-8.

With a source as distant as American Falls, it is somewhat surprising that core tools were transported, given that bifaces are generally accepted to be a much more efficient and useful method for transporting raw material. However, there are several factors that may explain this unexpected result. The overall sizes of the obsidian core tools are quite small. Further, relative to the number of bifaces excavated at 10-BT-8, the count of core tools is extremely small (7 core tools as compared to 57 nonhafted bifaces). Nonhafted bifaces still far outnumber core tools. Additionally, it is possible that these core tools were not utilized only for raw material, but as scraping or chopping implements. If they were used as tools, it might explain why they were kept and transported over such long distances. Finally, the three obsidian cores (all from American Falls) were excavated from levels two and three, some of the most recent levels at the site. While mere conjecture, it is possible that this obsidian was procured after the introduction of the horse. This would likely have made long-distance transport of stone less difficult.

Table 9.3 Core tool weight (g) by raw material type and level.

Material	Level	Weight
Obsidian	2	13.9
Obsidian	2	11
Obsidian	3	29.4
Chert	2	28.7
Chert	5	95.2
Chert	5	148.1
Chert	2	99.7

Nonhafted Bifaces

All bifaces without an identifiable haft were considered nonhafted bifaces. These bifaces may remain unhafted tools, or a haft may be added for prehensile use (Andrefsky 2005). Like core tools, their overall size may indicate reduction stage of a biface. In addition to size, biface reduction stage may be determined through the observation of cortex amount, number of flake scars, and thickness of the biface. Similar to Callahan (1979), bifaces were classified into stage from 0 to 5, with 0 representing a blank and 5 representing a thinned, reduced biface. No nonhafted obsidian bifaces are in production stage 1, while the majority of nonhafted bifaces are in production stage 3 or beyond (Figure 9.4). A high level of reduction and an overall smaller size would be expected among obsidian bifaces, given the distances of all relevant obsidian sources from 10-BT-8. Of course, the final size of the tool may also be dependent on the size of the original objective piece. However, bifaces are generally still smaller and more reduced when transported over long distances. Only one artifact from 10-BT-8, a nonhafted biface, was sourced to

