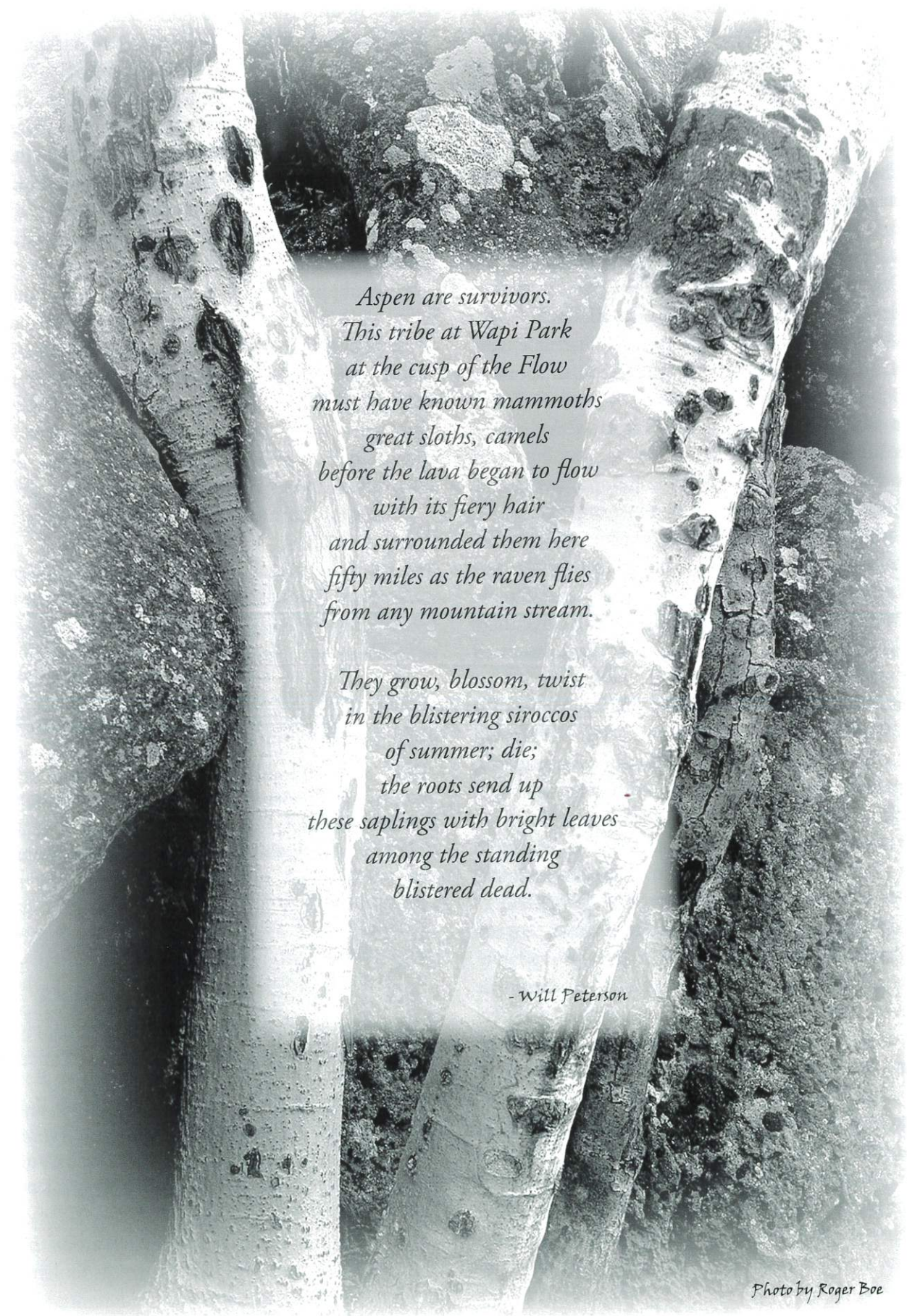




*Aspen are survivors.
This tribe at Wapi Park
at the cusp of the Flow
must have known mammoths
great sloths, camels
before the lava began to flow
with its fiery hair
and surrounded them here
fifty miles as the raven flies
from any mountain stream.*

