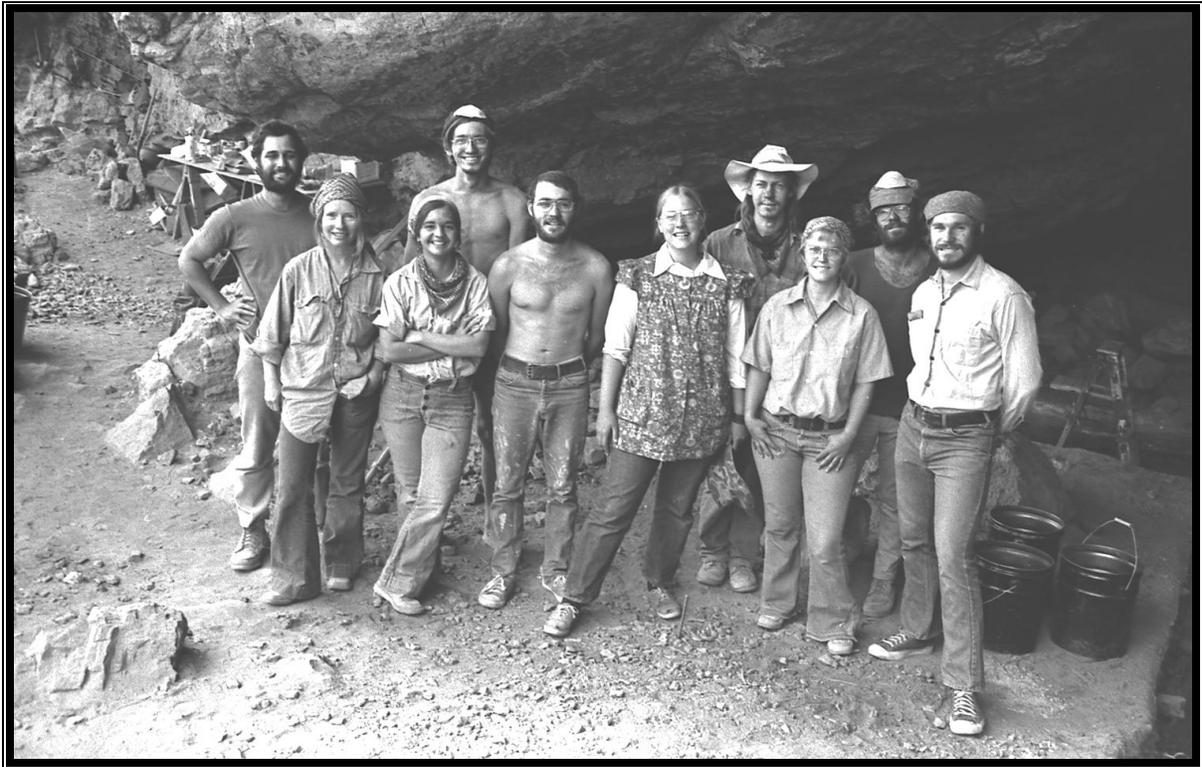


# NEVADA ARCHAEOLOGIST

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VOLUME 24, 2011

THE BLACK ROCK DESERT-HIGH ROCK COUNTRY



**NEVADA ARCHAEOLOGICAL ASSOCIATION**



# Nevada Archaeological Association

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The design for the NAA logo was adapted by Robert Elston from a Garfield Flat petroglyph.

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## Cover

The 1973 field crew standing in front of Last Supper Cave. Photo courtesy of Thomas N. Layton.



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## *Editors' Corner*

*Geoff Smith*

When I last edited the *Nevada Archaeologist* in 2007, my wife Linsie and I conjured up a first-time home purchase and subsequent remodeling, fieldwork, and graduate school as excuses for why Volume 22 was tardy. Although it's been four years since then, little has changed. We still live in the same house (as do many Nevadans, I suspect), and we are still remodeling it. There's still fieldwork and I am still in school, albeit now in a different capacity. I hope that you will again accept these excuses and my apology for the tardiness of the latest edition of the *Nevada Archaeologist*.

When I actually sat down and devoted time to finishing up this edition of the *Nevada Archaeologist*, I was amazed at how easy it was. This fact was a function of three factors. First, the papers in this volume were all meticulously prepared by the authors (except perhaps my own). By taking the time to make sure that everything was in order with their respective papers, the authors made my job remarkably easy. Second, Dave Valentine and Anne McConnell did most of the grunt work: soliciting and collecting papers as well as formatting many of them. Finally, the papers all focus on a region that is near and dear to my own heart; as such, they were a joy to read.

Those who have ventured into the Black Rock Desert-High Rock Country of northwest Nevada – either to watch the man burn each August with 50,000 of their closest friends or perhaps to seek the solitude that the region offers the other 51 weeks of the year – know how truly magnificent it is. People have probably always felt this way, whether they camped along the shores of the pluvial lakes that once covered the area, took refuge in

rockshelters along mountain streams, sought their fortunes searching for riches during a time when the nation had fallen on hard times, or spent time recording the footprints of earlier visitors.

The Black Rock Desert-High Rock Country is many things to many people. For those interested in Paleoindian archaeology, it is an area of great research potential. In the first article, Barker et al. describe how a great deal of such potential was lost when Elephant Mountain Cave was looted. The cave is one of a handful of sites in the Great Basin to have contained a stratified record of human occupation spanning the entire Holocene and its destruction represents a substantial loss to the archaeological and Native American communities. Thanks to the hard work of the Bureau of Land Management and other federal and state officials, materials from Elephant Mountain Cave were recovered and ongoing analyses of them are helping to mitigate the tremendous damage caused by their theft.

Reno conveys a happier story in the second article. As a green 19-year-old, Ron was swept away by the High Rock Ecological Project, headed by Thomas Layton, to work at Last Supper Cave. That site, one of the few other stratified caves in the Great Basin to contain a record of human occupation spanning the Holocene, somehow escaped the rampant looting of caves and rockshelters that was taking place in northwest Nevada during the 1960s and 1970s. As Layton once told me, “it was a race between professional archaeologists and pothunters to find and dig these sites and we knew if we did not excavate Last Supper Cave, it would soon be destroyed.” Thankfully,

Layton acted quickly, as the results of ongoing studies of the Last Supper Cave continue to reflect the importance of that site. Reno's generous retelling of his time as a young man working in the wilds of Nevada during the early 1970s provides a perspective on Nevada archaeology generally only shared late at night around campfires. Thanks to Ron, we can sit comfortably in our homes and offices and read about characters and events that jump to life because of his excellent account of an underreported but important chapter in Nevada archaeology.

In the third article, I pick up where Reno left off – at Last Supper Cave – and ponder a simple question: if one were to walk from the cave to the Parman localities (a series of open-air Paleoindian sites that Layton also recorded), how should they proceed? To answer this simple question, I employed a GIS-based least-cost path analysis to predict the “best” route. I chose slope as my primary variable, assuming that greater slope equals more physical effort. The results suggest that groups should have followed canyon drainages between higher landforms, rather than walk straight up and over mountains. Although these results clearly do not represent a major contribution to Great Basin archaeology or offer much insight into human behavior, I hope that my study represents at least two things: (1) a jumping-off point for more detailed studies conducted by people who are far more proficient with GIS than I; and (2) my first and last foray into the complicated world of GIS modeling.

The fourth article represents a short piece written by the late Alvin McLane just before his passing. McLane also ponders a simple question, albeit using an approach not rooted in computer technology. Alvin instead draws upon the ethnographic record of the Great Basin for his explanation of the enigmatic images of

Handprint Cave and provides those with an interest in the Black Rock Desert with yet another hypothesis to test.

Next, LaValley focuses on Paiute Creek Shelter, located almost directly across the Black Rock Desert from Handprint Cave. Like Handprint Cave, Native Americans visited Paiute Creek Shelter but left behind an extensive lithic and faunal assemblage rather than symbolic images. LaValley's study represents one of the first analyses of material from the shelter, which was excavated in 2006 by a small crew from the University of Nevada, Reno. It provides a sense of what prehistoric groups did while occupying Paiute Creek Shelter and adds to our collective understanding of settlement and land-use strategies in the Black Rock Desert-High Rock Country.

In the final article, McMurry et al. also consider human land-use and settlement strategies, albeit for a different period of Nevada's history. In a detailed study, the authors describe another University of Nevada, Reno project, showcasing the diversity of projects undertaken by the Department of Anthropology. Their work documents efforts by independent-minded Americans who worked to make ends meet during one of the harshest economic times in U.S. history. It is comforting to know that if the economy continues on its current downward trend, at least we might all be able to relocate to Rabbithole Springs and eke out a living mining gold.

I hope you enjoy the latest edition of the *Nevada Archaeologist* and that it has inspired you to get out there and experience all that the Black Rock Desert-High Rock Country has to offer. Again, I apologize for the delay in its completion and want to thank Dave Valentine, Anne McConnell, the NAA Board of Directors, and all of the authors for contributing to the volume's content and production.

## *Looting at Elephant Mountain Cave<sup>i</sup>*

*James P. Barker*  
Nevada State Museum

*Cynthia Ellis-Pinto*

*David Valentine*  
Idaho Power

*Between 1980 and 1985, Jack Harelson from Grants Pass, Oregon, systematically looted the Elephant Mountain Cave site in the Black Rock Desert. While looting this important site, Harelson excavated at least 500 cubic yards of stratified archaeological deposits and destroyed a major page from the history of Nevada. As reconstructed, the cave contained a record of human activity stretching from 10,000 years ago through ethnohistoric times. The deposits contained Fort Rock sandals, hafted projectile points, scrapers, atlatl shafts, arrow shafts, coprolites, floral remains, faunal remains, textiles, and the remains of at least five people. It also contained two bundle burials, dated to 2,000 years ago, suggesting significant differences in social organization and lifeways compared to ethnohistoric accounts. After a trial in Oregon State courts, Harelson was sentenced to 18 months in prison, \$20,000 in fines, and two years supervised probation. He was also served with a federal civil assessment of more than \$2,500,000. Harelson appealed the civil penalty and lost.*

Since the early 1980s the archaeological community in Nevada has buzzed with rumors of a prehistoric burial cave on Elephant Mountain in the Black Rock Desert, from which a looter removed two bundle burials along with prodigious amounts of treasure. In January 1995, Oregon State Police began working with an informant to develop evidence of illegal excavations on Bureau of Land Management (BLM) administered lands in the Black Rock Desert. The informant seemed to describe the rumored cave. In March 1995, the informant took BLM archaeologists and special agents, and Oregon State Police officers to a large cave site in a butte just south of Elephant Mountain in the northern Black Rock Desert. This cave had been looted and the informant provided photographs and testimony showing that she and Jack Harelson, from Grants Pass, Oregon illegally

excavated it in the early 1980s. On April 11, 1995, a search of Harelson's home produced hundreds of artifacts from the cave and the remains of two headless juvenile Native Americans. The bodies were buried in garbage bags in Harelson's garden. Harelson was pressured into giving up the skulls in 2002.

Due to the statute of limitations on Federal criminal proceedings, Harelson was arrested on Oregon State charges, tried in State court, and on January 10, 1996, found guilty of abuse of a corpse, possession of stolen property, and concealing evidence<sup>ii</sup>. Harelson was sentenced on February 6, 1996 to 18 months in jail, \$20,000 in fines and restitution, and two years supervised probation. Under his probation conditions Harelson cannot possess any prehistoric artifacts for which he does not have legal title. Harelson appealed his conviction of

abusing corpses to the Oregon Supreme Court and won based on his argument that the Oregon statute of limitations had run out. The BLM recovered the artifacts and human remains taken from Elephant Mountain Cave and is curating them at the Nevada State Museum, pending their final disposition under the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA).

Based on evidence presented, and not contested at the trial, Jack Harelson violated the Archaeological Resources Protection Act of 1979 (ARPA) by illegally excavating Elephant Mountain Cave in the early 1980s. Evidence at the trial established that Harelson knew he was excavating illegally on public lands and that he actively concealed his activities. Each year in the winter, Harelson went to the cave on weekends and holidays to avoid detection while excavating the cave. He also built rock walls to conceal the backdirt from excavating and hid the human remains from the cave by burying them, without their skulls, under a flower bed in his backyard.

## DESCRIPTION

Elephant Mountain Cave is located in Section 32 (unsurveyed) of T.39.N., R.27.E., Mount Diablo Meridian, on public land managed by the BLM in what is now the Black Rock Desert Wilderness Area of the Winnemucca District. The cave consists of two chambers. Overall it is approximately 17.68 m (58 feet) deep from back to front with an average width of 2.86 m (9.38 feet). The back chamber is 10.06 m (33 feet) deep and the front chamber is 7.62 m (25 feet) deep. At the level of the original surface, the cave was approximately 5.49 m (18 feet) wide at the mouth and 5.79 m (19 feet) wide in the middle of the front chamber. It tapers to approximately 3.05 m (10 feet) wide at the back of the front chamber. The back

chamber is 3.05 m (10 feet) wide in the front with roughly parallel sides for approximately 4.57 m (15 feet) toward the back. At this point, the back chamber tapers abruptly to about 1.52 m (5 feet) wide and continues at this width for 2.74 m (9 feet), at which point it tapers to nothing at the back of the cave.

The north wall of the cave is roughly vertical while the south wall/roof slopes steeply to the south. Because of this slope, the deposits below the original surface were generally wider at the floor of the cave than they were at the original surface line<sup>iii</sup>. It is also clear from comparing photographs taken during the illegal excavations with photographs taken during the damage assessment that approximately the back quarter of the cave was completely sealed when later deposition filled this part of the cave to within a few inches of the roof. The sealed portion of the cave would have been extremely valuable to archaeologists because it represented a time capsule preserved through the ages untouched by subsequent events.

Based on these measurements, the cave contained at least 382.28 m<sup>3</sup> (500 yd<sup>3</sup>) of excavatable archaeological deposits. As near as can be determined by comparing photographs taken during the illegal excavations with photographs taken during the damage assessment, all archaeological deposits in the cave were either completely excavated or disturbed during the illegal excavation. Approximately 60% [229.37 m<sup>3</sup> (300 yd<sup>3</sup>)] of the excavated volume consisted of roof spall that was moved during the illegal excavations and left in the cave when the excavations were finished. The remaining 40% [approximately 152.91 m<sup>3</sup> (200 yd<sup>3</sup>)] of the illegally excavated deposits were removed from the cave, screened for artifacts, and left on the apron in front of the cave.

Although approximately 95% of the original deposits in the cave were illegally excavated or disturbed, there were two places in the cave at

which remnants of the original deposits appear to have limited stratigraphic integrity. While representing only a fragment of the lower portion of the stratigraphic profile of the cave, these sections do reveal the nature of the archaeological deposits throughout the cave.

As reconstructed during the damage assessment, the archaeological deposits in the cave consisted of alternating stratigraphic layers composed of roof spall, windblown silts, or archaeological materials. This stratigraphy suggests that the cave was occupied and abandoned repeatedly by different groups throughout aboriginal times. This stratigraphy increases the archaeological value of the cave because it suggests that each occupation of the cave was physically separated from other occupations by layers of culturally sterile natural deposits.

The artifacts illegally collected from the cave support this interpretation. Based on time sensitive artifacts from the collection, at least five different occupations were represented in the cave. The earliest time sensitive projectile points in the collection are Western Pluvial Lake Tradition Stemmed Points, with an age range of 10,000 to 7,000 radiocarbon years ( $^{14}\text{C}$ ) BP. The cave also contained Fort Rock Sandals with an age range consistent with the stemmed points. Pinto Series Points, with an age range of 7,000 to 3,500  $^{14}\text{C}$  BP are next in the sequence, followed by Elko Series Points, with an age range of 4,000 to 1,500  $^{14}\text{C}$  BP, Rose Spring and Eastgate Series Points (i.e., Rosegate), with an age range of 1,500 to 800  $^{14}\text{C}$  BP, and Desert Series Points, with an age of post-800  $^{14}\text{C}$  BP. As represented by the number of points in each period, the cave was most intensively occupied during Rosegate and Elko times (from about 4,000  $^{14}\text{C}$  BP through 800  $^{14}\text{C}$  BP). Each of these occupations probably represents a different aboriginal lifeway and if undisturbed, the cave could have answered questions about the evolution of aboriginal cultures in Northwestern

Nevada over the last 10,000 years. All of this potential was lost during the illegal excavations.

During the damage assessment, seven samples were submitted for radiocarbon dating and since then an additional 13 textile dates have been obtained. The results are shown in Table 1. The initial dates confirm that remnant archaeological deposits in the cave are at least 5,000 years old based on a date of  $4,910 \pm 230$   $^{14}\text{C}$  BP for the hearth feature found at the base of Profile #1, Unit 2. This date is supported by a date of  $4,200 \pm 70$   $^{14}\text{C}$  BP from a human coprolite (desiccated human feces) found in Profile #2, Unit 1A/3 and a date of  $3,560 \pm 80$   $^{14}\text{C}$  BP on vegetation from Profile #2, Unit 2. The three date sequence from the two soil profiles is consistent with the stratigraphy of the remnant deposits.

Elephant Mountain Cave contained numerous woven sandals and sandal fragments. These include three Fort Rock sandals dated between  $8830 \pm 70$   $^{14}\text{C}$  BP and  $8670 \pm 80$   $^{14}\text{C}$  BP, four spiral weft sandals dated between  $8720 \pm 40$   $^{14}\text{C}$  BP and  $7780 \pm 90$   $^{14}\text{C}$  BP, and three multiple warp sandals dated to  $8330 \pm 40$   $^{14}\text{C}$  BP,  $6980 \pm 40$   $^{14}\text{C}$  BP, and  $130 \pm 40$   $^{14}\text{C}$  BP. In addition, the site contained a warp faced plain weave fragment dated to  $8830 \pm 70$   $^{14}\text{C}$  BP, a diagonal twining fragment dated to  $855 \pm 45$   $^{14}\text{C}$  BP, a twill twining fragment dated to  $6860 \pm 45$   $^{14}\text{C}$  BP, and two Catlow twined baskets dated to  $2030 \pm 60$   $^{14}\text{C}$  BP and  $2060 \pm 60$   $^{14}\text{C}$  BP.

The Fort Rock sandals indicate an occupation during the early Holocene. The dates for the subsequent Multiple Warp and Spiral Weft sandals and some textile fragments suggest occupation throughout the Holocene. The more recent  $^{14}\text{C}$  dates obtained from the Catlow Twined baskets, the moccasin, and the diagonal twined fragment support occupation during the late Holocene and the  $130 \pm 40$   $^{14}\text{C}$  BP date for a multiple warp sandal is consistent with an ethnohistoric occupation. These dates are supported by the range of projectile points in the

**Table 1. Radiocarbon Dates from Elephant Mountain Cave.**

SAMPLE	<sup>14</sup> C DATING METHOD	<sup>14</sup> C YEARS BP
Charcoal from hearth, Profile #1, Unit 2	Standard	4910±230
Human coprolite, Profile #2, Unit 1A/3	Standard	4200±70
Vegetation, Profile #2, Unit 2	AMS	3560±80
Netting	AMS	2050±60
Catlow Twined basket	AMS	2030±60
Catlow Twined basket	AMS	2060±60
Moccasin	AMS	1580±50
Fort Rock Sandal	AMS	8830±70
Fort Rock Sandal	AMS	8735±50
Fort Rock Sandal	AMS	8670±80
Spiral Weft Sandal	AMS	8720±40
Spiral Weft Sandal	AMS	8360±40
Spiral Weft Sandal	AMS	8280±65
Spiral Weft Sandal	AMS	7780±90
Multiple Warp	AMS	8330±40
Multiple Warp	AMS	6980±40
Multiple Warp	AMS	130±40
Warp Faced Plain Weave Fragment	AMS	8830±70
Diagonal Twining fragment	AMS	855±45
Twill Twining fragment	AMS	6860±45

collection. The comparison of the projectile point data with the radiocarbon dates confirms that the cave was occupied for at least twice as long as the period represented by the stratigraphic remnants of the deposits found during the damage assessment. The comparison also suggests at least three separate occupations of the cave.