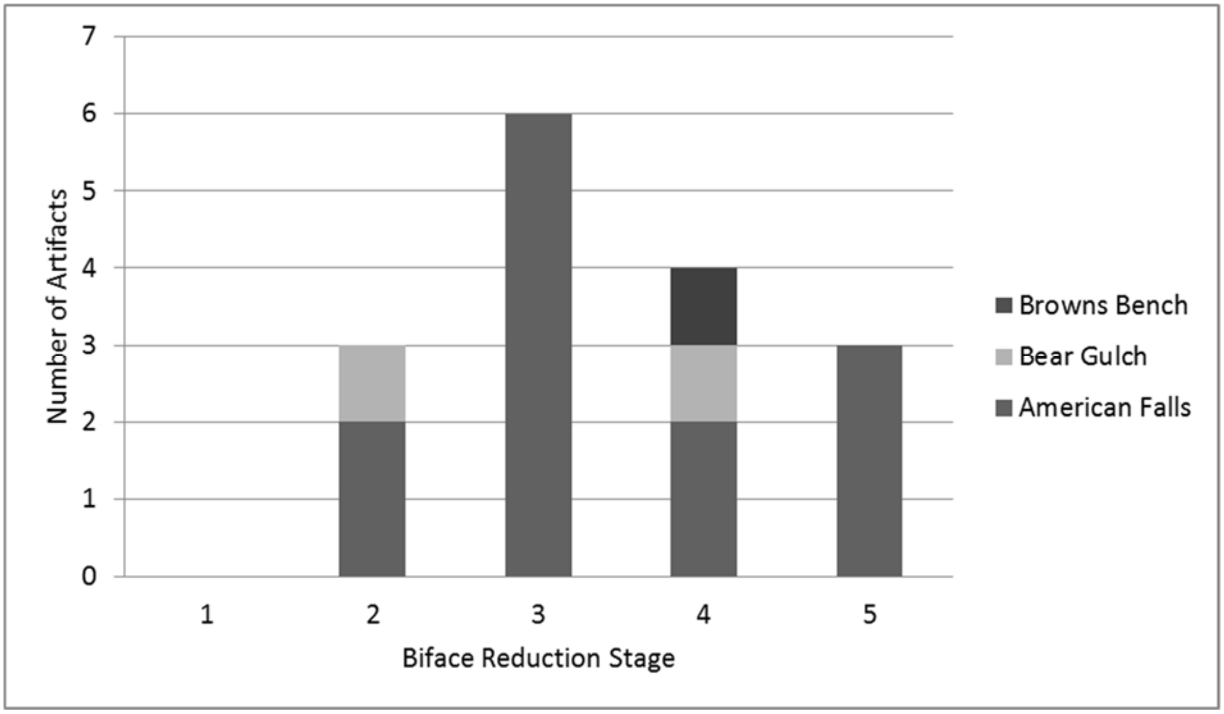

Figure 9.4. Nonhafted biface stage and obsidian source.

the far-distant Browns Bench Source. Notably, no nonhafted bifaces were sourced to the Big Southern Butte obsidian source, the closest obsidian source. While this must be cautiously interpreted, the fact that a nonhafted biface was moved so far (approximately 180 km from Browns Bench) is important for considerations of movement across the southern Idaho landscape.

The mean weight of nonhafted bifaces geochemically sourced seems to indicate a loss in weight relative to the distance from site 10-BT-8, with the most distant source (Browns Bench) having the smallest mean weight, and the nearest source (Bear Gulch) having the largest mean weight (Table 9.4). There are, however, two larger bifaces present from the American Falls source, which is unexpected given its distance. A nonhafted biface was characterized as the far distant (180km) Browns Bench obsidian, holding to expectations that the use of very distant sources should produce biface technology. Notably, no nonhafted bifaces were sourced to the Big Southern Butte obsidian source. Perhaps the people who utilized 10-BT-8 did not consider this source distant enough to reduce raw material into a nonhafted biface form.

Table 9.4. Nonhafted biface weight (g) by obsidian source.

	American Falls	Bear Gulch	Browns Bench	Big Southern Butte
Mean Weight (g)	9.09 (n=13)	11.25 (n=2)	7.9 (n=1)	None
Distance	125 km	100km	180 km	50 km