*They grow, blossom, twist
in the blistering siroccos
of summer; die;
the roots send up
these saplings with bright leaves
among the standing
blistered dead.*

- Will Peterson

Photo by Roger Boe

Seeking the Source: Obsidian XRF Analysis of Projectile Points from the Craters of the Moon National Monument and Preserve

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INTRODUCTION

The National Park Service has asked the University of Oregon Museum of Natural and Cultural History to apply GIS in the analysis of new and existing archaeological data at the Craters of the Moon National Monument and Preserve in south-central Idaho in order to develop a management plan for its cultural resources. While the ultimate goal of this research is to test the archaeological data from the Preserve against a deductive model already developed for the entire eastern Snake River Plain, this paper focuses on the results of an X-Ray Fluorescence, or "XRF" analysis, of volcanic glass artifacts recovered from the Preserve over the last 20 years.

In areas characterized by volcanic activity, such as the Snake River Plain and surrounding mountains, basaltic flows of tool quality obsidian are fairly common. Thus obsidian artifacts dominate the assemblage from most prehistoric archaeological sites in the region. Obsidian was selected by aboriginal groups for its unique qualities. Although not as durable as silicates, it is very accessible, easily knapped, and is extremely sharp.

METHODS

While obsidian scrapers, knives, multipurpose tools, and waste flakes are often found during survey and recovered during excavations, only diagnostic projectile points that could be assigned a temporal period were used during this research. By sourcing a wide range of projectile points recovered from sites throughout the study area we hoped to address questions regarding changes in volcanic glass source utilization through time. We also hope to be able to detect possible prehistoric trade routes and changes in the seasonal round which we will examine against the deductive model.

XRF analysis is a nondestructive analytical technique used to diagnose trace elements in volcanic glass. This technique looks at the

molecular make-up of different elements in various samples. Since the percentage of trace elements in obsidian, the most common of the volcanic glasses, varies from source to source, it is possible to locate the specific geographic locations from which the raw stone used in the manufacture of individual artifacts originated. This is done by comparing the element values used to characterize the samples to those for known obsidian sources reported in the literature and with unpublished trace element data collected through analysis of geological source samples. The projectile points used in this study were analyzed by Northwest Research Obsidian Laboratory, and were attributed to a source if their trace element values fell within two standard deviations of the known upper

and lower limits of a source's chemical finger print. The sources identified in the current investigation were originally described by Bailey, Holmer, and Plager.

Projectile point types on the Eastern Snake River Plain have changed through time, possibly reflecting variability in technologies, shifts in subsistence strategies and/or diffusion of stylistic traits. A projectile point chronology for the eastern Snake River Plain has been presented, with slight variations, in the previous paper. This chronology will be applied to our study to structure the analysis of source data from the Craters of the Moon National Monument and Preserve. Large fluted and stemmed points characterize the early Holocene on the eastern Snake River Plain. The beginning of the middle Holocene, roughly 7,500 years ago, is marked by the appearance of smaller stemmed and notched dart points. These include Northern Side-notched, Stemmed-indent base, and McKean type projectile points. The beginning of the late Holocene, around 3500 years ago, was dominated by Elko Corner-notched points, however, approximately 1,500 years ago, we see an emergence of small corner-notched projectile points. These points include the Rosespring, Desert Side-notched, Avonlea, and the Cottonwood Triangular. During the initial stage of our analysis, we applied intuitive methods to categorize points; however, a statistical analysis of the points is currently underway.