The cave contained two bundle burials: a juvenile male and a juvenile female. Radiocarbon dates from Catlow Twined baskets in which the children were bundled indicate that both were interred within 30 years of each other, sometime between 2,120 <sup>14</sup>C BP and 1,970 <sup>14</sup>C BP. While it can be argued on stylistic grounds that both individuals were interred by the same people, there is no way to conclusively demonstrate this. The dates for the burials and the materials associated with them suggest that

the burials are not culturally affiliated with the Numic-speaking people who occupied the area at the time of initial contact with American explorers. The Cattail-Eater Northern Paiute of Stillwater Marsh (Fowler 1992:163) for example, did not place the deceased in bundle baskets or bury them in caves. Neither did the Surprise Valley Paiute (Kelley 1932:167-169). Instead the dead were wrapped in a robe and buried, either extended or flexed, with items of personal property, in sandy or rocky areas in the foothills.

Both burials suggest a social organization that differs from that portrayed in the ethnographic record. At the time of contact, aboriginal cultures were egalitarian with minimal social stratification and non-hereditary leaders (d'Azevedo 1986:488-489; Fowler and Liljebland 1986:450-451; Thomas et al.

1986:274-279). In this type of society, burials are not usually associated with extensive grave goods. The burial bundles illegally excavated from the cave contained extensive grave goods suggesting a degree of social differentiation that was not characteristic of aboriginal cultures at the time of contact. Further, the individuals interred were too young to have earned significant status within the community and their burial with extensive and valuable grave goods (including rabbit nets, baskets, ornaments, and lithics) suggests that social differences were ascribed or hereditary, rather than achieved. Hereditary status was not typical of western Great Basin aboriginal cultures at the time of contact. The destruction of the archaeological deposits in the cave make it impossible for us to understand this culture and to gather data that could have helped us understand how egalitarian cultures evolve into ones that are stratified.

In addition to the two burials, human remains in the collection include: an adult finger nail, unburned; a skull fragment, sutures not closed, with some evidence of being burned; two adult incisors; and approximately 1/2-ounce of black, uncut human hair. The remains indicate that at least two other individuals, one of whom was likely cremated, were buried in Elephant Mountain Cave prior to the illegal excavation. Based on the hair sample and possible cremation, the presumption is that these were Native Americans buried sometime prior to contact. Cremation was very rare among the Northern Paiute and reserved for witches (Fowler 1992:163) or for people "who didn't know what was right" (Kelley 1932:167-169). The burial data taken as a whole suggest that at least one and possibly two different groups, in addition to the people who interred the bundle burials, used the cave. This interpretation would be consistent with the point and radiocarbon data. On the other hand, simple non-bundle burials may be lower status people buried at the same time as the high status people in the bundle

burials. Unfortunately, these possibilities cannot be tested because the illegal excavation destroyed the stratigraphic context of the burials. It is likely that more human remains would be recovered if the spoils and backdirt from the illegal excavations were screened.

An examination of the fill that was removed from the cave during the illegal excavations revealed that the archaeological deposits contained large numbers of mammal and bird bones, plant macrofossils, and sediments conducive to recovering pollen samples. In addition, the illegal collection contains numerous human coprolites and an additional coprolite was recovered during the damage assessment. If undisturbed, these materials would have allowed a reconstruction of environmental conditions over the least the last 5,000 years. Such an environmental record is invaluable for determining the effects of environmental change on human lifeways. It is also useful for determining baseline environmental conditions over time. Such baseline data is invaluable for understanding issues like global climatic change. In addition, if the coprolites had been scientifically excavated, they would have allowed archaeologists to develop a dietary reconstruction through time. Dietary reconstructions are important links between culture and the environment that help explain cultural adaptations through time. The illegal excavation of the cave destroyed all of these data.

The material found in the confiscated collection represents only a small fraction of the number of artifacts that must have been located in the cave. Similar cave sites subjected to scientific excavation typically contain thousands of artifacts and Elephant Mountain Cave was no exception. During the damage assessment fieldwork, the team noted that literally thousands of lithic artifacts remained in the backdirt in front of the cave. There was also a pile of

broken groundstone artifacts in front of the cave. This is typical of illegally excavated sites, where collectors commonly discard all but the most aesthetically pleasing or unusual materials. In contrast to collectors, archaeologists are interested in completely reconstructing past cultures and materials discarded by collectors are essential to making complete reconstructions. Unfortunately, these materials are only useful if they are excavated and recorded in place. Once they are removed during illegal excavations, all of their data potential is lost.

In summary, stratified cave sites with human burials are generally extremely rare in the Great Basin and the Black Rock Desert in particular. The apparent clearly defined stratigraphy increases the archaeological value of the cave because it would have been possible to organize its various occupations into a meaningful temporal sequence. Such sequences lead to inferences about changes in lifeways through time. This stratigraphy also allows reconstructions of environmental conditions and inferences about the relationship between human behavior and environmental change. In addition, the presence of status differentiated burials in the cave increases the archaeological value because such burials yield insights into Native American lifeways prior to those depicted in the ethnographic record. The cave also contained exotic materials acquired through trade with people living on the California coast and in Oregon.

## **DAMAGE ASSESSMENT**

On May 31 and June 1, 1995 a team of archaeologists and law enforcement rangers from the BLM and the Bureau of Indian Affairs (BIA) conducted a damage assessment of Elephant Mountain Cave<sup>iv</sup>. The goal of the fieldwork was to gather sufficient information to

determine the archaeological value and the cost of restoration and repair to the cave site caused by Harelson's illegal excavation. The team recorded the dimensions of the cave and estimated the amount of archaeological deposits removed or disturbed. The team also reconstructed the structure and content of these deposits from remnant deposits in the cave. Three samples were obtained for dating. Subsequent to the fieldwork, the team leader used photographs of the illegal excavations in progress, the inventory of the confiscated collections from the cave, and four samples from the collections for radiocarbon dating.

### ***Archaeological Value***

The archaeological value of a site is appraised by estimating the cost of the retrieval of the scientific information that would have been obtainable prior to the violation (Hutt et al. 1992:65-67). Archaeological value includes the cost of all activities that would be necessary to realize the information potential of the site as it existed prior to being illegally excavated. These costs include: (1) research design preparation; (2) fieldwork; (3) laboratory analysis; (4) report preparation; (5) curation; and (6) publication.

The description of the cave, its contents, and its scientific attributes developed here were sent to three organizations doing contract archaeology in Nevada. These included a private contractor from Northern Nevada, a private contractor from Northern California, and a university-based archaeological research unit from Southern California. Each of these organizations was asked to prepare an estimate of the cost of obtaining the scientific data assumed to have been lost during the illegal excavations. Based on the average of these estimates, the archaeological value of the scientific information lost at Elephant Mountain Cave is assessed as \$1,758,767.

### *Commercial Value*

During the first week of June 1995, Cynthia Ellis-Pinto and David Valentine examined, described, and assigned market values to the artifacts and human remains in the confiscated collection from Elephant Mountain Cave. Ellis-Pinto worked with the perishables from the collection and Valentine worked with the lithics. Commercial values were determined using Hothem (1983, 1993) as a reference for market values. In addition, values were determined in consultation with the staff of the Nevada State Museum for items not covered in either Hothem reference.

The commercial value of the archaeological resources destroyed and damaged during the illegal excavation is assessed by estimating their fair market value (Hutt et al. 1992:65). A summary of the items in the illegal collection is shown in tables 2 and 3. The lithic artifacts in the collection have a commercial value of at least \$9,747 and the perishable artifacts have an estimated value of at least \$41,980. The human remains in the collection have an estimated commercial value of at least \$4,220. The total commercial value of the archaeological resources destroyed and damaged during the illegal excavation of Elephant Mountain Cave is \$55,947.

### *Cost of Restoration and Repair*

The cost of restoration and repair is assessed by estimating the costs associated with the complete restoration and repair of the damage caused by the illegal excavation (Hutt et al. 1992:67-69). There is little restoration or repair to be done within the cave itself. As noted above, the illegal excavations removed almost all of the archaeological deposits. As is typical with illegal excavations, digging began at the mouth of the cave and proceeded through the

entire deposit. The backdirt and discarded artifacts from this digging were deposited immediately in front of the cave. This damage assessment estimated that at least 152.91 m<sup>3</sup> (200 yd<sup>3</sup>) of deposits were removed and dumped in front of the cave. The backdirt pile in front of the cave covered a roughly elliptical area 18.90 m (62 feet) long by 7.92 m (26 feet) at its maximum width to depths up to 1.83 m (6 feet).

**Table 2. Lithic Artifacts from Elephant Mountain Cave.**

<b>ARTIFACT TYPE</b>	<b>n</b>	<b>MARKET VALUE</b>
WPLT Stemmed Points	7	\$1,950
Humboldt Series Points	18	\$297
Pinto Series Points	11	\$220
Elko Series Points	23	\$709
Rosegate Series Points	29	\$370
Desert Series Points	5	\$52
Untyped Points	16	\$270
Bifaces	4	\$95
Blades	13	\$4,325
Blade Fragments	91	\$471
Preforms	3	\$47
Drills	1	\$10
Scrapers	39	\$417
Slate Pedants	1	\$100
Ground Stone	10	\$222
Cores	2	\$6
Utilized Flakes	113	\$161
Red Ocher Pieces	11	\$15
Turquoise Pieces	1	\$10
<b>Total</b>	<b>398</b>	<b>\$9,747</b>

Archaeologists begin excavating cave sites on the apron in front of the cave and then proceed into it. This is because aboriginal groups commonly used the areas in front of a cave as their primary working and living area. The interior of the cave was reserved for storage and sleeping. This means that there can be

significant archaeological information in the deposits in front of a cave. It is likely that intact archaeological deposits have been buried by the backdirt and spoils from the illegal excavation. It is also likely that the spoils and backdirt contain human remains that were discarded during the illegal excavation. The only way to restore and repair the damage caused by the illegal excavations is to remove and screen the accumulated backdirt and spoils from in front of the cave and excavate the remaining intact archaeological deposits. These deposits may yet yield significant archaeological information and the backdirt should yield human remains.

**Table 3. Perishable Artifacts from Elephant Mountain Cave.**

<b>ARTIFACT TYPE</b>	<b>n</b>	<b>MARKET VALUE</b>
Quids	40	\$200
Baskets	3	\$5,250
Textile Fragments	60	\$738
Wood Tools	21	\$295
Nets	3	\$21,000
Textile Materials	3	\$170
Bone Ornaments	71	\$3,096
Bone Tools	21	\$498
Hoof Necklaces	2	\$600
Animal Bones	45	\$48
Shell Ornaments	2	\$65
Gaming Piece	1	\$75
Atlatl Shafts	2	\$240
Arrow Shafts	6	\$220
Digging Sticks	5	\$405
Sandals	10	\$7,700
Sandal Fragments	2	\$75
Moccasins	9	\$900
Moccasin Soles	2	\$10
Rabbit-skin Weft	1	\$25
Wood Points	4	\$235
Other/Unknown	22	\$355
<b>Total</b>	<b>335</b>	<b>\$41,980</b>

The three organizations doing contract archaeology in Nevada asked to estimate the archaeological value of the cave itself were also asked to estimate the cost of removing the backdirt and spoils from the front of the cave and then scientifically excavating the remaining archaeological deposits. Based on the average of these estimates, the cost of restoration and repair of the damage to Elephant Mountain Cave is assessed as \$766,549.

### ***Total Damage***

The total damage assessment, as specified at 43 CFR 7.16(a), is a combination of the estimated cost of restoration and repair for the illegal excavation of Elephant Mountain Cave and either the archaeological value or the commercial value of the archaeological resources from the cave. The estimated cost of restoration and repair is \$766,549; the archaeological value is assessed at \$1,758,767; and the commercial value is \$55,947. Based on the estimates developed here, the total damage assessment can be either \$2,525,316 (restoration + archaeological value) or \$822,496 (restoration + commercial value).

In this case, the losses to the American people from the destruction of this significant archaeological site, and the insult to Native Americans from the desecration of the burials in the cave, far outweigh the commercial value of the materials in the illegal collection. Therefore, total damages have been assessed at \$2,525,316.

### **CIVIL PROCEEDING**

The Federal statute of limitations precludes Federal criminal prosecution more than seven years after the crime. In this case, the criminal clock started in 1985 when Harelson finished looting the cave, and ran out in 1992. The

statute does not preclude assessment of civil damages because the civil clock starts when the crime is discovered and runs for seven years. Based on the results of the trial and the damage assessment outlined here, in March 1996 BLM Nevada notified Mr. Harelson of its intent to assess him ARPA civil damages in the amount of \$2,525,316. Harelson responded with the argument that the statute of limitations had run out on civil action in this case and asked that the assessment be dropped. On September 3, 1996 BLM Nevada disagreed and issued him a Notice of Assessment for the full amount and on October 15, 1996 Harelson then filed an administrative appeal with the United States Department of the Interior Office of Hearings and Appeals (OHA).

In this appeal he again argued that the statute of limitations had run out and that the assessment was excessive and asked OHA to cancel the assessment. In June 2001, OHA issued a pre-hearing order requiring the parties to submit their expected witnesses and an outline of their evidence so that OHA could schedule a hearing. Mr. Harelson did not respond to this order and OHA issued a show-cause order asking why the case should or should not be resolved through written submissions without a formal hearing. Harelson again failed to respond and OHA determined that the case would be resolved solely on written submissions.

BLM submitted its case-in-chief arguing in support of the assessment on April 11, 2002 and Harelson responded with a request for an extension of time to prepare his case. He filed a response on September 10, 2002 and in October 2002 OHA accepted his response as sworn testimony. Administrative law judge William Hammett, OHA, then reviewed the written record and on December 10, 2002 completely affirmed BLM assessment.

In January 2003, Mr. Harelson filed an appeal of Judge Hammett's decision that the

civil penalty was reasonable and appropriate. Harelson argued that Elephant Mountain Cave was not significant, that the BLM greatly exaggerated the damage done by his illegal excavation, and that neither the government nor the people had suffered any damage because of his actions. This appeal was answered by the BLM in March, 2003 and on April 5, 2002 a two judge OHA panel affirmed Judge Hammett's decision and denied Harelson any further administrative appeal. Mr. Harelson failed to appeal the OHA decision in federal court within the time allowed for appeal and the civil phase of the Elephant Mountain Cave looting case came to an end.

In 2003, Harelson hired a police informant to kill six of the people involved in his conviction for looting Elephant Mountain Cave. He was arrested in 2003 and charged with six counts of conspiracy to commit murder and two counts of being a felon in possession of a firearm. In 2004, he was acquitted on two counts of conspiracy to committed murder and convicted of two count of being a felon in possession a firearm. While serving his 10-year sentence for illegal firearms possession, Harelson was convicted on the remaining four conspiracy counts and sentenced to an additional 10 years. During the same period, he also hired the same informant to finish looting Elephant Mountain Cave. Harelson was indicted for this conspiracy in September 2005. He pled guilty to the new federal conspiracy charges in October 2006 and is now awaiting sentencing. The federal court in Eugene Oregon is currently holding his sentencing in abeyance in an attempt to recover more artifacts. The United States Justice department is actively pursuing Harelson to recover the \$2,525,316 he owes the people of the United States for destroying a significant part of their heritage.

## REFERENCES CITED

D'Azevedo, Warren L.

1986 Washoe. In *Great Basin*, edited by Warren L. d'Azevedo, pp. 466-498. *Handbook of North American Indians*, Vol. 11, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Fowler, Catherine S.

1992 *In the Shadow of Fox Peak: An Ethnography of the Cattail-Eater Northern Paiute of Stillwater Marsh*. U.S. Fish and Wildlife Service, Cultural Resource Series, Number 5.

Fowler, Catherine S., and Sven Liljebld

1986 Northern Paiute. In *Great Basin*, edited by Warren d'Azevedo, pp. 435-465. *Handbook of North American Indians*, Vol. 11. William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Hothem, Lar

1983 *Arrowheads & Projectile Points, Updated for 1995*. Collector Books, Paducah, KY.

1993 *North American Indian Artifacts*, 5<sup>th</sup> Edition. KP Books, Iola, WI.

Hutt, Sherry, Elwood W. Jones, and Martin E. McAllister

1992 *Archaeological Resource Protection*. Preservation Press, Washington, D.C.

Kelly, Isabel T.

1932 Ethnography of the Surprise Valley Paiute. *University of California Publications in American Archaeology and Ethnography* 31(3):67-210.

Thomas, David H., Loran S. A. Pendleton, and Stephen C. Cappannari

1986 Western Shoshone. In *Great Basin*, edited by Warren L. d'Azevedo, pp. 262-283. *Handbook of North American Indians*, Vol. 11, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

## NOTES

<sup>i</sup> An earlier version of this paper was presented at the Great Basin Anthropology Conference, Kings Beach, California, October 1996.

<sup>ii</sup> This prosecution would not have happened without the vision and support of Timothy Thompson, the Josephine County, Oregon District Attorney, and the hard investigative work of Walt Markee from the Oregon State Police, and Frank Castrogiovanni, BLM Special Agent.

<sup>iii</sup> For example, at 1.88 m (6 feet) from the back of the cave the floor is 3.05 m (10 feet) wide while the original surface is 1.88 m (6 feet); at 5.49 m (18 feet) from the back, the floor is 8.23 m (27 feet) wide while the original line is 5.79 m (19 feet) and at 9.14 m (30 feet) from the back the floor is 4.57 m (15 feet) while the original surface is 2.74 m (9 feet).

<sup>iv</sup> The team consisted of: James P. Barker, Ph.D., BLM, Nevada State Office Archaeologist, Team Leader; Regina Smith, BLM, Winnemucca District Archaeologist; Richard C. Myers, BLM, Winnemucca District Ranger; Garry Cantley, M.A., BIA, Acting Phoenix Area Archaeologist.

## *Digging Last Supper Cave*

*Ron Reno*

Heritage Resource Consultants

*This article provides a personal glimpse of what academic and museum-based archaeological expeditions were like in Nevada before the field was largely taken over by cultural resources management based firms. Ron Reno recalls impressions of his first professional dig at Last Supper Cave under the direction of Dr. Thomas Layton.*

No volume about the Black Rock Desert–High Rock Country would be complete without some mention of Last Supper Cave. This significant site is located on Hell Creek, a tributary to Virgin Creek in northern Humboldt County. Discovered in 1967 by Stan Smith while hunting, this undisturbed cave was tested in 1968 and found to be rich enough to warrant excavation during the summers of 1973 and 1974 under the direction of Dr. Thomas N. Layton. In the second season, fieldwork was supervised by the late Dr. Jonathan Davis and Robert York. A large collection of perishable artifacts was recovered from packrat nests and from the upper levels. Post holes indicated remnants of a shelter within the large cave mouth and shallow house pits were present. Extensive deposits of systematically butchered fresh water mussels were found. Numerous Great Basin Stemmed points and related artifacts were recovered from a layer sealed beneath Mazama Ash. This was the first discovery of Parman and Cougar Mountain points in a context of this age.