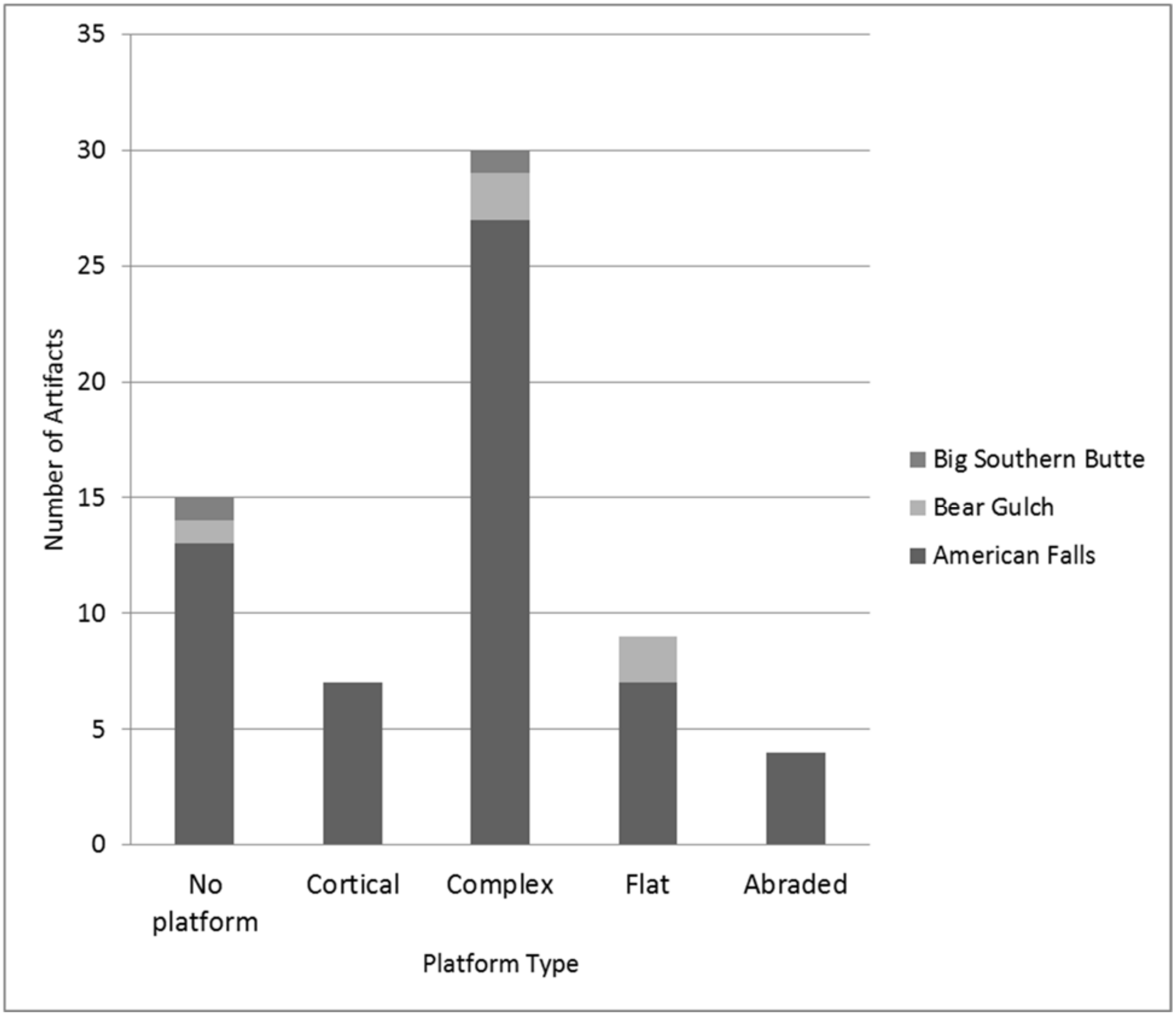

Figure 9.5. Platform type and obsidian source.

Debitage

Complex platforms are the most prevalent type at the site, suggesting biface technology (Figure 9.5). Of the 1,807 proximal flakes in the assemblage, they constitute 83 percent. Complex platforms are also the most prevalent type for flake tools (37 percent), though not to the same extent as proximal flakes. Complex platforms are the dominant type in every level. While Big Southern Butte obsidian exhibited only complex platforms, both the American Falls and Bear Gulch sources (which are a much greater distance away), exhibited more diverse platform types. It is possible that this result may be partially due to small sample size of sourced proximal flakes (65 out of 1807 is only 3.5%). However, complex platforms still occur at the highest frequency of any other type of platform, indicating a common use of biface technology at 10-BT-8.