To ensure that projectile points from all segments of the study area were included, I created a shape file in ArcView GIS that presented all recorded prehistoric finds with diagnostic projectile points in the research area. Since the study area has had very limited subsurface excavations, the majority of the projectile points used in this analysis were collected during intensive pedestrian survey. I selected 78 diagnostic projectile points for XRF analysis. Most of these projectile points were selected based on information provided in the Idaho State Historic Preservation database and then procured from the collections at Idaho

State University. In addition to these, I utilized points that were collected from the Craters of the Moon National Monument and Preserve during the 2004 and 2005 University of Oregon Summer Field Schools. In order to get a varied sample, I selected points from recorded isolated finds as well as sites designated as field camps, base camps, residential bases, and lava tubes. I also selected a range of projectile points from many of the multicomponent sites to document changes in source utilization through time.

RESULTS

Of the projectile points submitted for source analysis we included 29 projectile points from the middle Holocene and 49 projectile points dating to the late Holocene. As of yet, no projectile points from the early Holocene have been recorded or collected from within the Craters of the Moon National Monument and Preserve. The complete lack of early Holocene sites in this area is fascinating in itself and deserves future investigation.

From the middle Holocene we sourced 11 Northern Side-notched, and 8 Stemmed-indent base and 10 McKean projectile points. From the late Holocene we sourced 24 Elko type projectile points, 12 Rosespring, one Gatecliff Split-stemmed, 9 Desert Side-notched points, two Avonlea type points, and one Cottonwood Triangular point. A larger number of late Holocene specimens were sourced because they represented a larger percentage of the assemblage.

Results of the research indicate that the obsidian utilized in projectile point manufacture originated from twelve different sources. These includes obsidian from the American Falls source, Bear Gulch, Big Southern Butte, Brown's Bench, Cannonball Mountain, Malad, Owyhee, Timber Butte, Wedge Butte, Butte Valley Group A, and two unknown sources. Of these twelve known obsidian sources, three make up the bulk of the assemblage. These include Big Southern Butte, Brown's Bench, and American Falls. Big Southern Butte, located just to the northeast of the project area,

is the most commonly utilized source in the sample. Sourcing results indicated that a total of 29 points, or 37 percent of the sample group, originated here. 21 points are from the Brown's Bench source, located near the Nevada/Idaho border, these comprise 27 percent of the sample group. Fourteen projectile points originated from the American Falls source, located just south of the project near the Snake River, and make up 18 percent of the sample group.

The remaining sources are all located within Idaho as well. The Bear Gulch obsidian source is located in eastern Idaho near Island Park and is represented by five points. The Owyhee source, represented by 2 points, is located in the southwest corner of Idaho, although, the exact geographic location of the Owyhee source is still undetermined as obsidian with a similar signature is found over a large region. One projectile point was sourced to the Timber Butte quarry is western Idaho. The Wedge Butte source, located just north of the Shoshone ice caves, is represented by one point. The Malad source, also represented by one projectile point, is located in the southeast corner of Idaho. The Cannonball Mountain source, located in the Soldier Mountains to the west of the project area, is represented by one point. One point was sourced to the Butte Valley Group A quarry. This source's location is still unknown but is suspected to be located on the Nevada/Idaho border. Obsidian material used in the manufacture of two points in the

sample originated from an unknown location.

If we examine variations in the distribution of obsidian sources through time, we see a glimpse of what may have been an overall pattern of obsidian utilization over the past 7,500 years. The middle Holocene is represented by Northern Side-notched, Stemmed-indent base, and McKean type projectile points. Based on absolute dating methods, of points found in stratified contexts, Northern Side-notched type projectiles date from 7500 - 5000 B.P. in the study area. Although the sample group is dominated by Big Southern Butte and American Falls obsidian, sources nearest to the study area, the Northern Side-notch sample has the widest range of obsidian for the middle Holocene points (Figure 1). Other sources include Brown's Bench, the Malad source and Cannonball Mountain.