These scientific wonders are not my story. See the attached bibliography for further reading concerning technical details. Most of us that do archaeology are at least as attached to the excitement of discovery and to the people we find ourselves associated with as we are to the actual results. After all, there are very few

avocational window washers or hot tar workers out there. Last Supper has a distinctive role in my own life. After spending uncounted weekends and vacations hunting relics as an amateur with my parents throughout the northern Great Basin, this marked the point, at the age of 19, when I made the leap to professional archaeologist. I was paid \$25 a week plus food by the Nevada State Museum to work 10-hour days, six days a week during the first summer season, which lasted nearly three months. Except for one Californian who volunteered for a short time, all other excavators were field school students from Louisiana State University, where Dr. Layton was teaching at the time (Figure 1). This project was so intense and different from anything I have been involved with since, that I will shed some of my professional armor and try to recreate the experience of digging Last Supper Cave. I will relate what it was like to be a kid away from home for the first time dropped into a remote place with a group of unique people on the adventure of a lifetime.

It all began on a typical day at UNR. At the end of an excellent lecture about Pacific Island cultures, Dr. Ken Knutsen announced that the Nevada State Museum was looking for people to dig somewhere. This was before CRM made such announcements commonplace. Without any conscious choice I found myself in the

familiar surroundings of the Nevada State Museum (where displays had not changed during my lifetime) passing for the first time through the double doors in the back with ANTHROPOLOGY painted over the lintel. Indiana Jones could not have felt more excitement and trepidation entering a hidden temple for the first time. Inside, instead of snakes, Don Tuohy and Tom Layton were examining stemmed and Clovis assemblages covering a large table. In the course of my interview they quickly determined: (1) I was fairly strong and liked to dig holes; (2) I had no field experience or field school; and (3) I was very excited about the whole thing. Since no one else applied, I got the job and Don gave me copies of Museum Papers with his articles about stemmed point assemblages. Yeehaaa!!! How did he know we would find a Great Basin Stemmed assemblage – he and Tom would coin the term later – at the bottom of Last Supper Cave? I was now a member of the Nevada High Rock Ecological Project. In those days, everything had to have “ecology” in the title to get a grant.

I packed my clothes, almost all secondhand Navy dungarees from my brother which quickly fell apart and led to a continuous summer of patching, into yet another of a succession of vehicles cobbled together by my mechanic father – in this case, a temperamental white Jeepster. I met the team in Carson City where we packed an impossibly large load on a Museum pickup and hitched a small silver travel trailer behind it for use as a field lab. The students had a motley fleet of cars. The state also contributed a classic station wagon. The caravan managed to cross the High Rock Country to a CCC camp on Virgin Creek used by Sheldon Wildlife Refuge by the end of the day. There, we experienced what happens when everyone who passes the spaghetti pot adds some more chili powder. This was the last odd meal we had, since a fellow crewmember,

Grace, turned out to be a gourmet cook specializing in Indian and Middle Eastern recipes picked up during her travels. I have never had such food before or since, in the field or out of it – the downside is that I doubt any crew ever washed so many dishes and pots every day, but it was worth it! In general we adapted to the exotic meals with no ill effects, but on one occasion it proved otherwise. We had just managed to excavate a deep row of pits across the cave and were working three pits side by side when the entire crew was simultaneously hit by a day-long bout of highly spiced farts. If this happened to one person, it would have led to ostracism, but with all equally afflicted it turned into a hilarious holiday of sorts and one of the high points of the season as far as morale goes.

The day after arriving on Virgin Creek we left the cars behind and crammed into the truck and my Jeepster for the rugged crossing over the divide from Virgin to Hell Creek. Most of the crew ended up walking nearly all the way, tossing stones out of the road. When we reached Hell Creek, Tom used the truck to smash a road through tree-size sagebrush into a flat spot below a short cliff. The entire crew then spent the rest of the day knocking down enough sagebrush to clear a camp large enough for four large tents, a trailer, and two vehicles. The crew occasionally accidentally threw sagebrush at the cameraman, who was on scene to film to expedition, as a diversion. One part of the season’s work involved production of a movie by James Toms and DeWayne Blacketer. After the work got going they returned every so often to record progress of the dig and curious changes in the diggers.

I volunteered to dig the privy pit and got so carried away that I struck water and had to partly backfill it. We probably could have stayed there for years without completely filling that hole. The privy had a wonderful view downstream toward Virgin Creek, beneath dissected lava flow topography.



**Figure 1. The 1973 field crew standing in front of Last Supper Cave. From left to right are Dr. Thomas Layton, Grace Corse, Donna Hauler, Ricky “Rick the Rat” Collins, Philip “Duke” Rivet, Mary Catherine Rapp, Ron Reno (with floppy hat and shoulder-length hair), Lora Foote, Thomas “Tom” Conn, and David Dye. Not shown are Eileen Moffat, Roberta McGonagle, James Toms, and DeWayne Blacketer. Photo courtesy of Thomas N. Layton.**

Laden with equipment, food, and water going upstream and with artifacts and lots of soil samples going downstream, the nearly mile-long hike along Hell Creek to and from the site generally took about an hour each way. The crew rotated carrying Tom’s big frame pack down each day. Since I foolishly brought my own frame pack, I got a heavy load every day. The canyon, though not particularly deep, is rugged and quite beautiful, particularly when the colors are brought out after a rare rainstorm.

The photographers tried to capture the romance of this daily journey by lying on the ground and photographing the row of boots tramping through the undergrowth. Unfortunately for them, I was wearing a pair of worn out-turned over hunting boots that utterly destroyed the artistry of it all.

At the cave, we soon divided into digging

teams and worked out a routine that quickly became set for the summer. The cave protected us from sun and wind. Otherwise the 70-foot-deep cave created some serious problems. A thick layer of vegetation had burned in the cave, leaving several inches of pure white powder on the surface. Every step raised a cloud. In one memorable scene, the photographers caught a person dumping a bucket of the stuff into a screen from a vantage on the opposite side of the canyon. One shake of the screen, and the entire side of the canyon disappeared behind a white cloud. Hence, we wore bandanas or a variety of respirators almost constantly. When excavating in the rat nests along the edges and rear of the cave, it was necessary at first to lay prone and scoop the material into a dustpan in front of my face. I still have vivid images of desiccated animal parts rolling into the pan inches from my

nose. Between dim light and intense dust it was barely possible to see a person working at one's shoulder. After about a month of this I was taking breaks about every 10 minutes to wash out my eyes (we did not think of buying goggles). One unfortunate fellow acquired the name "Rick the Rat" due to his specialization in rat nest mining.

The screening area was quite a way from excavations, particularly when deep in the cave. We hauled pairs of 5-gallon steel buckets (courtesy of NDOT) on endless trips out of the pits and down the slope. Duke, who was immensely strong despite his small size, successfully shamed the rest of us into filling the buckets too full by loudly muttering "candy ass" to himself every time someone passed him with one less than brim full. About midseason one of my knees went on strike and I hobbled around on a stick while recovering. Over the years I have learned to pay less attention to such social pressure and my buckets have now reached about the half-full mark. The next season Jonathan Davis took one look at this madness and rigged a tramway from the cave down to the screening area. The first season we really missed out not having Jonathan and his geological expertise around in several ways. For one thing, he would have immediately stopped our digging when we hit tuff deposits that predated the Flintstones (actually about 14 million years old). It took us a while longer to catch on, but when fresh it made beautiful Pepto-Bismol pink sidewalls and the deepest pit was a great place to keep water jugs cool. After the perpetually sloughing cultural deposits, it was gave us artistic joy to carve beautiful and enduring sidewalls in the tuff deposits.

Meanwhile, the rest of the deposits kept us interested with the superb haul of artifacts, occasional features, and puzzling convoluted stratification in the upper levels. One of my favorite artifacts was a carbonized sandal. It was extremely brittle and I spent an entire work

day alternately brushing it off and applying glyptol preservative. If I saw anyone having that kind of fun on one of my present excavations, I would jump in the pit, slip a shovel under the lot, wrap it up, and send it to the lab dirt and all. This would free the lab from trying to figure out how to get rid of all that preservative goop. Every couple of weeks the photographers would arrive and we would get a rest day. Tom would give animated lectures about the site stratification to the video cameras while we would stand out in the sun reflecting light into the cave with mylar panels. We were never able to stand very still and there was often a breeze, so the lighting effect was quite pretty, like sun reflecting onto the top of a grotto from a rippling pool.

Our excavation technique was by natural and cultural levels and we were meticulous about documentation and locational information (Figure 2). Looking back at the field notes we have nothing to be ashamed of. As an aside, it was possibly the last prehistoric site dug in the Basin with all control in feet and inches. I suspect this was due to Tom getting a great deal on a pile of yard sticks. We dug the cave in five foot squares. For vertical control, a magnificent brass transit was kept in place all summer. It was much more entertaining to shoot levels with this antique than fooling around with line levels. Toward the back of the cave we had to use a foot-long ruler as the stadia rod at first. Although well equipped in most things, the expedition lacked hand picks. Fortunately, I had an army surplus pick my brother bought me as a kid from a surplus store in Las Vegas – and which I still use all the time. The pick was in almost continuous use as it was shared back and forth. As I said before, I loved digging holes for any reason, anywhere, anytime.

The dig was well publicized and I think that about everyone within 200 miles visited us over the course of the summer. My much more-experienced coworkers were somewhat taciturn



**Figure 2. From left to right are David Dye, Duke Rivet, and Eileen Moffat excavating in Last Supper Cave. Photo courtesy of the Nevada State Museum.**

with visitors, so I ended up being the unofficial tour guide most of the time. Oh, the analyses and secrets of the past we were going to unravel according to my impromptu talks! Everything I read about in my *Introduction to Archaeology* class was going to be applied to the site. Considering that I occasionally forgot to remove my bandana before speaking, and that I have a voice that is the opposite of a drill sergeant and very hard to understand in the best of circumstances, I suspect many of the guests left the site just a little puzzled. The high point of my lecture series was when a listener fainted into a pile of ash – perhaps in self-defense.

Toward the end of the season we were descended upon by the entire Board of Trustees of the Nevada State Museum. It was Tom's show of course. The rest of us simply followed around and held our mylar panels for the group photo. For me, it was largely a day of unmitigated terror. Our excavation was shoulder deep by now and large enough for all of the

Trustees to stand in the bottom while Tom told them of the wonders of Last Supper. Don Tuohy chose a vantage point almost at the edge of the excavation. He was standing on an unsupported peninsula of shoulder high sediments! He stayed there practically forever and Tom was too preoccupied to notice the danger to his site. I will never understand how that dirt failed to collapse and partly bury two or three trustees. For the next week we meticulously scoured the approach trail on our daily trips to the cave and collected the numerous cigarette butts left by some of the Trustees in the wake of their visit. We took pride in leaving no trash in the canyon.

We were isolated and thrown together for an extremely long time without meaningful breaks. This intensified the experience in a way that is simply not approached anymore. There were no radios or cell phones. Once a week, a supply run was made to Cedarville. Anyone could go, but since it was about a 14-hour roundtrip and

hardly restful, most people chose to just stay in camp. As I recall, I went to Cedarville twice. Once was because I absolutely had to have a Fudgesicle (it was tremendous). I saw the only 10 minutes of televised Watergate I was exposed to that day – while in the checkout line at the grocery. The other time was our two-day holiday in midsummer, when everyone left. For that great vacation I drove to Cedarville, slept in the car behind the gas station, and the next day collected a jeep load of brown obsidian from the Warner Mountains. It was so pretty I never could bring myself to break the cobbles for flint knapping.

The museum pickup was used for the rugged portion of the supply trips to the CCC camp. The huge white station wagon, which went like a bomb, took over from here. This car excited the envy of street-dragging teenagers in Cedarville after it blew its muffler, which we did not fix. We lost count of the blown tires on those endless gravel roads. All of the trips over the rugged road finally did in the truck, which dropped its drive shaft on one of the steepest and rockiest side hills of the approach road. Fortunately I was able, just barely, to work the Jeepster around the hulk to do the ferrying. I made so many roundtrips one weekend that on the last one I scared Donna quite severely by falling mostly asleep at the wheel and driving mostly off the road. During that same journey, at about 2:00AM, a kangaroo rat leaped into the rut and gamely kept in front of the vehicle just about forever. I finally had to stop the car and scoop the beggar out of the rut before proceeding. By that time, the rat probably could have handled the driving better than I could. The kindly mechanic at the Virgin Valley Ranch eventually fixed the truck, and just in time because the transmission on my Jeepster packed in, resulting in my rig becoming parked for the rest of the project. I unbolted the seats and used them as camp chairs.

There is such thing as too much togetherness and within weeks, except for meals and splashing in the creek, most of the crew fled camp and found alternative abodes. The exodus was enhanced by the discovery that our “sheltered” campsite actually was perfectly sited to create dust devils in the slightest breeze. I moved in with a bat and various other critters in a tiny rockshelter in a cliff face about 50 feet above the creek. Some moved into a larger rockshelter up Hell Creek. Others constructed and lived in a brush wickiup, while another lived on a cot beneath a cliff face. Only four people stuck to tent life in camp. Bobbie McGonagle, who spent some time at camp working on botanical flotation, showed us all up with her commodious and fully equipped camper shell. The dispersed group was brought together for meals with a rousing cry of “Soueeeeee.” Rick had extensive experience with this call from back home and gave lessons to the rest of us on how to make it carry. To maintain schedule, the expedition alarm clock was given to everyone on a rotating basis. It was a big silver wind-up clock with large bells. My first stint with the beast after I moved into my cave was memorable. The cave was barely large enough for my cot and a storage box. The enhanced echoes of the ticking would have excited the envy of any digital sound company. Unfortunately, I did eventually manage to go asleep, for when the thing went off, sounding like every noise that ever was compressed into a single instant in the enclosed space, I leaped upright, smashing my head into the roof of the cave. After that I slept outside on clock nights.

My utter aversion to cold water produced a combination of horror and amusement among the crew. Bobbie still refers to me as the original “Bathless Groggins.” With the combination of fairly extreme heat and filthy working conditions, I was truly in a sorry state before finally relenting and bathing in the creek like everyone else. To facilitate rapidly getting a

bath after work, the crew soon abandoned modesty and went co-ed at the eight inch deep swimming puddle in Hell Creek. At least some of the females of the crew maintain to this day that they only made this step as a desperate ploy to regularly get me into the creek so I would stop offending their sensibilities. If so, it was successful. The only problems that developed out of this arrangement was the attempt, immediately quashed, by the photographers to surreptitiously obtain some art shots of this aspect of camp life.

Here I was in Nevada, a native, and I was the foreigner. Most everyone on the dig at the cave crew talked like they just walked out of *Gone With the Wind* except for Duke, who was extremely Cajun and proud of it. They were in awe of the place. Rick said that the closest thing to a rock he had ever seen was an extra-hard dirt clod. After a couple weeks they all dried up and their skin fell apart. We used untold bottles of skin cream trying to keep them together long enough to get back to their accustomed humidity.

James and DeWayne, the photographers from California and Carson City, bore the brunt of social criticism through no fault of their own. It was their lot to show up in clean clothes from a civilization that held no end of luxuries from the perspective of our increasingly quirky group. On one occasion, well into the summer, they brought a watermelon with them and put it into the creek to cool upon arrival. The entire crew worked happily all of that extremely hot day anticipating a rare treat at the end of it. Oblivious to all of this, the photographers ate their watermelon that evening. We were perilously close to staging another massacre in the High Rock Country that night.

Psychosis started popping up in weird ways after about six weeks. On one occasion Dave was mining out one of the rat nests. It was in an easy place to access for once and Lora was not able to keep up screening. Taking pity on her,

one after another of the crew started helping with the screening until everyone was doing it. After about an hour of this Dave got me aside and asked, "What have I done? Why is everyone doing this to me?"

I just loved the rugged setting of our camp. Many evenings and nights after work, I would wander all over the mountains and canyons, occasionally frightening others when appearing out of nowhere in the dark. On one of the days off I hitched a ride on the truck to Virgin Creek and then spent the entire day sloshing along the Virgin in its steep canyon, then up the lower portion of Hell Creek, arriving back in camp around 10 pm.

My absence that day proved very useful to the crew. The previous week I got a crazed mood and spent an entire afternoon and evening cleaning the stove and oven, which was an ordinary household gas range sitting on the ground beside the trailer. In amazed gratitude for this odd behavior, I was granted an un-birthday and my absence was used for creating some astounding gifts. Some of these things, bestowed at a surprise party, included a can of sauerkraut juice, a bottle of opened home-made wine deemed undrinkable even by our low standards with several drowned bugs floating in the top (I took a big hit and passed the jug), a live black beetle with my name carefully printed on it in white ink (still alive out there I hope), a distinctive cow pie, and wonder of wonders, a beautiful multi-strand necklace crafted out of various dry scats from the cave alternately painted green and clear. I should probably give this relic back to the museum someday.

That stove created problems another day when a rattlesnake crawled into it. It took hours to flush him out of there, then he hid under the front step of the lab trailer. We left the critters alone everywhere else but this was indecent. Following the snake battle, eventually won with a shovel, one of the crew took a snapshot of me with the snake dangling out of my mouth. It was

a tough tussle. The poor snake spent the rest of the summer in the refrigerator and is now probably a hatband somewhere in Louisiana if the hurricane did not get to him.

And so it went, a slice of time that seemed to go on forever. Ultimately we dug a very big hole in that cave, wrote up books of notes, and hauled out what seemed like tons of stuff in our backpacks. Then we packed it all up and drove to Carson City. There, we were shown the uncut (and therefore outrageously funny) film footage by our video artists, and split up. With my lack of experience, in retrospect I know I was a trial for Tom and my comrades at times. My summer at Hell Creek made some changes, mostly for the better, particularly when the starting point was 19 years old and clueless.

#### ACKNOWLEDGEMENTS

I am grateful to Tom Layton for hiring me and making materials available for this article. The field crew were unforgettable: Excavators David Dye, Thomas "Tom" Conn, Lora Foote, Eileen Moffat, Philip "Duke" Rivet, Ricky "Rick the Rat" Collins, and Donna Hauler; Cook and Camp Director Grace Corse; Lab Director Mary Catherine Rapp; Flotation Specialist Roberta "Bobbie" McGonagle; and Cinematographers James Toms and DeWayne Blacketer. Maggie Brown, Eugene Hattori, and Sue Ann Monteleone of the Nevada State Museum helped me locate notes, photographs, and other documents. Additional help in tracking down the somewhat scattered sources was provided by Dave Valentine and Geoff Smith. Shannon Hataway and Mona Reno helped scan the photographs into a usable format. Erich Obermayr provided editorial suggestions. Despite all of this help I am solely responsible for any inaccuracies. Dick Reno provided and maintained the Jeepster, which was

repaired and sold as soon as it made it back home.

#### NOTES

For further reading concerning Last Supper Cave:

- Barker, James P., and Susan McCabe  
2006 *Textile Evolution in the Great Basin*. Paper presented at the 30<sup>th</sup> Great Basin Anthropological Conference, Las Vegas. [The perishable artifact collection from this site demands extensive analysis but meaningful work will not be possible until radiocarbon dating of the remains takes place since nearly all of the perishable artifacts are from unstratified or turbated deposits. Permission for this dating is presently under negotiation].
- Cerveri, Doris  
1974 They „Dig“ Nevada History. *Sparks Tribune*. June 13, 1974:13.  
1975 An Exciting Archeological Site... The Last Supper Cave. *Desert Magazine*. September 1975:14–15. [A well-written popular summary, it contains the only two quality photographs of the first season available to the public].
- Davis, Jonathan O.  
1974 Geological Setting and Stratigraphy of Last Supper Cave. Unpublished manuscript in possession of Thomas N. Layton.
- Grayson, Donald K.  
1988 Danger Cave, Last Supper Cave, and Hanging Rock Shelter: The Faunas. *Anthropological Papers of the American Museum of Natural History*, v. 66 pt. 1.