While dorsal cortex was present, approximately 81 percent of proximal flakes did not have any dorsal cortex. Another 13 percent of proximal flakes had a dorsal surface covered in less than 50 percent cortex. The American Falls source exhibited the highest diversity of cortex (Figure 9.6). It was the only source to exhibit all four amounts of dorsal cortex. Artifacts sourced to Big

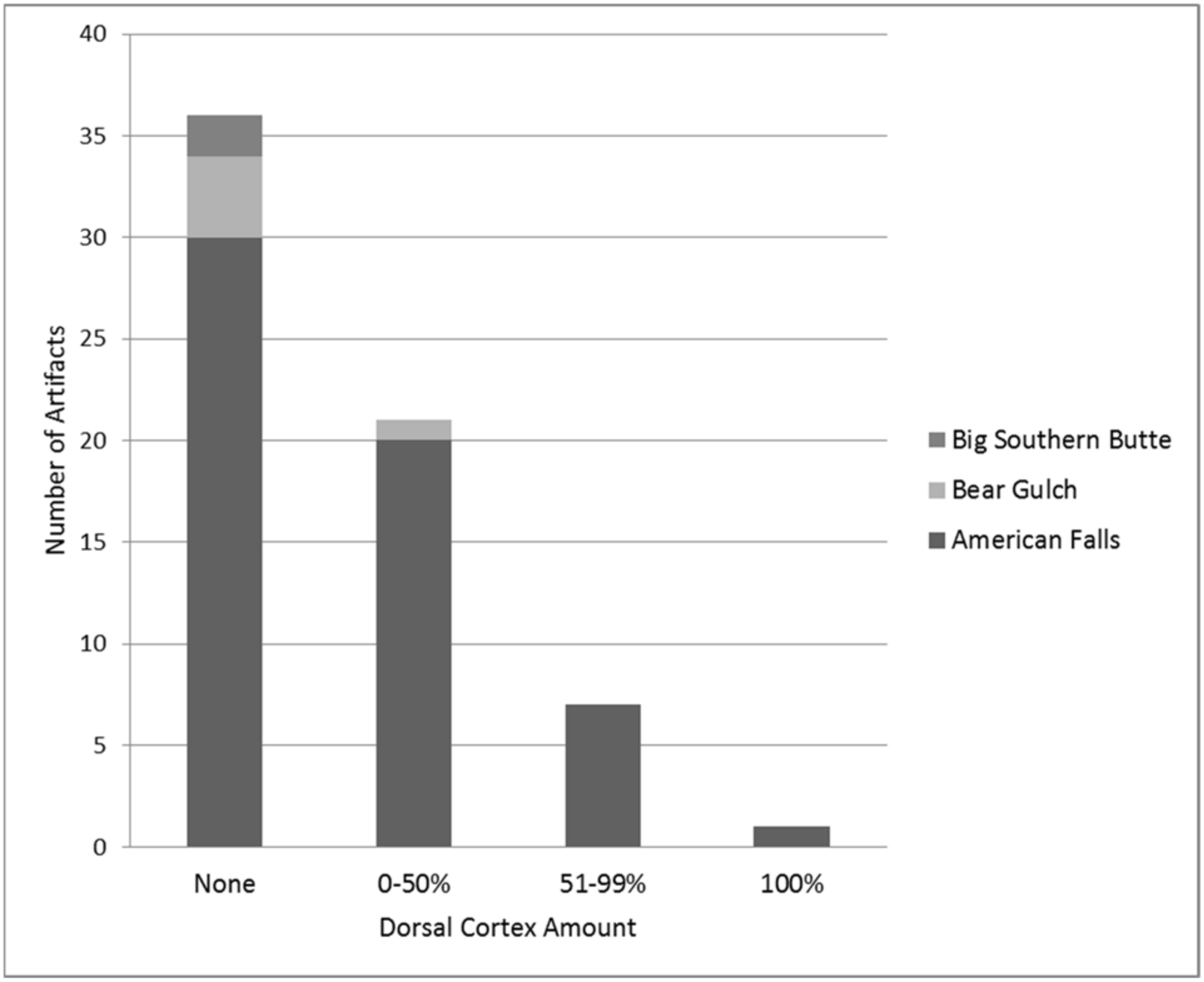

Figure 9.6. Dorsal cortex percent and obsidian source.