Our selected sample of Stemmed-indent base projectile points originates from only three lithic sources (Figure 1). Brown's Bench is represented by 37.5 percent of the sample group, Big Southern Butte is represented 37.5 percent of the sample group and American Falls is represented by 25 percent of the sample group.

Our sample of McKean type projectile points is dominated by obsidian originating from American Falls, 40 % sample group, and Big Southern Butte, comprising 30% of the sample (Figure 2). Brown's Bench is represented by two points and Butte Valley A

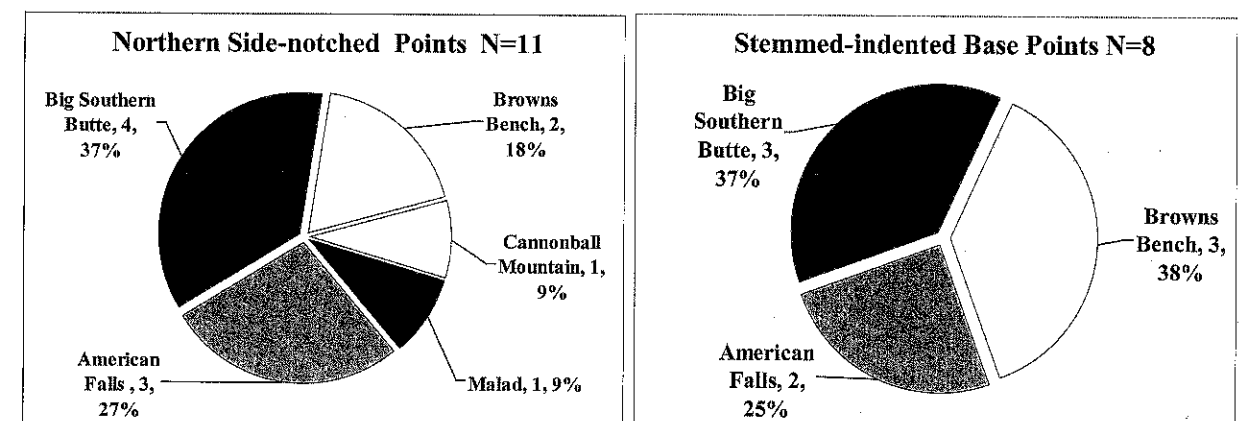


Figure 1. Total number of samples, percentage of sample group, and source locations for Northern Side-notched and Stemmed-indent base projectile points.

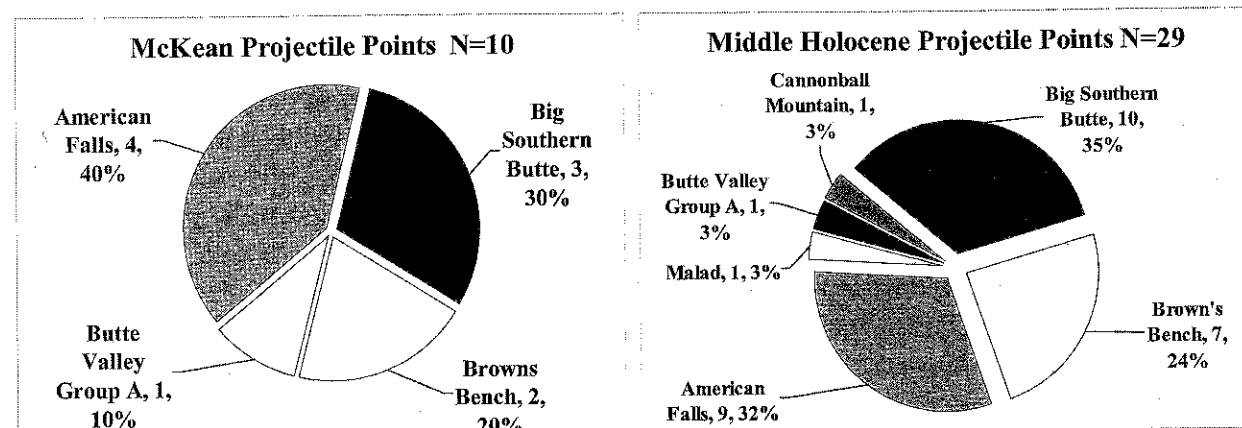


Figure 2. Total number of samples, percentage of sample group, and source locations for McKean and all of the Middle Holocene projectile points.

by one point.