[This volume documents a detailed analysis of the Last Supper Cave faunal materials, most of which came from unstratified rat nests. Grayson handled most of the bones. Paul W. Parmalee contributed a section on mollusks and birds, which is of particular importance considering the presence of the old fresh-water mollusk beds in the cave. R. Lee Lyman reevaluated the surface remains of domestic cattle in light of recent advances in taphonomy and concludes that there is in fact no evidence for Native American cattle rustling and butchering at Last Supper Cave].

- 1993 *The Desert's Past: A Natural History of the Great Basin*. Smithsonian Institution Press, Washington. [A summary of the stemmed point assemblage appears on pp. 241–243].

Layton, Thomas N.

- 1970 *High Rock Archaeology: An Interpretation of the Prehistory of the Northwestern Great Basin*. Ph.D. Dissertation, Harvard University, Cambridge. [Contains preliminary ideas about surface remains in the cave].
- 1977 Indian Rustlers of the High Rock. *Archaeology* 30:366–373. [Here Layton elaborated on the notion that the surface cow bone assemblage was related to rustling by Native Americans. See Lyman's contribution in Grayson (1988) for a conflicting interpretation].
- 1985 Invaders from the South? Archaeological Discontinuities in the

Northwestern Great Basin. *Journal of California and Great Basin Anthropology* 7(2):183–201. [A pioneer work in the use of obsidian hydration dating in the region].

Layton, Thomas N., and Jonathan O. Davis

- 1978 *Last Supper Cave: Early Post-Pleistocene Culture History and Paleoecology in the High Rock Country of the Northwestern Great Basin*. Unpublished manuscript on file at the Nevada State Museum, Carson City and at the Bureau of Land Management Winnemucca Field Office. [This document is a very preliminary and incomplete draft. Fortunately, before he died, Davis completed his basic analysis of the cave stratification and documented it in this draft and in the 1974 manuscript noted above. The draft also includes a preliminary analysis of stone artifacts and a somewhat more extended discussion of the Parman variant Great Basin Stemmed points. The site is briefly described and field methods are documented in the draft. Any user of this document must remain aware that it is a partial work in progress and that it would be unfair to the authors to treat it otherwise].

Field notes, administrative documents, faunal analysis notes, second season photographs, video film, sediment samples, and most artifacts are curated at the Nevada State Museum, Carson City.



## *A Least-Cost Path Analysis of Pre-Archaic Travel across the Black Rock Desert-High Rock Country of Northwest Nevada*

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*The Pre-Archaic foragers that inhabited the Great Basin during the late Pleistocene and early Holocene are typically perceived to have been far-ranging and traveled long distances to procure resources. A common source of evidence used to support this position are the results of lithic sourcing studies, which link artifacts made on particular raw materials to geologic sources on the landscape. These results are typically used to reconstruct Pre-Archaic ranges using “as the crow flies” distances between sites and toolstone sources. In this paper, I demonstrate how this common approach may misrepresent the actual distances traveled by pedestrian groups by employing a GIS-based least-cost path analysis between two archaeological sites in northwest Nevada. Although this study focuses on Pre-Archaic foragers in that region, it should be of relevance to any researchers with an interest in modeling the movements of prehistoric populations in the Great Basin and elsewhere.*

Northwest Nevada is a rugged and sparsely-populated region characterized by volcanic tablelands, deeply-incised drainages, and upland lake basins. Three decades of archaeological fieldwork there has identified numerous concentrations of Pre-Archaic artifacts thought to date to between ca. 11,500 and 8,000 radiocarbon years ago (Beck and Jones 1997; Jones and Beck 1999). These sites are situated along the margins of pluvial lake basins as well as in many of the caves and rockshelters in the region (Camp et al. 2007; Gruhn and Bryan 1988; Layton 1970, 1979; Layton and Davis 1978; Smith 2006).

The Pre-Archaic foragers that left these artifacts behind have traditionally been characterized as “highly-mobile” and are believed to have traveled great distances across the landscape (Beck and Jones 1997; Jones and Beck 1999; Jones et al. 2003). Studies of lithic technology (e.g., Graf 2001, Smith 2006) and results of X-ray fluorescence analysis of artifacts

manufactured on volcanic toolstone (e.g., Amick 1997, Jones et al. 2003, Smith 2006) provide support for this model of early-period mobility.

Many researchers (e.g., Graf 2002, Jones et al. 2003, Smith 2006) use the distances between known geologic sources of lithic raw materials and archaeological sites containing artifacts manufactured on such materials to delineate foraging ranges, or areas where groups obtained critical resources. These Pre-Archaic foraging ranges are inferred to have been broad territories often extending hundreds of kilometers in any given direction (Jones et al. 2003). Typically, these ranges are reconstructed using straight-line, or “as the crow flies,” distances to estimate the distances traveled between locations.

While this approach is standard in Great Basin research today, it is not without its shortcomings. For example, the straight lines used to represent prehistoric travel routes and distances fail to consider topographic variability. Lakes and extensive wetlands, steep-walled

canyons, high-elevation mountain ranges, and the routes traveled by pedestrian groups. As such, current approaches may not accurately represent how and where foragers moved across the landscape. In this paper, I present the results of a GIS-based least-cost path (LCP) analysis of topography and elevation conducted to consider how Pre-Archaic groups may have traveled between two points – in this case, archaeological sites in northwest Nevada. This method represents a suitable alternative to modeling prehistoric travel using straight-line distances. Although a relatively simple example, the results of the analysis strongly suggest that the traditional approach may significantly underestimate the distances traveled by groups as they moved across the landscape.

## BACKGROUND

The topography of the Black Rock Desert-High Rock Country is extremely variable. The landscape ranges from Basin-and-Range topography to the south to volcanic tablelands and deeply-incised drainages to the north. Elevations in the region vary from 1,200 m to 2,850 m. The area is rich in Pre-Archaic archaeological resources. The majority of early-period sites are found along the margins of pluvial lake basins; however, some have also been found in upland caves and rockshelters, suggesting that Pre-Archaic foragers may have visited a variety of ecozones. These groups have traditionally been characterized as being highly-mobile, traveling great distances across the landscape between resource patches. Analyses of lithic technological organization, minimal intersite diversity, a general lack of midden accumulation or evidence of structures, and toolstone sourcing provide support for this position (Jones et al. 2003). Due to the nature of the environment in the Great Basin and an absence of evidence for alternative means of

other natural features almost certainly influenced transportation (e.g., watercraft), this extensive travel is assumed to have occurred on foot.

Typically, pedestrian travel between locations frequented by Pre-Archaic groups has been modeled using straight-line distances. Clearly, such an approach fails to account for natural features on the landscape including deep canyons, lakes and rivers, and steep mountains that undoubtedly influenced the decisions made by foragers about how and where to travel. Due to this fact, it likely misrepresents where Pre-Archaic groups traveled and left behind traces of their occupations. As such, the current approach cannot help refine models of early-period mobility or identify areas with a high potential to contain Pre-Archaic archaeological sites.

Geographic Information Systems (GIS) have been increasingly applied in archaeology to develop a better understanding of land-use patterns (Connolly and Lake 2006). Approaches employing GIS-based analyses have ranged from developing models of how the New World may have been populated (e.g., Anderson and Gillam 2000) to considering how specific loci (e.g., bison jumps) were used by prehistoric groups (e.g., Byerly et al. 2005). More complex approaches have included combining GIS-based models with other types of analyses (e.g., studies of caloric expenditures during pedestrian travel) to provide previously unparalleled models of how groups moved across different terrains (e.g., Wood and Wood 2006). Together, these approaches are increasing researchers' abilities to model prehistoric behavior and decision-making processes.

A GIS-based LCP analysis that models where foragers may have traveled if topography influenced their decisions is well-suited for considering how Pre-Archaic groups moved across northwest Nevada. The variability of the terrain – specifically in terms of slope and elevation – strongly suggests that foragers did not move in straight lines between resource

patches that would have taken them over mountains or across canyons. Instead, I argue that they likely followed routes that were easier to negotiate. These may have included the deeply-incised drainages that dissect the region, which would have constituted flat, easy-to-travel paths as well as provided relatively abundant food and water compared with the surrounding tablelands. This paper tests this hypothesis by conducting a LCP analysis between two archaeological sites. Although the shortest distance between the sites is obviously a straight line, the results of the analysis indicate that this was likely not the route traveled. An alternate path is presented that, although longer, minimizes the variability of terrain that Pre-Archaic foragers would have had to negotiate.

## MATERIALS AND METHODS

Two archaeological sites containing Pre-Archaic artifacts were included in this study. The first is Last Supper Cave, a deep cave located 20 m above Hell Creek in a steep-walled canyon. It was excavated in the late 1960s and early 1970s and contained a well-preserved record of human occupation spanning the latest Pleistocene and Holocene (Layton and Davis 1978). The second site incorporated into this study is actually a cluster of four open-air surface localities in Five Mile Flat, an upland basin that once contained Pluvial Lake Parman (Mifflin and Wheat 1979). Known as the Parman Localities, these four artifact scatters contained large numbers of stemmed- and concave-based project points diagnostic of late Pleistocene/early Holocene occupations (Layton 1970; Smith 2006). For simplicity's sake and because of their proximity to one another and similar technological and temporal compositions, these four localities are herein represented as a single location. Because they are located close together in a flat lake basin,

this did not impact the results of the LCP analysis. These two sites – Last Supper Cave and the Parman Localities – are located 19 km apart “as the crow flies.” The terrain across this straight-line distance is variable and contains deeply-incised drainages and elevated volcanic tablelands. The area containing the two archaeological sites and the terrain surrounding them is represented on four 7.5” 1:24,000-scale United States Geological Survey (USGS) quadrangle maps.

Using ArcMap 9.2, a LCP analysis was performed to model how groups may have negotiated the rugged terrain between the two sites. Simply put, the approach uses one or more specified costs to develop a path between two points that would be the least-costly to travel (Connolly and Lake 2006). Because it undoubtedly influenced the decisions made by pedestrian travelers, slope was selected as the cost. The steps used to develop and execute this analysis are outlined below.

First, the four quadrangle maps representing the study area were downloaded from <http://www.geocommunity.com>. The maps were available as 10-m resolution digital elevation model (DEM) rasters in a digital data file (.DDF) format. These high-resolution files are ideal for a LCP analysis because using lower-resolution files (e.g., ones with 30-m cells) could potentially obscure features such as cliffs that would undoubtedly affect the results of the analysis. These files were converted to Imagine image files (.IMGs) to construct a mosaic. Constructing a mosaic was critical because without it, ArcMap would consider any gaps between the quadrangle maps as possessing a slope of “0”, which again would significantly alter the results. When the four quadrangles were merged, they provided a single raster that illustrated the elevation (in meters) of the project area. A hillshade was applied to the mosaic in order to emphasize the variability of the terrain (Figure 1).

The next step was to select a cost on which to base the LCP analysis. As previously indicated, slope was chosen because it undoubtedly impacted the decisions made by pedestrian travelers. Slope was calculated through a surface analysis of the mosaic using the spatial analyst extension in ArcMap. It ranged from 0 to 73 degrees in the study area and was classified into eight categories based on arbitrary divisions. The resulting map (Figure 2) illustrates how variable the terrain is in regards to slope as well as elevation.

Following the creation of a slope grid, a cost allocation grid was developed. Basically, this grid displays the cost of traveling as one moves farther from Last Supper Cave – the hypothetical starting point for this analysis. The grid was calculated using two variables for each 10-m raster cell: (1) the slope of the terrain; and (2) the distance from Last Supper Cave. In general, the steeper the slope and the greater the distance from Last Supper Cave, the more costly it would be to travel across the cells (Figure 3).

Once the cost allocation grid was created, the LCP analysis was performed. In this step, ArcMap considers every possible combination of cells in the study area from the start point to the end point – in this case, from Last Supper Cave to the Parman Localities – using data derived from the cost allocation grid. As its name implies, the results of the analysis display the least-costly path between the two points. Again, in this case, cost is based on the slope of the terrain and the distance from Last Supper Cave. As such, the path selected by ArcMap should be relatively slope-free.

## RESULTS

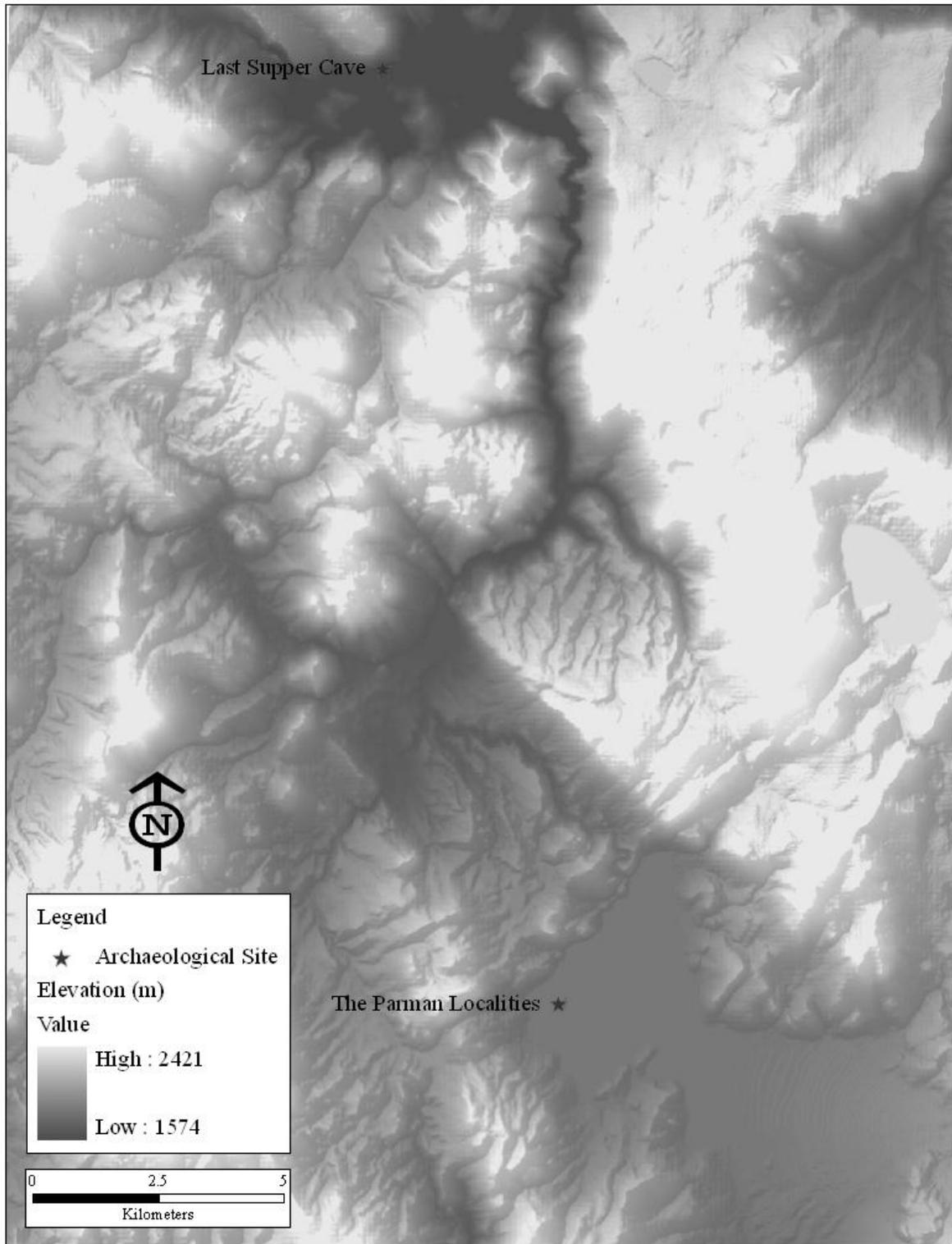
The result of the LCP analysis is illustrated in Figure 4. Clearly, the path selected by ArcMap avoids traversing areas of significant slope. Instead, it makes use of the deeply-

incised drainages that characterize the study area and moves eastward along Hell Creek to its intersection with Virgin Creek. From there, it follows Virgin Creek south to Five Mile Flat, where pluvial Lake Parman once stood. It then moves westward along the edge of the basin for a short distance before reaching the Parman Localities.

The least-cost path calculated by ArcMap is 34.9 km long. This is almost twice the distance of the straight-line path (19.0 km) between Last Supper Cave and the Parman Localities, although to travel the latter route several significant slopes would have to be negotiated. This fact seems counterintuitive given that the goal of this project was to model the least-costly way to move between points. If we recall, however, that slope was the only variable selected for inclusion in this project, the path appears well-suited to avoid the single specified cost. ArcMap permits multiple costs to be specified and its users may even assign different weights to each one (Price 2008). As such, future applications of this technique might include an analysis that takes numerous variables such as slope, aspect, total path distance, and other elements of pedestrian travel into consideration. Despite the shortcomings that stemmed from the simple nature of this particular analysis, the results nonetheless indicate that LCP analysis possesses the potential to contribute to ongoing studies of forager mobility.