Southern Butte had no cortex present, while those from Bear Gulch exhibited less than 50% cortex. All of these obsidian sources are generally found in cobble form, so high amounts of cortex should be present on flakes from the early stages of cobble reduction. It is possible that this result is somewhat biased, as XRF sourcing requires larger artifacts for accurate geochemical characterization, and cortex is more likely to be present on larger flakes. Per Northwest Research Obsidian Studies Laboratory standards, all flakes analyzed were at least 10mm in diameter and 1.5mm thick.

Hafted Bifaces

Because the sample of hafted bifaces was very small (n=17), very few analyses of the hafted biface data are possible. However, the diversity of obsidian sources in the hafted biface assemblage is much higher relative to other chipped stone types in which the American Falls source dominates (Table 9.5). This is consistent with expectations that foragers transport and curate formal tools over great distances.

DISCUSSION

While some expectations created by the obsidian source assemblage were supported by lithic technological data, not all expectations were fully met. Most significantly, the majority of the obsidian at site 10-BT-8 did not come from Big Southern Butte, but from the much more distant source of American Falls. Of my two land-use hypotheses, the second best explains human land use at 10-BT-8. The first of the land-use hypotheses does not account for the overall high frequency of American Falls obsidian throughout all levels. These results immediately suggest a much broader circulation range across southern Idaho for people during the Late Archaic and Protohistoric.

CONSIDERATIONS AND FUTURE RESEARCH

There are a few items that should be noted in relation to the interpretation of human landscape use at 10-BT-8. First, the sampling of artifacts for geochemical characterization could present a possible confounding factor in overall sourcing results. While 101 artifacts is a relatively large sample in terms of obsidian sourcing studies, it does not begin to reach the total number of artifacts excavated from 10-BT-8 (0.1% sample of total artifacts).

A second factor that may yet influence future interpretation of obsidian sourcing results at 10-BT-8 is related to the characterization of the American Falls obsidian source. The American Falls obsidian source, also known as the Walcott Tuff, is spread over a large geographic area across the Snake River Plain in southern Idaho. While geographically diverse, Hughes and Smith have suggested that the American Falls source is homogeneous in its XRF trace element signature, making precise identification of the original geographic location of obsidian difficult to determine (Hughes and Smith 1993). This would certainly make the issue of obsidian use at 10-BT-8 more complicated if obsidian at this site could be procured from a multitude of minor American Falls outcrops closer to the site. This might also explain high amounts of dorsal cortex being present only on debitage sourced to American Falls. Of coruse, I did not consider the qualities of various sources, nor whether American Falls might have been seen as a superior raw material.

Table 9.5. Obsidian source frequency in hafted biface assemblage.

Source	Hafted Biface Frequency
American Falls	6
Bear Gulch	5
Big Southern Butte	6

Third, while Big Southern Butte is a reliable raw material source, the area immediately surrounding it is an extremely dry desert with treacherous recent volcanic flows (such as Craters of the Moon). While the other obsidian sources might be technically more distant, water sources are generally more reliable, with the exception of the Snake River itself, near the mountains north and south of the Snake River Plain. People may have preferred to keep to places where subsistence resources were more readily available.

Lastly, there are other components of 10-BT-8 that may shed further light on the use of this site: a fairly large faunal assemblage deserves analysis, and further radiocarbon dates would serve to bracket time frames more definitively. Any of the aforementioned issues will be important for any future research done at site 10-BT-8, and would greatly add to this study.

CONCLUSIONS

Analysis of lithic artifacts at 10-BT-8 indicates an unexpected pattern of landscape use on the Snake River Plain. In light of the technological organization and obsidian sourcing results of 10-BT-8, it is most likely that the site was a frequently utilized camp site within a larger-scale circulation pattern of very mobile hunter-gatherers. The picture of human landscape use at 10-BT-8 from the Archaic to the Protohistoric is not one of groups of people simply moving back and forth between the Snake River Plain and the central mountain area of Idaho. Rather, it is a dynamic picture of land-use change over the past 3,000 years.

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