When examining all the middle Holocene projectile points, three sources appear to dominate the assemblage (Figure 2). Lithic material originating from Big Southern Butte, American Falls, and Brown's Bench each make up from 24 percent to 35 percent of the sample group. The remaining 9 percent of the sample group is split between the Malad, the Butte Valley Group A, and the Cannonball Mountain sources.

Projectile points dating to the late Holocene in the study area include Elko, Gatecliff Split-stemmed, Rosespring, Avonlea, Desert Side-notch, and Cottonwood Triangular. We sourced a total of twenty-four Elko projectile points from the study area. 34 percent of the tool stone originated from the Brown's Bench source

(Figure 3). Big Southern Butte and American Falls are also well represented. Two points were identified as Bear Gulch obsidian, two points are from an unknown source, and one Elko point originated from the Timber Butte source.

From the 12 projectile points that fell in to the Rosespring classification, a total of six projectiles, or 50%, of the sample group were identified as Big Southern Butte obsidian (Figure 3). The next largest obsidian group is Brown's Bench which makes up 33 % of the total sample. Rosespring points from Wedge Butte and an unknown basalt group each make up eight percent of the total sample.

Nine projectile points were identified as the Desert Side-notch type. This group is dominated, 33%, by Bear Gulch lithic material

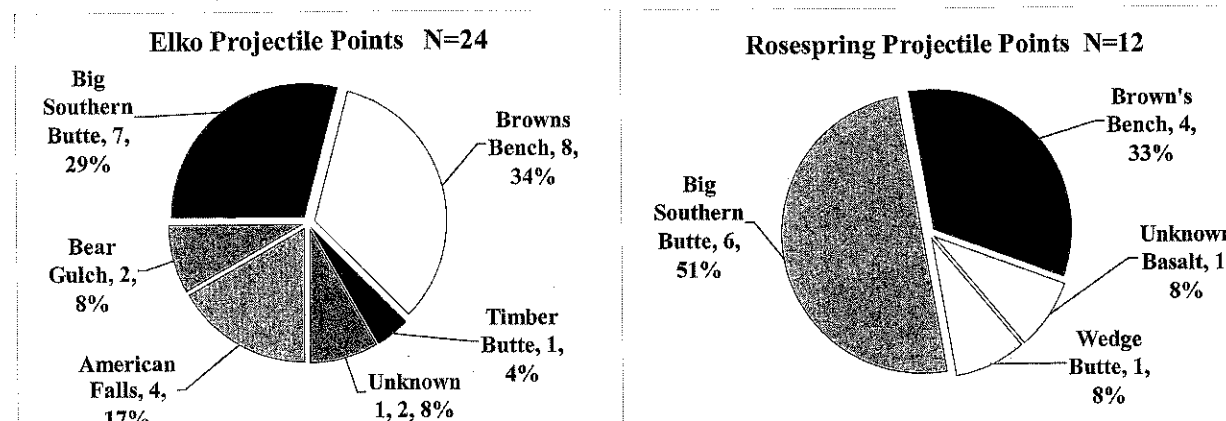


Figure 3. Total number of samples, percentage of sample group, and source locations for Elko and Rosespring projectile points.