## RESEARCH SIGNIFICANCE

This study has provided a simple example of how a GIS-based LCP analysis can be applied to archaeological research. A path between two points on the landscape was identified with the slope of the terrain constituting the primary variable taken into consideration. Although this LCP is a greater total distance (34.9 km) than



**Figure 1. A DEM mosaic of the study area showing the locations of Last Supper Cave and the Parman Localities.**

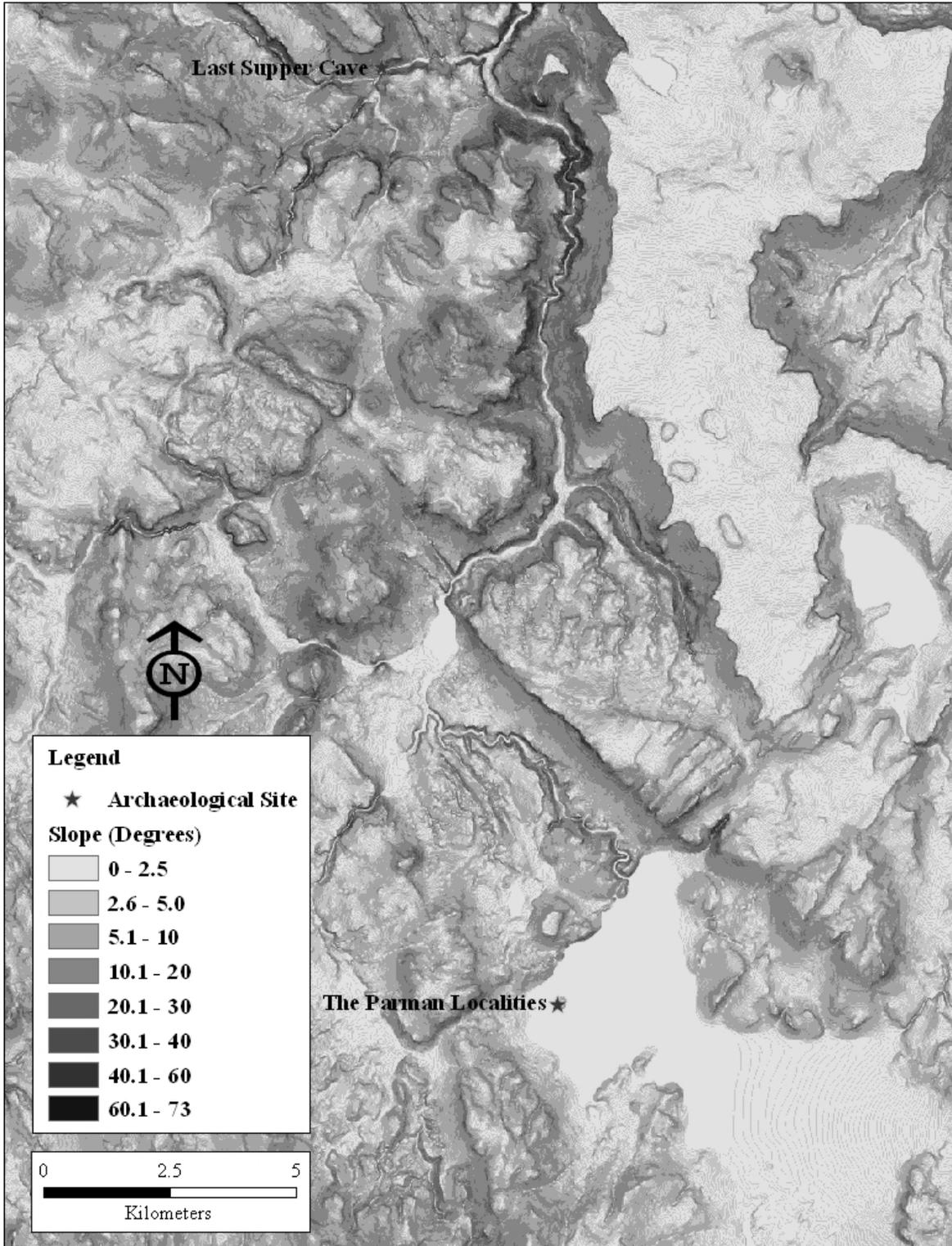
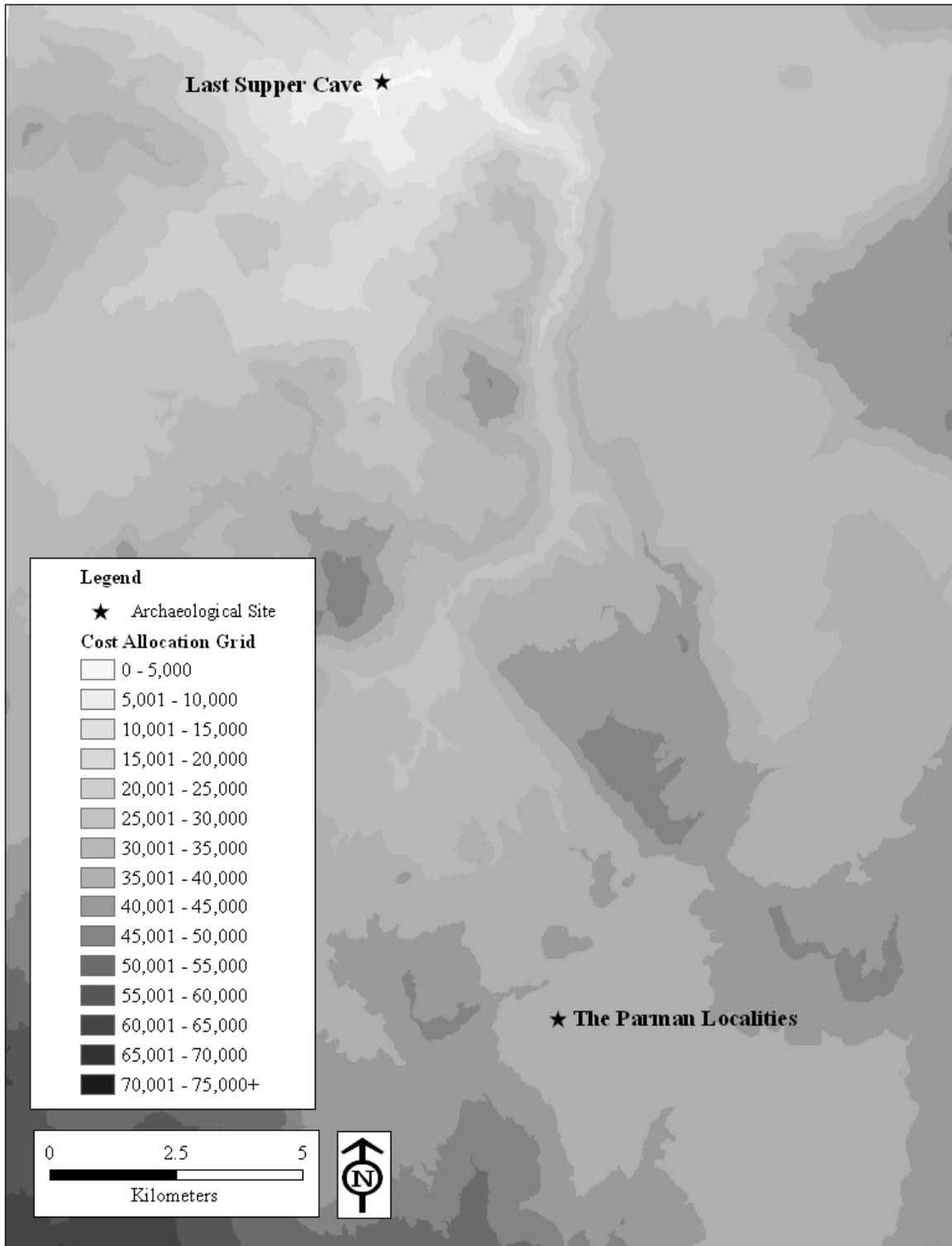


Figure 2. Breakdown of slope in the study area: lighter colors indicate areas of minimal slope while darker colors indicate areas of maximum slope.



**Figure 3. Cost allocation grid displaying the cost of traveling from Last Supper Cave: lighter areas are less-costly to traverse and darker areas are more costly to traverse.**

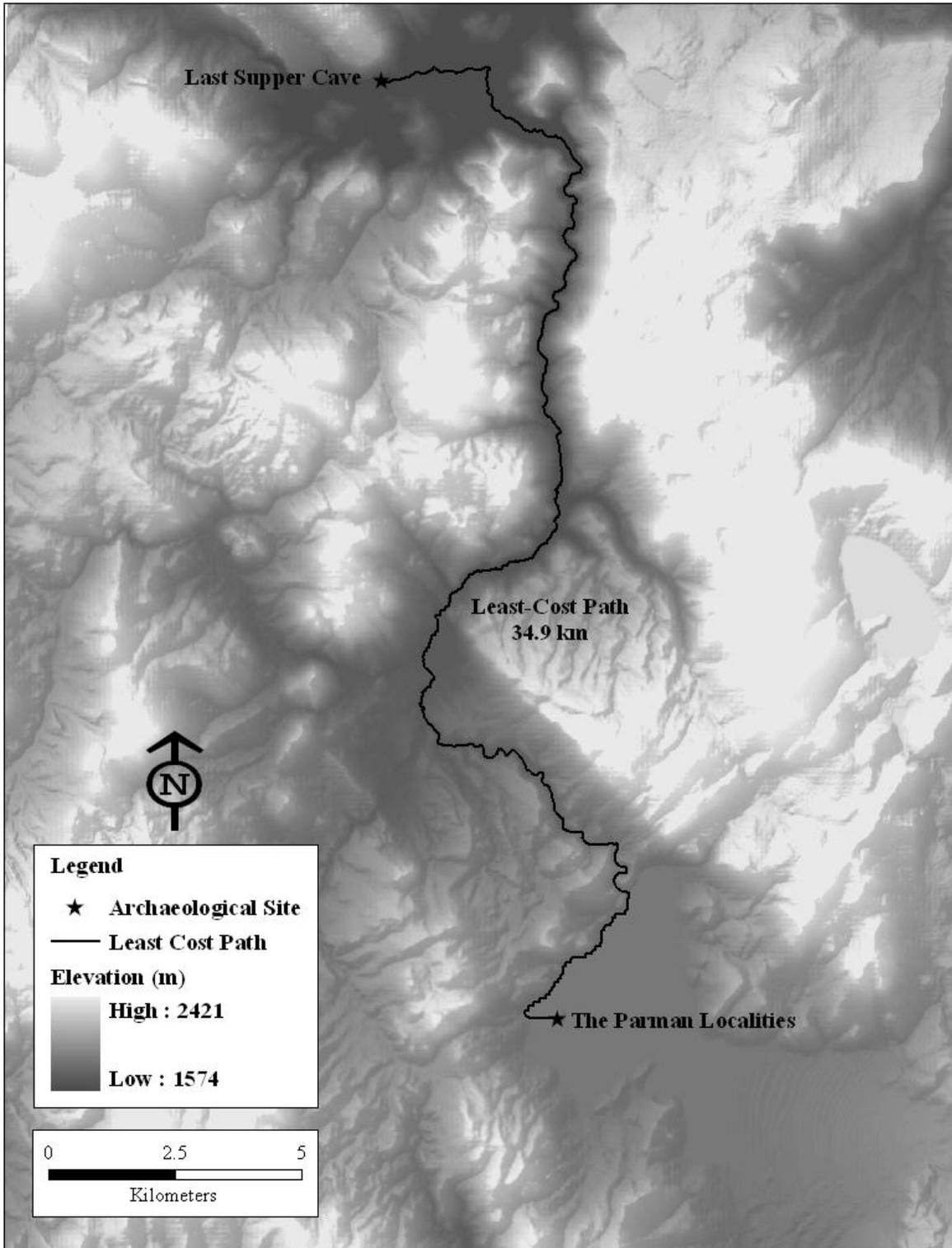


Figure 4. Results of the least-cost path analysis showing the predicted route from Last Supper Cave to the Parman Localities.

the straight-line path (19 km) between the two points, it clearly avoids negotiating any substantial slopes.

Although a basic process, LCP analyses may be able to address complex research questions related to prehistoric mobility, land-use patterns, and decision-making processes. Two nearby archaeological sites were utilized in this project but the points on the landscape could just as easily represent any kinds of place that held importance to foragers. For groups that inhabited the Great Basin, such locations could have included toolstone sources, subsistence resource patches, or entire pluvial lake basins. As such, the least-cost approach contains the potential to contribute to the development of more accurate models of prehistoric behavior.

LCP analyses may also be combined with other types of studies to provide more robust approaches to investigating the past. For example, Wood and Wood (2006) have integrated a suite of variables related to pedestrian travel including the slope of the terrain, distance of the path, body weight of the traveler, and speed of travel into more traditional approaches to modeling least-cost paths in order to estimate the caloric expenditure required to travel particular routes. They suggest that this method provides an even more realistic way to consider how foragers used the landscape.

A second potential area of research that LCP analyses may be incorporated into involves combining them with geomorphologic studies aimed at identifying areas of exposed sediment of particular ages. For researchers interested in the Pre-Archaic archaeology of the Great Basin, this would entail finding sediment dated to the late Pleistocene/early Holocene. By combining the geomorphologic data with the pedestrian pathways modeled by LCP analysis, the two approaches could serve as a kind of predictive model that would highlight areas possessing good potential to contain evidence of Pre-Archaic occupations. Similarly, LCP analyses

could be used to direct systematic surveys and testing of caves and rockshelters along predicted travel routes. Such an approach might help identify locations containing buried and well-preserved early-period occupations, which are a relative rarity in the Great Basin.

## CONCLUSION

GIS-based analyses have become a standard component of archaeological research. This project has provided a simple example of how one such approach – LCP analysis – can contribute to how we interpret the past. Although not without its shortcomings (for example, the length of the proposed route relative to the straight-line distance), the results of the analysis of Pre-Archaic travel routes in northwest Nevada provide a good foundation on which to develop additional, more complex studies which take more than a single variable into consideration. Such approaches possess the ability to greatly improve the way that prehistoric travel – which in the Great Basin was conducted almost exclusively on foot – is modeled. They are particularly useful in regions of rugged terrain, as evidenced by the results of the analysis of travel across the Black Rock Desert-High Rock Country of northwest Nevada.

## REFERENCES

- Amick, Dan S.  
1997 Geochemical Source Analysis of Obsidian Paleoindian Points from the Black Rock Desert, Nevada. *Current Research in the Pleistocene* 14:97–99.

- Anderson, David G., and J. Christopher Gillam  
2000 Paleoindian Colonization of the Americas: Implications from an Examination of Physiography, Demography, and Artifact Distribution. *American Antiquity* 65(1):43–66.
- Beck, Charlotte, and George T. Jones  
1997 The Terminal Pleistocene/Early Holocene Archaeology of the Great Basin. *Journal of World Prehistory* 11(2):161–236.
- Byerly, Ryan M., Judith R. Cooper, David J. Meltzer, Matthew E. Hill, and Jason M. Labelle  
2005 On Bonfire Shelter (Texas) as a Paleoindian Bison Jump: An Assessment Using GIS and Zooarchaeology. *American Antiquity* 70(4):595–629.
- Camp, Anna J., Geoffrey M. Smith, Evan Pellegrini, and Ted Goebel  
2007 *A Class III Archaeological Inventory of 1,980 Acres in the Black Rock Desert, Humboldt County, Nevada*. Cultural Resource Report CR2-2941(P). Prepared for the Winnemucca Field Office of the Bureau of Land Management by the Sundance Archaeological Research Fund, University of Nevada, Reno.
- Connolly, James, and Mark Lake  
2006 *Geographical Information Systems in Archaeology*. Cambridge University Press.
- Graf, Kelly E.  
2001 Paleoindian Technological Provisioning in the Western Great Basin. Unpublished Master's Thesis, Department of Anthropology and Ethnic Studies, University of Nevada, Las Vegas.  
2002 Paleoindian Obsidian Procurement and Mobility in the Western Great Basin. *Current Research in the Pleistocene* 19:87–89.
- Gruhn, Ruth, and Alan L. Bryan  
1988 The 1987 Archaeological Investigations at Handprint Cave, Nevada. *Nevada Archaeologist* 6(2):1–13.
- Jones, George T., and Charlotte Beck  
1999 Paleoarchaic Archaeology in the Great Basin. In *Models for the Millennium*, edited by Charlotte Beck, pp. 83–95. University of Utah Press, Salt Lake City.
- Jones, George T., Charlotte Beck, Eric E. Jones, and Richard E. Hughes  
2003 Lithic Source Use and Paleoarchaic Foraging Territories in the Great Basin. *American Antiquity* 68(1):5–38.
- Layton, Thomas N.  
1970 *High Rock Archaeology: An Interpretation of the Prehistory of the Northwestern Great Basin*. Unpublished Ph.D. Dissertation, Harvard University, Cambridge, MA.  
1979 Archaeology and Paleo-Ecology of Pluvial Lake Parman, Northwestern Great Basin. *Journal of New World Archaeology* 3(3):41–56.

Layton, Thomas N., and Jonathan O. Davis

1978 Last Supper Cave: Early Post-Pleistocene Cultural History and Paleoecology in the High Rock Country of the Northwestern Great Basin. Unpublished manuscript in possession of the authors.

Mifflin, Martin D., and Margaret M. Wheat

1979 *Pluvial Lakes and Estimated Pluvial Climates of Nevada*. Nevada Bureau of Mines and Geology Bulletin 94. University of Nevada, Reno.

Price, Maribeth

2008 *Mastering ArcGIS*. McGraw Hill, Boston.

Smith, Geoffrey M.

2006 Pre-Archaic Technological Organization, Mobility, and Settlement Systems: A View from the Parman Localities, Humboldt County, Nevada. Unpublished Master's Thesis, Anthropology Department, University of Nevada, Reno.

Wood, Brian M., and Zoe J. Wood

2006 Energetically Optimal Travel across Terrain: Visualizations and a New Metric of Geographic Distance with Archaeological Implications. *Proceedings of SPIE Electronic Imaging* No. 6060. SPIE Publications, San Jose, CA.



## *The Handprints of Handprint Cave (26Hu1836) Humboldt County, Nevada*

Alvin R. McLane

*Editor's Note: This short piece was submitted by Alvin McLane prior to his passing in the fall of 2006. It ponders what anyone who has ever worked in the Black Rock Desert has considered at one time or another: who made the handprints in Handprint Cave?*

Two friends that I trusted about such matters as pictographs stated that they were natural stains and not handprints. There the subject stood until Steve Glotfelty, a cave exploring friend, came by one day in 2001 and said that they are red handprints. He noted that you can see the ridges made by the heel of the hand!

Ruth Gruhn and Alan Bryan, researchers from the University of Alberta, excavated test pits in the floor sediments of Handprint Cave in 1987. Here is their description of the naming of the cave:

“In the main chamber of the cavern near the south wall is a large stalagmitic column which had split along its length. On a light smooth surface on the east side of the column is a cluster of about a dozen ovoid smudges of bright red ochre, each roughly about 10 x 12 cm in diameter. Human handprints can also be discerned, a feature that gives the site its name” (Gruhn and Bryan 1988:1-3)

Handprint Cave is a solution cavern in the Black Rock Desert formed by acidic waters that dissolved limestone. It is located at an elevation of 1,402 m above the high water level of Lake Lahontan. The west-facing shelter-like entrance is 6 m wide and up to 5.5 m high. The floor of

the cave drops steeply into a large room over 15 m wide and 10 m high. Two smaller passages ascend eastward from this room and pinch out 65 m from the entrance.

Gruhn and Bryan (1988) excavated here in June and July 1987. They thought that the best area to locate artifacts was in the well lighted entrance to the cave. Three excavation units were tested here up to a depth of 120 cm. Another pit over 1 m deep was put in near the handprints in the semi-dark part of the cave. The main artifacts recovered in these excavations were 14 projectile points. Point types were Elko, Gatecliff and Humboldt basal-notched, considered to be of Mid- to Late Archaic age. Also found were Stemmed points and these range in the neighborhood of 10,000 years old. Two artifacts, a square-based point and a bifacial blade, were recovered from the test pit adjacent to the pictographs. Charcoal from the 10-20 cm level just below the two artifacts resulted in a date of 10,740 years old (Excellent drawings of the artifacts by Margaret [Maggie] Brown are found in Bryan [1988:55]).

After the 1987 excavations, several trips were made to the region by cave explorers from Oregon and California (Block 1995; Broeckel 2004; L. Wolff 2004; J. Wolff 2002, 2004). None of the reports from these trips describe the pictographs in Handprint Cave.

The handprints are located 27 m into the cave from the entrance drip line. This area of the cave would be lit by the sun in the afternoon during the fall and winter months. The pictographs are located on a 2.7 m high stalagmite column near the south wall of the cave. The prints themselves are on the smooth east side of the cave formation and cover an area 1 m wide and 1.10 m high. Many of the motifs are somewhat obscured, and as far as can be determined, there are 17 handprints. The individual prints range from 8-10 cm wide and 16-17 cm long. These measurements are probably not the actual size of the handprints when they were made because of the smearing of the paint. It is believed that the obscurity of the images is caused by water flowing over the paint. During dry times, in the fall and wintertime, the cave formation may have been dry when possibly the paint was applied. However, during wetter times of the year, especially in the spring, a film of water would flow over the prints which would cause the paint to run.

The defining factor that indicated that the red paint was actual stamped handprints was the ridges in the palm of the hand. The part of the palm at the base of the thumb is called the thenar eminence. On the opposite side next to the wrist and below the little finger is known as the hypothenar eminence. It was imprints of the lateral skin ridges of the thenar eminence that could be seen in some of the handprints, though this defining feature was blurred out in most of the prints.

Now, the question of who made the prints? Over Nevada and the Southwest (including California), red handprints are relatively common. The ones that I have seen are always smaller than my hand (8.5 cm x 20 cm), which would indicate that the images were made by a girl or boy. As far as known, no detailed analyses have been made in Nevada on stamped handprints. An excellent study on handprints

(real and pictographs) has been carried out by Freers (2001) on a site in Riverside County, California. The assumption there is that the prints were made by adolescents. Here in Nevada, references to adolescents making handprints are rare. However, a reference by Stewart (1942:333) presents information relating to caves and a girls first menses. He gives an account that guardian spirits (not shamans) could be sought in a cave or by sleeping near a pictograph. He further states that pictographs were "[m]ade by girl at time of first menses." Therefore, I am also of the belief that the diminutive red handprint pictographs were made by girls at their first menses.

#### ACKNOWLEDGMENTS

Charlie Larson and Bill "Bighorn" Broeckel are thanked for providing the cave explorers' journals to me. Express gratitude is to Steve Glotfelty for bringing the handprints to my attention and accompanying me on a trip to Handprint Cave.

#### REFERENCES

- Block, Ed  
1995 Of Desert Rats, Exploratory Wanderings, and Handprint Cave. *The Speleograph* 31(9):115-117 (Newsletter of the Oregon Grotto, Vancouver, Washington).
- Broeckel, Bill "Bighorn"  
2004 NW Nevada Caving Trip. *Sag Rag* 23(4):6-8 (Newsletter of the Shasta Area Grotto, Yreka, CA).

Bryan, Alan L.

- 1988 The Relationship of the Stemmed Point and Fluted Point Traditions in the Great Basin. In *Early Human Occupation in Far Western North America: the Clovis-Archaic Interface*, edited by Judith Willig, C. Melvin Aikens, and John L. Fagan, pp. 53-74. *Nevada State Museum Anthropological Papers* 21, Carson City.

Freers, Steve

- 2001 The Hand Prints at CA-RIV-114: A Forensic and Anthropometric Study. In *American Indian Rock Art* Volume 27, edited by Alanah Woody and Steven M. Freers, pp. 319-332. Piedra Pintada Books, Claremont, CA.

Gruhn, Ruth, and Alan Bryan

- 1988 The 1987 Archaeological Fieldwork at Handprint Cave, Nevada. *Nevada Archaeologist* 6(2):1-13.

Stewart, Omer C.

- 1942 Culture Element Distributions: XVII Ute-Southern Paiute. *Anthropological Records* 6(4):231-360.

Wolff, Jim

- 2002 Black Rock Desert – Another Under Earth Weekend. *Sag Rag* 21(3):6-7 (Newsletter of the Shasta Area Grotto, Yreka, CA, also reprinted in the 2002 *Speleo Digest* of the National Speleological Society:163-164).
- 2004 Handprint Cave. *Sag Rag* 23(4):9 (Newsletter of Shasta Area Grotto, Yreka, CA).

Wolff, Liz

- 2004 No Caves Here to Speak of or a Weekend of Karst-walking: *SAG Rag* 23(4):4-5 (Newsletter of the Shasta Area Grotto, Yreka, CA).



## *Continuity in Biface Reduction Strategies at Paiute Creek Shelter (26Hu147), Humboldt County, Nevada*

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*This paper analyzes biface reduction strategies at Paiute Creek Shelter (PCS), Humboldt County, Nevada. Using biface reduction sequence and debitage analyses I determine how the people using the shelter produced the stone tools discarded at the site. By establishing at which points in the reduction sequence tools entered the shelter, proximity to toolstone sources and mobility strategies are inferred. Additionally, lithic artifacts from temporally discrete components are compared to identify any diachronic shifts in biface reduction strategies. Finally, raw material use is examined to identify any preferences for biface manufacture. The results of these analyses are integrated to understand of how prehistoric people utilized PCS.*

Bifaces have been established as multifunctional tools well-suited for mobile hunter-gatherers because bifaces maximize edge area while minimizing weight. Because pedestrian hunter-gatherers have strict constraints on the weight of items that can be carried, bifaces represent reliable, multifunctional, light-weight tools (Andrefsky 2005; Hayden et al. 1996; Kelly 1988; Nelson 1991).

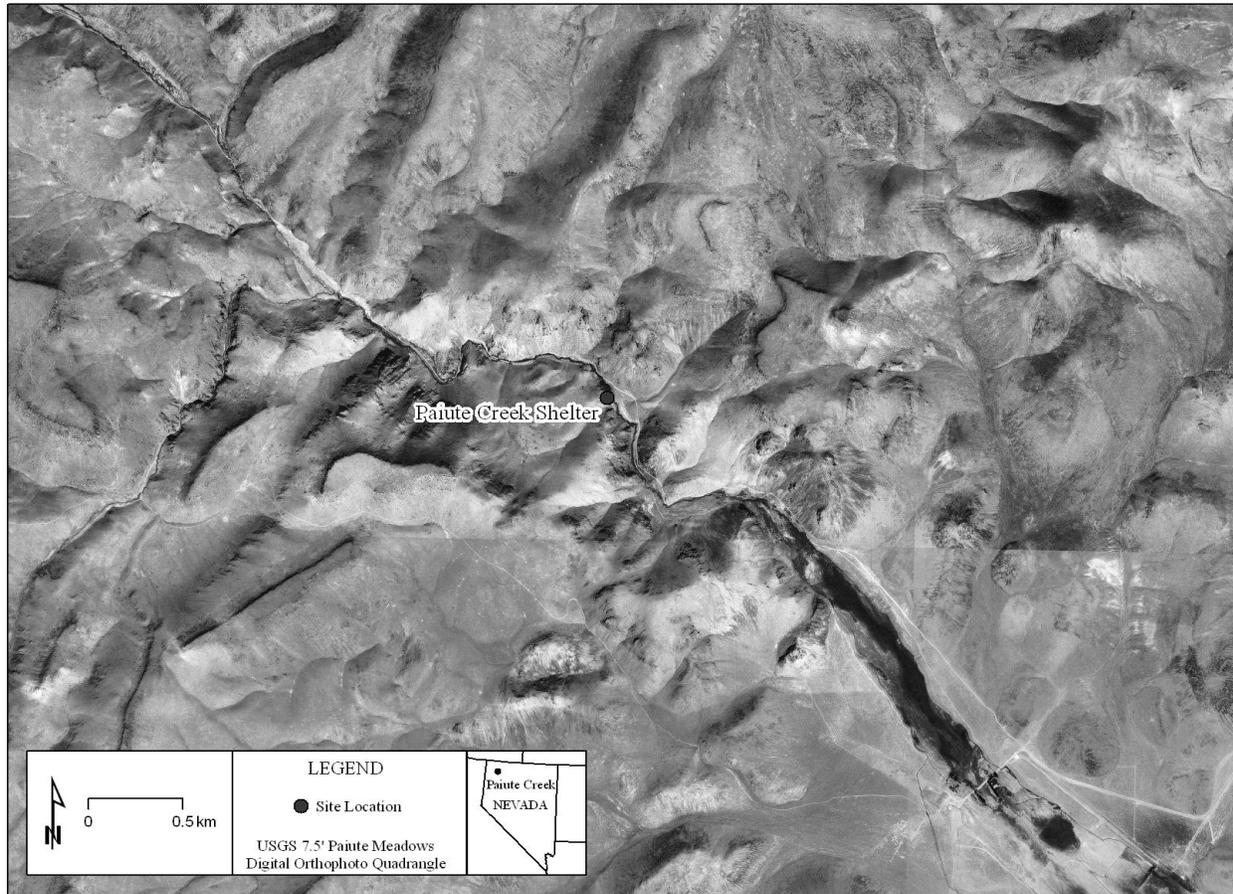
Prehistoric people in the Great Basin moved around the landscape utilizing scattered raw material sources for the production of tools. To minimize weight and reduce the possibility of breakage during production, bifaces were often reduced to middle or late stage forms at quarries (Andrefsky 2005; Beck et al. 2002; Hayden et al. 1996; Johnson 1989; Jones et al. 2003). Because of bifaces' possible utility, they can be reworked and resharpened until they are broken beyond repair, lost, or utilized to their fullest potential. Broken bifaces made on local raw material are usually discarded and replaced, but broken bifaces made on distant raw material are often recycled and typically show evidence of

repair and retouch (Andrefsky 2008; Kelly 1988). Thus, studies of biface reduction trajectories at archaeological sites can shed light on the specific technological activities carried out there.

### **PAIUTE CREEK SHELTER AND THE SURROUNDING AREA**

Paiute Creek Shelter (PCS) is located in the Black Rock Mountain Range, Humboldt County, Nevada (Figure 1). It was first recorded by Elston and Davis (1979) during their survey of the Lahontan Cutthroat Trout Study Area and was given the site number 26Hu147. The shelter is located at an elevation of 1,415 m (4,640 feet) adjacent to Paiute Creek, which flows southeast out of the mountains into Paiute Meadows.

The area surrounding PCS receives very little rainfall and has high rates of evapotranspiration that prevent trees from growing abundantly. Over 90 percent of the Black Rock Mountain Range is categorized as



**Figure 1. Location of Paiute Creek Shelter.**

shrub steppe (Elston and Davis 1979:8). Local plants include budsage, rabbitbrush, elderberry, Great Basin wild rye, tall sage, greasewood, willow, and non-native cheatgrass. Fauna include small game such as ground squirrel, sage grouse, rabbits, and chukar, as well as large mammals such as mountain lion, pronghorn, and mountain sheep (Elston and Davis 1979). Many of these plants and animals would have been available to the prehistoric occupants of PCS.

People have occupied the Black Rock Desert for the past ~11,000 radiocarbon years ( $^{14}\text{C}$  B.P.) (Grayson 2011). Initial populations are thought to have utilized the lacustrine environment of the late Pleistocene and early Holocene, but by ~7,000  $^{14}\text{C}$  B.P. the lakes had disappeared, creating a harsh arid environment (Elston 1986;

Grayson 2011). During the Early Archaic (~7,500-4,000  $^{14}\text{C}$  B.P.), the area saw a dramatic decrease in population size (Grayson 2011). By the Middle Archaic (~4,000-1,500  $^{14}\text{C}$  B.P.) populations are thought to have moved back at greater frequencies than before into the Black Rock Desert and surrounding areas, where they found a relative abundance of large game (Elston and Davis 1979:19). Utilization of upland resources decreased during the Late Archaic (~1,500  $^{14}\text{C}$  B.P. to contact) and groups relied heavily on small mammals and plant foods until the arrival of Euro-Americans in the mid-19<sup>th</sup> century (Elston and Davis 1979:29; Elston 1986).

During the late Pleistocene and early Holocene, discharge from Paiute Creek and

possible overflow from Paiute Lake may have formed the shelter (Elston and Davis 1979). The shelter sits beneath a 15 m-high volcanic debris deposit consisting of pebble to boulder-sized clasts, with 6-7 m between the current shelter floor and top of the deposit. The floor consists of dislocated clasts from the ceiling and walls, alluvial deposits, and some colluvial material entering the site from the southern slope above the shelter.

PCS is one of several shelters along Paiute Creek. Elston and Davis (1979) mention that the number of shelters formed along Paiute Creek is not typical throughout the rest the Paiute Highlands. They also note that PCS is the largest of those shelters and held the best potential for having a well stratified cultural and environmental record like those of Gatecliff Rockshelter and Last Supper Cave (Elston and Davis 1979:126). This is due to the stratified alluvial and colluvial deposits in the shelter that would have preserved the shelter's occupational history (Elston and Davis 1979:49).

Sometime between 1979 when Elston and Davis first recorded the shelter and 2006 when test excavations by the University of Nevada, Reno were conducted, looters visited the site, disturbing approximately 10 percent of the area within the dripline. Excavations at PCS were conducted during the summer of 2006 by a crew from the Sundance Archaeological Research Fund at the University of Nevada, Reno, in cooperation with the Bureau of Land Management, to determine the integrity of the remaining deposits.

Four 1-m<sup>2</sup> test pits were dug primarily within the dripline. Each pit was excavated using arbitrary 5-cm levels within individual stratigraphic levels. Ten radiocarbon dates were obtained on material from the excavations. Based on the stratigraphy, radiocarbon dates, and temporally diagnostic points found in the shelter, the occupational history of PCS can be split into four components (Table 1). Paiute

Creek is believed to have cut through the shelter sometime prior to 4,700 cal. BP, as evidenced by the presence of river gravels and lack of cultural material around 230 cm below datum. For analytical purposes components 1 and 2 are combined, due to lack of prehistoric material and very late age of in Component 1. This paper presents some preliminary findings from analysis of lithic artifacts from PCS.

**Table 1. PCS Cultural Components.**

<b>Comp.</b>	<b>Stratum</b>	<b>Depth (cmbd)</b>	<b>Age (cal BP)</b>
1	1, 2, 3, 3a	20-67	200-0
2	4a, 4	67-102	200-850
3	4a, 4	102-152	850-1450
4	4, 5, 6, 6a, 7	152-230	1450-4700

## MATERIALS

The total amount of artifacts recovered from PCS number in the tens of thousands. A total of 386 bifaces or biface fragments, 136 diagnostic projectile points, 55 cores, and 1,425 pieces of debitage were analyzed. Of those artifacts, 276 bifaces or biface fragments, 122 projectile points, 53 cores, and 1,425 pieces of debitage were used in this analysis; the rest either lacked exact provenience information and cannot be assigned to a particular component, or are too fragmentary to be accurately classified. Of the tens of thousands of pieces of debitage, only 1,425 have been analyzed so far; additional analysis is ongoing. In each artifact class, three raw material types are present: obsidian; cryptocrystalline silicates (CCS); and fine-grained volcanic rock (FGV).

## METHODS

The objectives of this paper are to: (1) define biface reduction strategies at PCS; (2) determine if any diachronic shifts in these strategies are evident; and (3) identify raw material preferences for the production of bifaces.

The production of bifaces follows general stages of reduction from initial core or flake blank to finished tool. The precise definition of each stage is debatable (Callahan 1979; Whittaker 1994), but they are generally measured by the amount of cortex present, the depth of flake scars, and/or a width vs. thickness ratio. As objective pieces are reduced into bifaces they lose cortex, thickness relative to width, and flakes. Initial reduction of objective pieces results in the removal of cortex, forming flake scars around the edges. Later stage reduction results in thinning the objective pieces, leaving flake scars that extend across their midlines (Andrefsky 2005). During biface

reduction the flakes removed from the objective pieces also have characteristics that can be used to establish biface reduction trajectories. Flakes removed earlier in the reduction process typically have more cortex and weigh more than later stage reduction debitage, which has little to no cortex (Carr and Bradbury 2001).

Looking at the biface reduction strategies of an archaeological site can shed light on the technological activities that took place there. For example, a lithic assemblage dominated by cores, blanks, and early stage bifaces implies that the site was a quarry or workshop used for early biface reduction. Conversely, an assemblage dominated by late stage or finished bifaces implies that the site was likely some distance from a raw material source and that the people occupying the site provisioned themselves elsewhere in anticipation for travel (Beck et al. 2002; Jones et al. 2003; Thomas 1983). These trends are illustrated in Figure 2, adapted from Thomas (1983).

To address biface reduction strategies at

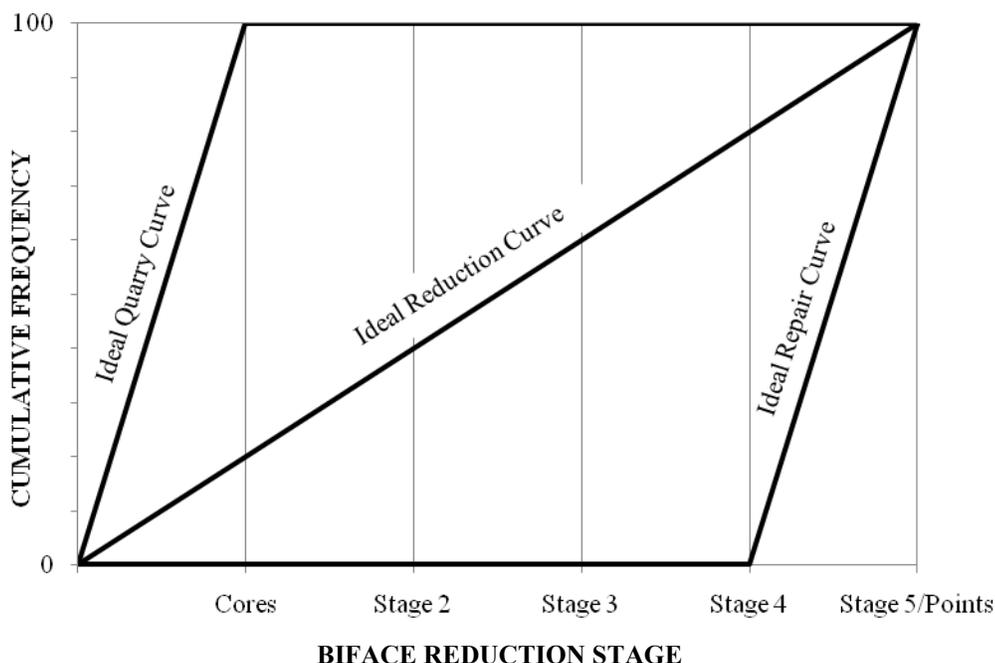


Figure 2. Hypothetical biface reduction sequences (adapted from Thomas [1983]).

PCS, each biface and biface fragment from the assemblage was staged to one of four stages (stages 2-5) according to criteria presented by Andrefsky (2005:188). Cores represent initial objective pieces (Stage 1) and projectile points are grouped into Stage 5 finished bifaces, which themselves may have been classified as point fragments if they lack hafting elements (e.g. notches). Individual flakes were weighed and the presence/absence of cortex was recorded. All artifacts were assigned to a component to consider if reduction activities varied diachronically.

To determine if the occupants of PCS used raw materials differently, artifacts were separated by raw material type and analyzed. Lithic studies have shown that raw material availability and quality affected hunter-gatherers' decision-making processes regarding tool production. For example, when abundant, high quality raw material will be used to produce both formal (e.g., bifaces) and informal

tools (e.g., retouched flakes). When high quality raw material is not available, both formal and informal tools will be produced on low quality raw material (Andrefsky 1994, 2005).

Tools at PCS were produced on obsidian, CCS, and FGV. Obsidian and CCS are higher quality than FGV but located further from the site. The nearest obsidian source is ~14 km away, CCS can be found ~5 km away, and FGV cobbles are embedded within the volcanic debris deposit from which the shelter was formed. Obsidian and CCS, though not immediately available, are nevertheless considered local.