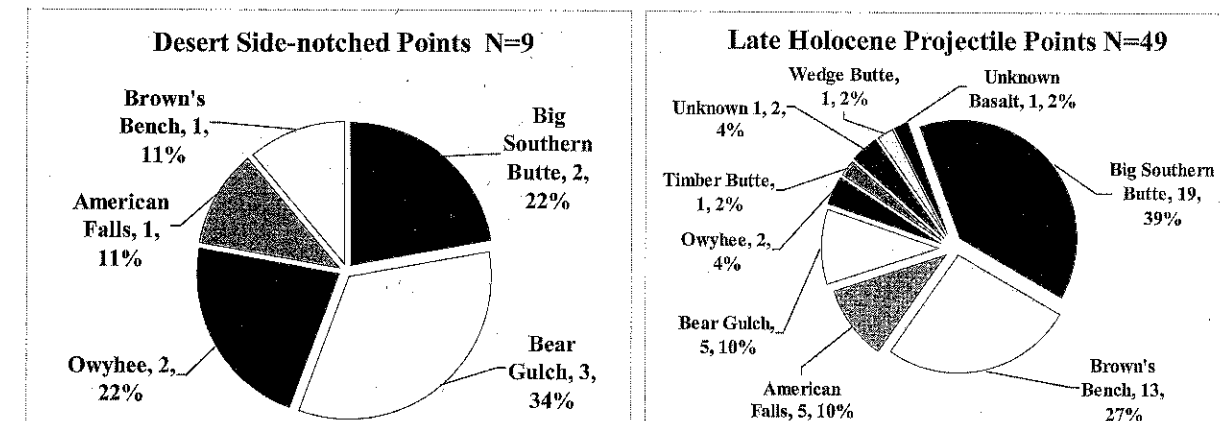


Figure 4. Total number of samples, percentage of sample group, and source locations for Desert Side-notched and all the late Holocene projectile points.

(Figure 4). The Big Southern Butte and Owyhee sources are represented by 22% of the sample group. The Brown's Bench and the American Falls sources are each represented by 11% of the sample group.

During this preliminary analysis, due to funding limitations, we were unable to source a large enough representative sample of Gatecliff Spit-stemmed, Avonlea, or Cottonwood Triangular projectile points to have scientific validity. Although individual analysis of these points was not possible, I have still included the small sample with the broader late Holocene sample group. A total of nine lithic sources were utilized during the late Holocene by groups in the study area (Figure 4). The primary sources being Big Southern Butte, represented by 39 percent of the sample group, and the Brown's Bench source represented by 27 percent of the sample group. Five points come from each Bear Gulch and American Falls with the remaining lithic sources are represented by one or two points each.

CONCLUSIONS

When comparing all the middle Holocene lithic sources to the sources of late Holocene points a pattern emerges (See Figures 2 and 4). It appears that during the late Holocene groups on the eastern Snake River Plain utilized tool quality stone from a wider variety of obsidian sources and from greater distances away from the project area. Although it does appear that

obsidian originating from Big Southern Butte and Brown's Bench dominate both sets, during the middle Holocene we see a increased use of American Falls obsidian while during the late Holocene we see evidence of utilization of a greater number of more distant sources. This phenomenon could be the result of increased population densities resulting in increased group contact. More people in this region would also result in greater utilization of possible site locations and thus greater number of late Holocene period sites.

Henrikson's research on the eastern Snake River Plain suggests continuity of subsistence strategies and material acquisition in the Shoshone-Bannock's seasonal round. Based on the preliminary results of the XRF analysis, obsidian sources utilized, the geographic locations of recovered specimens, and evaluating the site types from which these specimens were recovered, evidence resulting from this study agrees with the current theory of a fairly stable subsistence strategy. All obsidian utilized by the Shoshone-Bannock and sourced during this study originated from sources within Idaho.

The three dominate obsidian sources include American Falls, Brown's Bench, and Big Southern Butte. These localities all fall within the ethnographic seasonal round of the Shoshone-Bannock. The other sources identified during this study are located in areas from which acquisition on the eastern Snake River plain would not have been difficult. Ethnographic