## RESULTS

The results of the biface analysis for the entire assemblage, regardless of component or raw material, exhibit a trend of later stage reduction at PCS (Figure 3; Table 2). This suggests that the occupants of the site

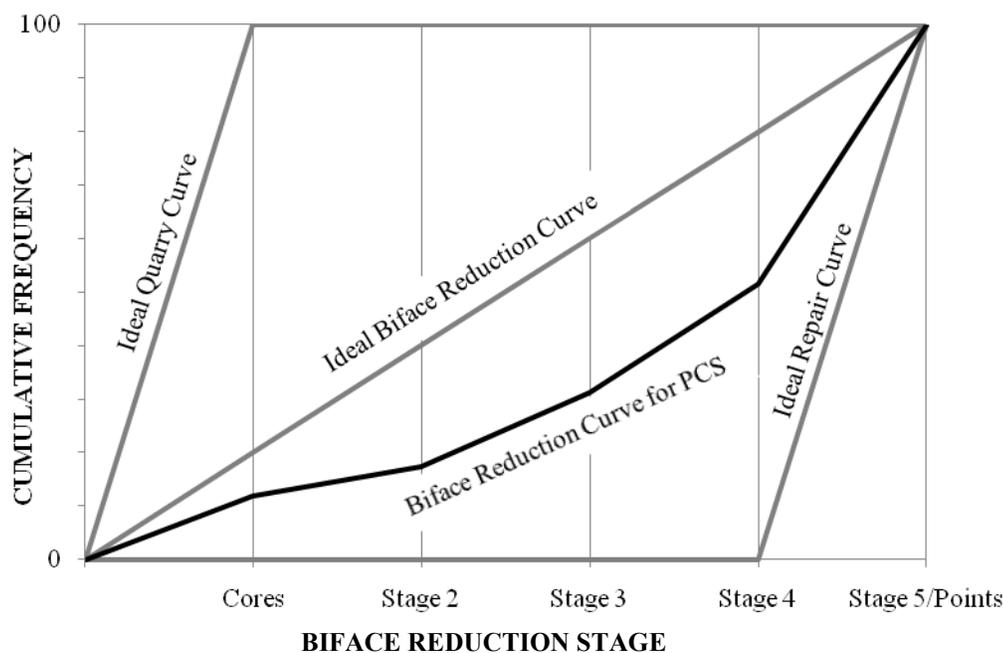


Figure 3. Biface reduction sequence for all components at PCS.

**Table 2. Frequency of Biface Reduction Stages by Components from PCS  
(Percentages Shown in Parentheses).**

Comp.	Biface Reduction Stage					Total
	Cores	2	3	4	5/Points	
1/2	30 (11.1)	19 (7.0)	44 (16.2)	55 (20.3)	123 (45.4)	271
3	18 (12.6)	6 (4.2)	16 (11.2)	29 (20.3)	74 (51.7)	143
4	5 (13.5)	0 (0.0)	3 (8.1)	7 (18.9)	22 (59.5)	37
Total	53 (11.8)	25 (5.5)	63 (14.0)	91 (20.2)	219 (48.5)	451

typically provisioned themselves elsewhere with early stage bifaces prior to arriving at PCS and finished reducing the tools while at the shelter. Comparisons of biface reduction trajectories suggest that there is no change in biface reduction trajectories over time at PCS (Figure 4). Due to small samples in a few cells (see Table 2), a chi-square test could not be performed to determine if there are any significant differences; however, debitage analyses support the trends suggested in the biface data. As expected with the fact that most bifaces are in later stages of reduction, most flakes lack cortex and this trend does not change over time (Table 3). A one-way analysis of variance (ANOVA) shows no significant difference in mean flake weight between components 1/2 (0.457 g), Component 3 (0.387 g), and Component 4 (0.235 g) ( $F=2.444$ ,  $df=2$ ,  $p=.087$ ). Based on these congruous results, there appears to be no diachronic shifts in biface reduction at PCS. Finally, regarding potential raw material preferences, results suggest that there is a predilection to use certain raw materials over others. Figure 5 and Table 4 show substantial differences between biface reduction trajectories of different raw materials. Of the FGV tools, 67 percent are cores and/or Stage 2 bifaces. CCS tools show a fairly steady reduction strategy with a slight emphasis towards late stage reduction. Finally, nearly 70 percent of obsidian bifaces are Stage 5 (finished). Although small cell sizes preclude

determining whether or not these differences are statistically significant using a chi-square test, these trends certainly suggest that obsidian and CCS were preferred over FGV for the manufacture of bifaces.

Based on these trends, we should expect a greater frequency of FGV flakes with cortex than CCS and obsidian flakes, because such flakes are typically produced during earlier stage reduction. This expectation is confirmed by the debitage analysis (Table 5). Although a chi-squared test of presence/absence of cortex by raw material could not be performed due to small sample sizes, a one-way ANOVA shows significant differences in mean flake weight between FGV (2.640 g), obsidian (0.193 g), and CCS (0.383g) ( $F=90.243$ ,  $df=2$ ,  $p<.001$ ). The mean weight of FGV debitage is significantly ( $p<.001$ ) heavier than those of obsidian and CCS debitage. Also, the mean weight of CCS debitage is significantly ( $p=.021$ ) heavier than that of obsidian debitage. As previously mentioned, earlier stage biface reduction typically produces in larger/heavier debitage with cortex, while later stage biface reduction typically results in smaller/lighter debitage lacking cortex; therefore, both the biface and debitage data provide similar pictures of technological activities at PCS. These trends conform to the notion that when available, high quality raw material is preferred for the production of formal tools such as bifaces.

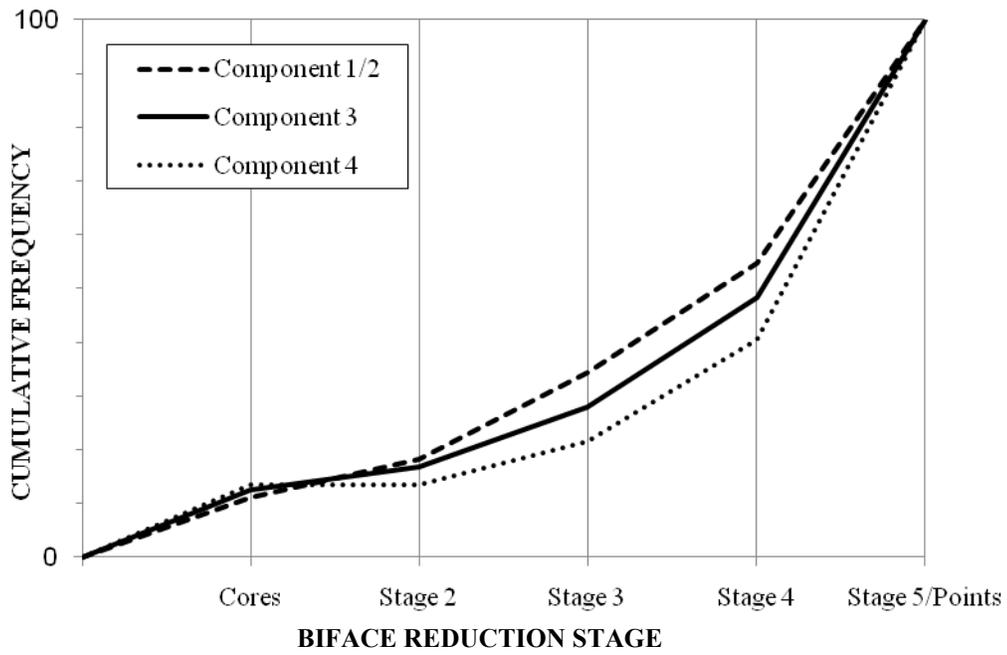


Figure 4. Biface reduction sequence by component from PCS.

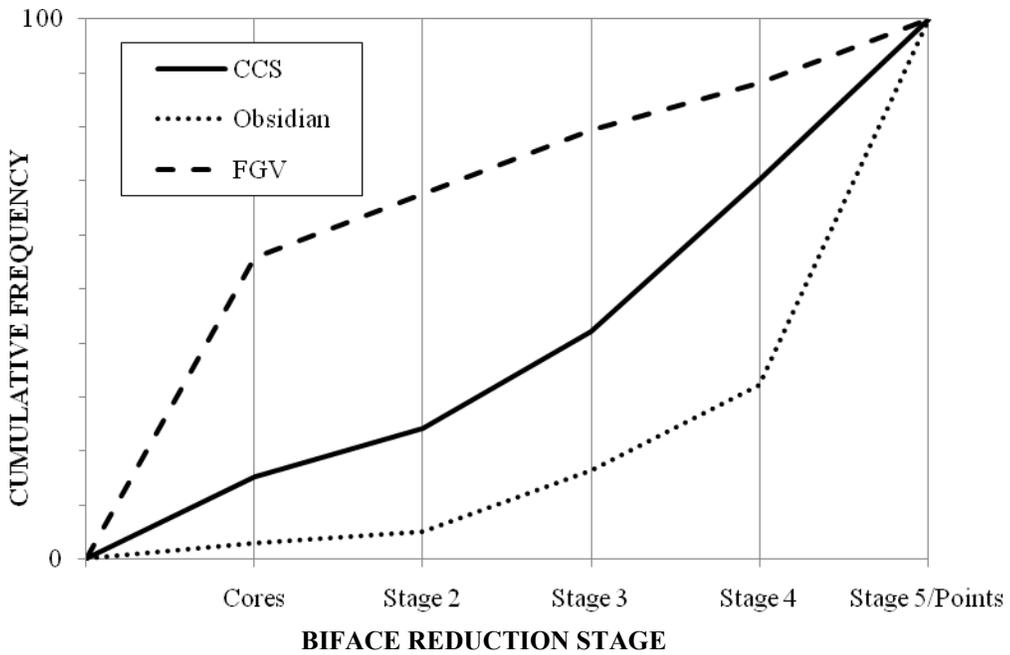


Figure 5. Biface reduction sequence by raw material from PCS.

**Table 3. Cortex Presence on Debitage by Component from PCS.**

<b>Comp.</b>	<b>Cortex Presence</b>		<b>Total</b>
	<b>Yes</b>	<b>No</b>	
1/2	30	691	721
3	10	443	453
4	4	247	251
<b>Total</b>	<b>44</b>	<b>1,381</b>	<b>1,425</b>

( $\chi^2 = 5.82$ ;  $df = 2$ ;  $p = .054$ ).

**Table 4. Frequency of Biface Reduction Stages by Raw Material from PCS (Percentages shown in Parentheses).**

<b>Material</b>	<b>Biface Reduction Stage</b>					<b>Total</b>
	<b>Cores</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5/Points</b>	
CCS	27 (15.2)	16 (9.0)	32 (18.0)	50 (28.1)	53 (29.7)	178
Obs	7 (2.9)	5 (2.1)	27 (11.3)	38 (15.9)	162 (67.8)	239
FGV	19 (55.8)	4 (11.8)	4 (11.8)	3 (8.8)	4 (11.8)	34
<b>Total</b>	<b>53 (11.8)</b>	<b>25 (5.5)</b>	<b>63 (14.0)</b>	<b>91 (20.2)</b>	<b>219 (48.5)</b>	<b>451</b>

**Table 5. Cortex Presence on Debitage by Raw Material from PCS (Percentages Shown in Parentheses).**

<b>Material</b>	<b>Cortex Presence</b>		<b>Total</b>
	<b>Yes</b>	<b>No</b>	
CCS	10 (1.2)	791 (98.8)	801
OBS	29 (5.1)	539 (94.9)	568
FGV	5 (8.9)	51 (91.1)	56
<b>Total</b>	<b>44</b>	<b>1,381</b>	<b>1,425</b>

## DISCUSSION AND CONCLUSION

The lithic assemblage from PCS provides valuable information regarding the technological organization of prehistoric hunter-gatherers in the Black Rock Desert. This paper used just a few basic analyses to answer simple questions about reduction strategies and raw material preference. Preliminary results show that people

visiting the shelter generally reduced tools elsewhere and provisioned themselves in anticipation for travel to the site. Based on the biface reduction curve, bifaces – in particular, those manufactured on CCS and obsidian – entered the shelter either as finished implements or during later stages of reduction. Further analyses show that there is no significant change in biface reduction trajectories through time at

PCS. Instead, reduction strategies remained static throughout the entire occupation of the shelter. This suggests a consistent use of the shelter across time.

Analyses of raw material use show that the prehistoric occupants of PCS favored the higher quality and relatively abundant obsidian and CCS for the production of bifaces. The majority of bifaces are made of obsidian and CCS, indicating that the minimal travel costs to procure these raw materials far outweighed the

drawbacks of using the poorer quality FGV available in the immediate area of PCS.

Further research to incorporate faunal and groundstone analyses, as well as expansion of the debitage analysis, will create a more definitive picture of how people used PCS. Additionally, source provenance studies from this assemblage and other nearby sites will provide a better understanding of how prehistoric hunter-gatherers moved through this area and utilized PCS.

## REFERENCES

- Andrefsky, William, Jr.  
 1994 Raw Material Availability and the Organization of Technology. *American Antiquity* 59:21-34.  
 2005 *Lithics: Macroscopic Approaches to Analysis*. Cambridge University Press: Cambridge.  
 2008 Projectile Point Provisioning Strategies and Human Land Use. In *Lithic Technology: Measure of Production, Use, and Curation*, edited by William Andrefsky, Jr., pp. 195-215. Cambridge University Press, Cambridge.
- Beck, Charlotte, Amanda K. Taylor, George T. Jones, Cynthia M. Fadem, Caitlyn R. Cook, and Sara A Millward  
 2002 Rocks Are Heavy: Transport Costs and Paleoarchaic Quarry Behavior in the Great Basin. *Journal of Anthropological Archaeology* 21:481-507.
- Callahan, Errett (editor)  
 1979 The Basics of Biface Knapping in the Eastern Fluted Point Tradition: A Manual for Flintknappers and Lithic Analysts. *Archaeology of Eastern North America* 7:1-180.
- Carr, Phillip J., and Andrew P. Bradbury  
 2001 Flake Debris Analysis, Levels of Production, and the Organization of Technology. In *Lithic Debitage: Context, Form, Meaning*, edited by William Andrefsky, Jr., pp. 126-146. University of Utah Press: Salt Lake City.
- Elston, Robert G.  
 1986 Prehistory of the Western Area. In *Great Basin*, edited by W. L. D'Azevedo, *Handbook of North American Indians* Vol. 11, pp. 135-148. William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

- Elston, Robert G., and Jonathan O. Davis  
1979 *An Overview of Cultural Resources in the Lahontan Cutthroat Trout Study Area, Black Rock Range, Humboldt County, Nevada*. Report Submitted to Winnemucca District, Bureau of Land Management on file in Special Collections, Mathewson-IGT Knowledge Center, University of Nevada, Reno).
- Grayson, Donald K.  
2011 *The Great Basin: A Natural Prehistory*. University of California Press, Berkeley.
- Hayden, Brian, Nora Franco, and Jim Spafford  
1996 Evaluating Lithic Strategies and Design Criteria. In *Stone Tools: Theoretical Insights into Human Prehistory*, edited by George H. Odell, pp. 9-49. Plenum Press: New York.
- Johnson, Jay K.  
1989 The Utility of Production Trajectory Modeling as a Framework for Regional Analysis. *Archaeological Papers of the American Anthropological Association* 1:119-138.
- Jones, George T., Charlotte Beck, Eric E. Jones, and Richard E. Hughes  
2003 Lithic Source Use and Paleoarchaic Foraging Territories in the Great Basin. *American Antiquity* 68(1):5-38.
- Kelly, Robert L.  
1988 The Three Sides of a Biface. *American Antiquity* 53:717-734.
- Nelson, Margaret C.  
1991 The Study of Technological Organization. *Archaeological Method and Theory* 3:57-100.
- Thomas, David H.  
1983 The Archaeology of Monitor Valley: 2. Gatecliff Shelter. *Anthropological Papers of the American Museum of Natural History* 59(1):1-522.
- Whittaker, John C.  
1994 *Flintknapping: Making and Understanding Stone Tools*. University of Texas Press: Austin.

## *The Rabbithole Mining District: Survey and Excavation in a Depression-Era Mining Community*

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*In 2006, the University of Nevada Reno partnered with the Bureau of Land Management to conduct historical archaeological investigations near the Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area. Fieldwork in 2006, conducted as a five-week undergraduate field school, focused on the Rabbithole Springs Mining District, located in Pershing County, Nevada. Placer gold deposits near Rabbithole Springs drew numerous miners during the challenging Great Depression of the 1930s. One area within the Rabbithole Springs Mining District where Depression-era mining occurred was the Double O Mine site (CrNV-21-8259). During the 2006 fieldwork, crews surveyed this site extensively and also conducted test excavations of Feature 16, a dugout. This article presents the preliminary results of these investigations.*

### **INTRODUCTION**

The Rabbithole Mining District is one of seven historic mining districts in the Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area (NCA). Located in T. 34 N., Rs. 29 and 30 E (Mt. Diablo Meridian), it is centered in the basin formed by the Kamma Mountains to the east, Rosebud Peak to the north-northeast, and an unnamed east-trending hill to the south-southwest (Johnson 1977:76). The district is accessible via the Lovelock-Sulphur road 127 km northwest of Lovelock. It can also be accessed via Gerlach-Sulphur road, 77 km east of Gerlach, then 13 km south of Sulphur on the Lovelock-Sulphur Road. Shadscale, bud sagebrush, and Bailey greasewood dominate the alluvial fans at elevations of 1280 to 1525 m. Nearby water sources include Rabbithole Springs, Barrel Spring, Outlaw Spring, and Rosebud Spring. Two sites in the district were investigated from July 17 to August 17, 2006 (Figure 1).

Historical mining activity in the Rabbithole Mining District occurred in areas both inside and immediately adjacent to the NCA. The Rainbow Canyon Clay Mine site (CrNV-21-8260) covers 1.42 hectares located adjacent to the south side of the Rosebud channel, 2 km west of the Double O Mine site, in the vicinity of Rainbow Canyon. The entire site lies within the Emigrant Trail corridor of the NCA. The site is historically associated with clay mining activities during the 1930s on claims owned by Charles F. Barker of Lovelock, Nevada (Vanderburg 1936b:26). The site was later investigated by the Western Pacific Railroad Company during the 1960s (Bradbury and Associates 1964).

The Double O Mine site (CrNV-21-8259) covers 108.86 hectares bounded by a series of ridges and gullies with southerly exposures that comprise the western tributaries of Rosebud Canyon. Investigation of the Double O Mine Site began with the Emigrant Trail Corridor of the NCA, and, following the boundaries of

historically documented placer mining claims, extended beyond the boundaries of the NCA. Historical mining activities in the Rabbithole Mining District were intimately tied to the roadway leading to Rabbithole Spring, part of which is included in the NCA. This article

presents preliminary results of the 2006 field season in Rabbithole Springs. The results of the Double O Mine component are the focus of this article.

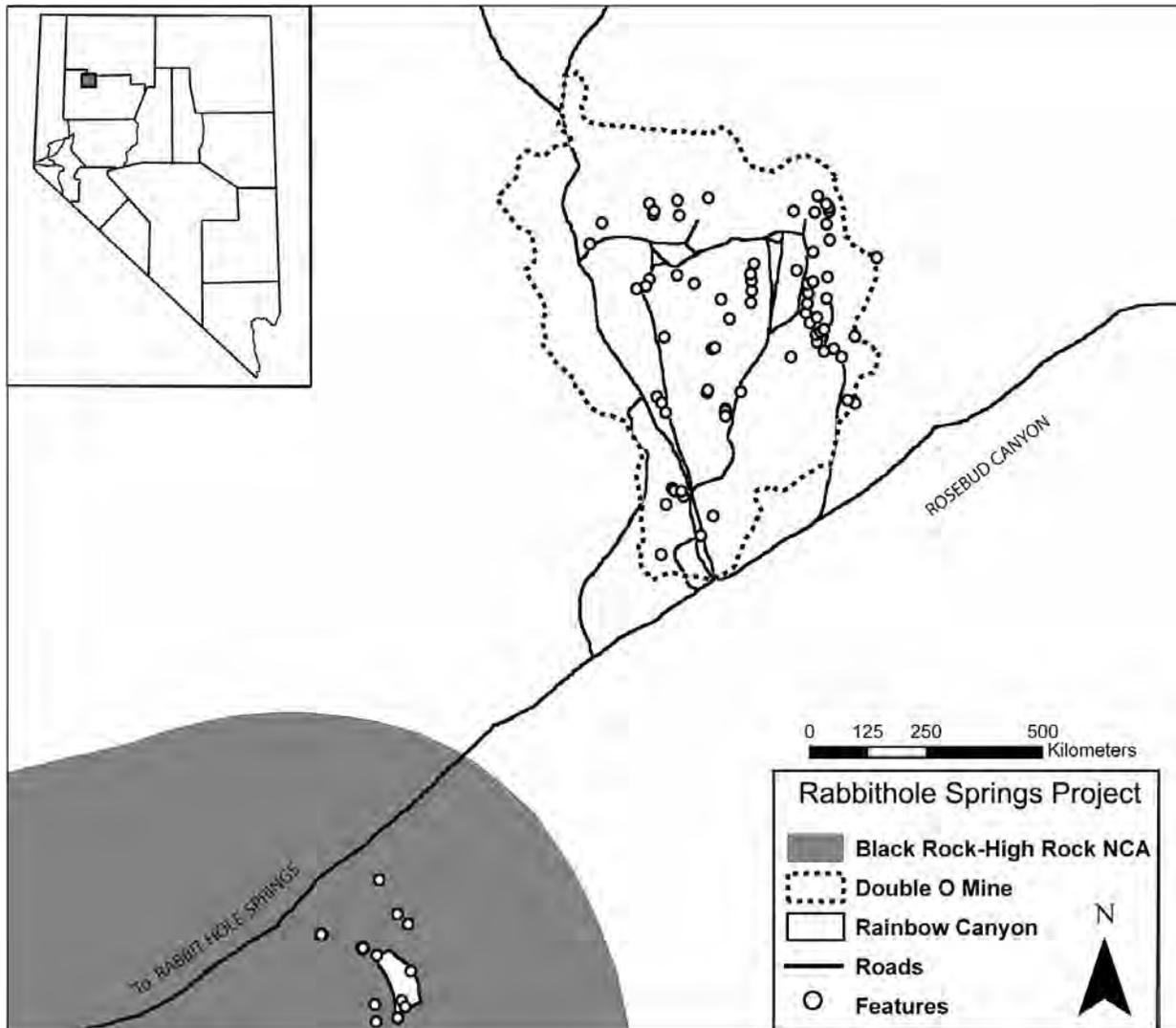


Figure 1. Rabbithole Springs project area.

## THE RABBITHOLE SPRINGS PROJECT

The Rabbithole Springs Project is being conducted in conjunction with a Class III inventory of the Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area. This inventory is designed to meet the basic objectives of protecting the setting and physical traces of emigrant trails and all cultural resources in the NCA for the benefit of current and future generations, as well as specific objectives CRM-4 and CRM-5 of the resource management plan (Bureau of Land Management 2004:2-7)

The Class III inventory undertaken in 2006 was conducted as part of an archaeological field school offered through the University of Nevada, Reno, under the supervision of Dr. Donald L. Hardesty and Dr. Carolyn L. White. Dr. Jessica Smith was the field director and Benjamin Barna and Sean McMurry were field supervisors. In addition to the cultural resource inventory, the field school focused on identifying cultural resources related to the historically documented inhabitants of the Rabbithole Mining District during the 1930s and early 1940s. Using information from oral history and documentary sources, the mining district was divided into four localities, and survey began with the first in the vicinity of the historically documented Double O Mine. Students located, recorded, and mapped surface features, collecting limited surface samples of diagnostic artifacts. Excavations focused on the interior and exterior of Feature 16, a dugout building.

## HISTORICAL BACKGROUND

The Great Depression, beginning with an economic crisis in 1929, eventually affected all aspects of American culture, including the economy, politics, and people's everyday lives

(Kyvig 2002; Wector 1948). From the stock market crash in October of 1929 until the United States entered World War II in the early 1940s, the nation was wracked by staggering unemployment rates, increased poverty, and unprecedented financial difficulties. Local governments, including cities, were initially responsible for caring for people needing relief, but by 1932 these small agencies were overwhelmed (Bird 1966:27,32; Coode and Bauman 1981:98). It was clear that the country needed an aggressive relief program organized at a higher level. No national charity existed, however, until 1933 when the United States federal government under newly elected Franklin Delano Roosevelt stepped in to attempt to curb the devastation. The U.S. began to implement numerous governmental aid programs, including the "New Deals" 1933-1936. There was a great deal of discontent over government aid. In the American West, small-scale placer gold mining (and, later, hard rock mining following higher gold prices) offered a viable option to make a living, and some people turned to this industry rather than accept the stigma of receiving federal aid or remaining unemployed (Hardesty 1998:83; Hoepfer 1988; Miller 1998:19,39). These people rushed to the mountains to work mining claims, usually looking for gold. Some individuals held legal title to mining claims, but others, termed "snipers," squatted on land and removed minerals that were technically not their own. Unlike earlier rushes, very few miners involved in this "Automobile Gold Rush" were professionals; rather, they were novices and amateurs who turned to mining as a means to survive (Miller 1998; Twitty 2002). Often entire families participated in mining, and while they rarely "got rich," by their participation in this industry the negative effects of the Depression were significantly mitigated.

Depression-era gold placer mining was particularly important because of the significant

role gold played at this time. Throughout the economic crisis, gold was seen as a tangible resource of unquestioned value, a perception critical to the United States' reliance on a gold-backed dollar. Gold was essential to the world economy before and during the Depression because it backed currency. By 1933, President Roosevelt was willing to experiment with decreasing the amount of gold that a dollar was worth, hoping to allow more money to be put into production and stimulate inflation to raise price levels and increase industrial activity (Goldston 1968:118). While much of the nation struggled to sell products that were not in demand, miners who found gold in the Western states had a ready market, especially in the federal government.

#### **EURO-AMERICANS AND RABBITHOLE SPRINGS**

In the 19th-century, white explorers and travelers learned of the precious water source at Rabbithole Springs, and a few emigrants reported gold in the area. It was not until the Depression, however, that Rabbithole's placer gold gained significant notoriety (Johnson 1977:76-77; Vanderburg 1936:148). In 1929, individuals began to acquire property and mining rights in the Rabbithole area, hoping to tap into the promising placers. Several mining companies were formed in the early 1930s, but it was not until late 1931 that mining in Rabbithole gained widespread notoriety, when Dr. Richard P. Landis, a surgeon from Portland, Oregon with interests in mining, and his partners were the first people to attempt to work the Rabbithole gravels on a large scale. By early 1932, Landis started the Landis Mining Company, with Landis as president, even though the property was divided equally into eight shares and he did not hold a controlling interest. Two share owners were W. W. ("Wally") and Ethel I.

("Ma") Irwin. The couple, with their daughter Doris (later, Venable), had relocated from Idaho where Wally had worked with Landis (Venable 2006).

Initial results were promising, but ultimately unfounded. The company installed a washing plant at Rabbithole Springs, an operation requiring significant water (Lovelock Review-Miner [LRM] 1932; LRM 1933a; LRM 1933b). Legal headaches, financial woes, and water shortages all contributed to the company's decline. The company suspended operations in 1935 (Vanderburg 1936:150) and leased their property to outside interests, marking the end of the first major attempt to use large-scale methods to mine Rabbithole gravels. Several later attempts were made to mine the placers on a large scale, but each one failed, primarily because of lack of water.

Small-scale operations fared much better, however. Even though the life of a small-scale placer miner at Rabbithole was difficult, people survived and managed to make "beans," or daily wages, allowing them to stay off government relief during the depression. Between 50 and 400 people mined and lived in the district at any one time during the years between 1932 and 1941. Many were attracted by popular press about Landis's large-scale mining project and the possibility of securing gold for themselves. These people were able to remain in the district, and continue to extract gold, because of legal vagaries which left claim ownership unclear. The snipers remained largely self-governing, even forming their own "kangaroo court" to resolve internal claim disputes (LRM 1938). When legal claim ownership was decided by the courts, the snipers were forced out by individuals asserting their ownership rights (LRM 1941). By 1942, little mining was being done at Rabbithole. In the 1950s Rabbithole saw another episode of mining activity, and since then the district has remained quiet.

## RESEARCH QUESTIONS

The archaeological investigation of Depression-era remains at Rabbithole Springs was designed to provide information about three significant research goals. The first goal was to better understand the history of mining technology, particularly that of the Depression Era. The second was to address the issue of variability and change in domestic households and settlements. Finally, the third theme guiding research was to elucidate how the landscape evolved over time (Hardesty 2006).

## DOUBLE O MINE SURVEY

The mining areas in northern Pershing County were never divided into official districts, making “Rabbithole” a term that applied to a general region, rather than a well-delineated area. In order to narrow the research area, we defined an artificial site boundary based on the presence of one of two characteristics: (1) a lack of cultural materials for at least 30 m; or (2) presence of major roads. The site boundary was then mapped using a Trimble GPS unit. Within the site, the crew then recorded all “features,” or areas that exhibited definite cultural materials. These features were documented using forms, GPS, black and white and digital photographs, and drawings. Features that were related were recorded as “feature systems.” A total of 141 features and 10 feature systems were mapped. These features fall into several categories: mining features, trash scatters, industrial structures, buildings, and miscellaneous features.

### *Mining Features*

Identified mining features include adits (27), shafts (8), trenches, diggings, and tailings piles. These features varied in size, level of

complexity, and state of disrepair. Safety considerations restricted access, so observations were restricted to the exteriors. Several adits had collapsed, especially those whose original shoring had been compromised. The presence of tools in the area and scrape marks on feature walls suggest that adits and shafts were dug with both hand and mechanized tools. It was difficult to gauge the age of these features, especially since some of them had been subsequently used for various, non-mining (i.e., recreational) purposes.

### *Trash Scatters*

Trash scatters of various sizes (14 total) were identified across the mining landscape. Several contained artifacts related almost exclusively to industrial activity, including oil cans, batteries, and equipment. Others contained mostly domestic artifacts, such as tableware, food cans, and glass jars. Most of the trash scatters had a mixture of both industrial and domestic remains. Condensed or evaporated milk cans were found in all domestic dumps, and occasionally appeared throughout the rest of the site. Several artifacts in these scatters date to the 1930s and early 1940s. “Depression glass” was found in several of the dumps, and several alcohol bottles bearing the post-1933, federally mandated embossing “Federal Law Prohibits Sale or Reuse of this Bottle” were found. Other notable artifacts found in trash scatters included many glass artifacts with legible maker’s marks and Fiestaware ceramics.

### *Large Industrial Structures*

Several large structures remained that were related to industrial activities, likely large-scale mining (Figure 2). These included a water tank and two tank bases, two loading platforms, a

large metal structure, a dam with spillway, and a four tier mining processing plant. The age of these structures was difficult to determine, but were most likely between 1929 and 1970.



**Figure 2. Large industrial structure (Feature 17).**

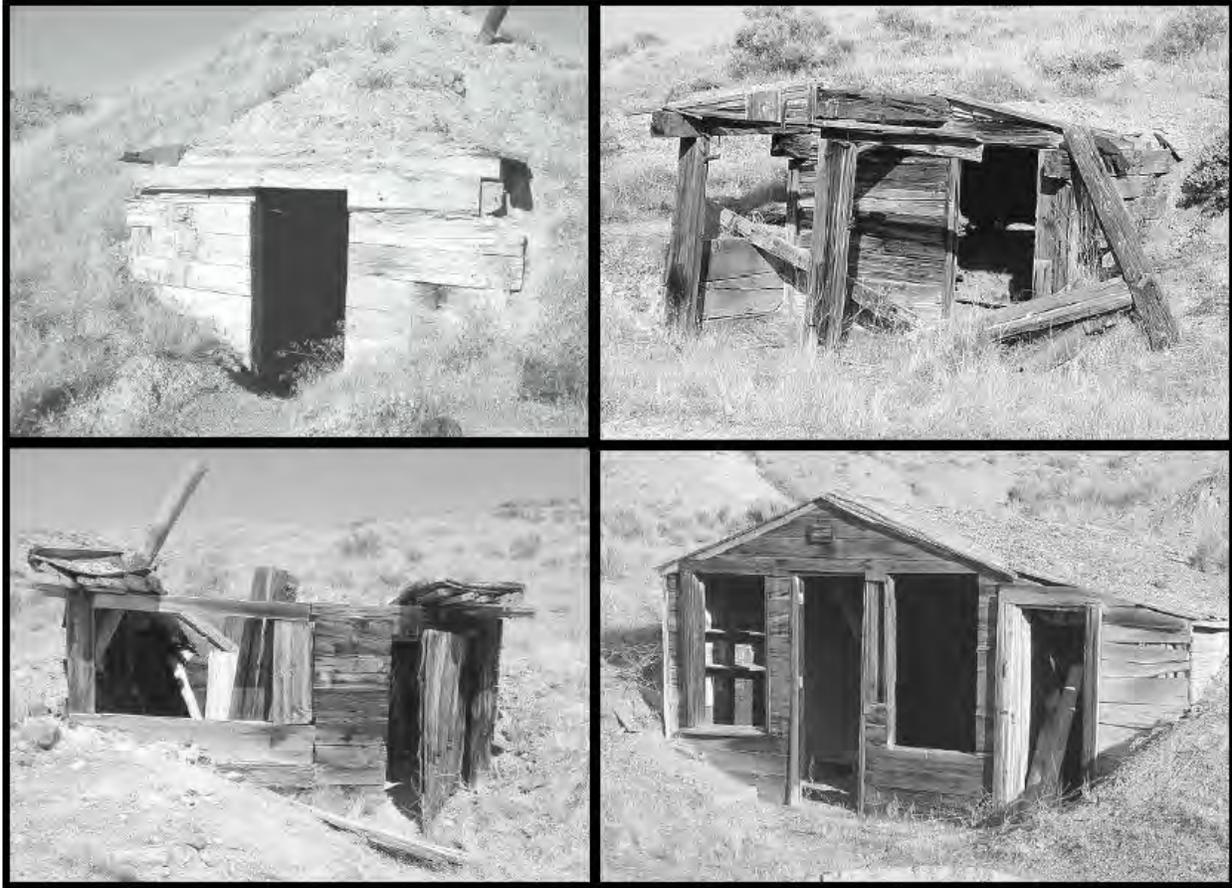
### ***Buildings***

Eighteen buildings were identified. The term “building” was applied to features that had standing structures or evidence of former structures that appeared to be domestic in nature. All had some visible evidence of architecture remaining (such as a dugout outline or remains of walls). Considerable resources, both time and monetary, had been expended to build these features, which likely served multiple purposes within the community. For example, excavation of Feature 16 (originally identified as a domestic structure) suggests that it was a mechanic’s shop, and any domestic activities were ancillary to its primary function as a shop. Of these 18 features, six were standing structures (Features 6, 7, 9, 16, 39, and 47; Figure 3), three were partially standing (Features 10, 13, and 30), and nine possessed no standing elements. This section describes the standing and partially standing structures.

Railroad ties were a common architectural material in all structures, and many were insulated with cardboard and tar paper. The structures contained many reused materials such as cardboard pieces, fruit boxes, tin cans, and pieces of metal and wood. Some structures were shoddily constructed and are now in very poor condition. Other structures were built with obvious care and attention to detail with heavier walls and roofs; many of these are still intact. Although the buildings used common materials in their construction, the form and layout of each building was distinctive.

**Feature 6** is a three room structure with a loft above the main room (see Figure 3). The front wall runs roughly southwest to northeast. Two sides of the dwelling abut embankments, so much so that the dwelling almost resembles a dugout on the eastern and western sides. There are two windows and two doors in the front wall and one window in the back. One door and the two windows are part of the main room. In this room part of a wooden floor remains intact. Several shelving units are in place, and an area with flashing nailed to the wall suggests the former presence of a stove. Two utility poles serve as rafters in this main room and several pieces of wooden fruit boxes, one exhibiting stencils reading “CALIFORNIA GROWERS EXCHANGE, U.S.A.,” are nailed to the rafters. In the western corner of this room is another door that leads into a storage area with a three-tier shelving unit. The other door along the front wall leads to a room where carpet is nailed to the walls with bottle-cap washers. A door along the eastern side of the main room connects the two rooms. Several artifacts are associated with the feature: a crushed metal washtub, metal pipe, pieces of metal screening, timber, and tin cans.

**Feature 7** is a partially buried, one-room dwelling made of railroad ties (see Figure 3). A single door faces east, and two windows are evident on the north and south sides. The interior ceiling is flat and lined with cardboard



**Figure 3. Standing buildings identified in survey (clockwise from upper left: Feature 7, 9, 6, and 39).**

panels. The building is roughly rectangular, although the southern interior wall bulges inward. The interior walls are chinked with newspaper and cloth. The exterior walls were probably hung with siding, as suggested by irregularly spaced nails in the railroad ties. A stovepipe extends through the roof. Feature 7 is part of Feature System A along with Feature 8 (a trash scatter).

**Feature 9** is a two-room dugout structure with a southeast-facing doorway that opens into the eastern room (see Figure 3). The adjoining second room is immediately behind and west of the front room. This west room has dirt back and side walls. Feature 9 has corrugated metal for roofing material and the walls and frame are mostly made with railroad ties and some

additional machined lumber. The structure is immediately off a road and is associated with a can concentration to the north. Feature 9 is part of Feature System C, along with Feature 62 (structure) and Feature 64 (trash scatter). The small trash scatter contains cans of various sizes, glass, and an unidentifiable auto part.

**Feature 13** is a collapsed structure partially embedded in an embankment. The front side is the south wall. The north wall consists of two sections. One is made of five vertical wooden boards nailed to wooden cross beams. The other section is constructed of three horizontal boards nailed to cross braces. The roof consists of 10 boards oriented east-west. In the southwest corner of the roof is a rectangular cutout filled with a piece of metal with a hole in the middle:

likely a thimble for a stovepipe. A large piece of corrugated metal is on top of part of the roof. A railroad tie runs along the east side of the dugout. Associated artifacts include a metal car window frame, corrugated metal pieces, various lumber pieces, a piece of stovepipe, tin cans, window glass, a metal stove, metal screening, and a metal bucket.

**Feature 16** is a single-room structure partially built into the hillside (Figure 4). It is constructed of lumber and railroad ties with corrugated cardboard nailed to the walls. The gabled roof is constructed of lumber and covered partially with sheet metal and corrugated metal; the metal is covered with earth. There are two small windows on the northwest and southeast walls and one large window on the southwest wall. The door is located on the southwest wall. There is shallow shelving high on the southwest wall. Flashing is against the southwest wall and above it is a hole for stove piping. Also on the southwest wall there is a low bench; a coat hook is in the northern corner of the northeast wall. Chinking is composed of cardboard and mud. Artifacts associated with this feature include tin cans, window glass, lumber, a wire mesh screen, and metal pieces. This feature was excavated (see below).



**Figure 4. Feature 16 with field school students working inside.**

**Feature 30** is a dugout structure with a wooden door frame that faces south. The entrance is partially collapsed. A metal stovepipe extends from inside the dwelling out of the upper embankment. Extending from the door frame is a lumber construction consisting of six vertically oriented boards nailed to one cross brace. Several other boards, possibly part of the door or frame, lie around the entrance. The remains of a metal stove lies in front of the entrance. A decayed piece of denim clothing lies near the entrance. The upper part of the door jamb is not surrounded by dirt, suggesting that the roof partially collapsed. Inside the dwelling is a wooden table. Lying next to the table is a metal gas tank with a hole punched out. Just inside the entrance on the southern side is a dirt bench cut out of the side of the dugout. Six metal cans and three labels are on the earthen floor, as is a bone from a beef round steak. Fragments of newspaper are on the floor. Cardboard pieces, which might have covered the floor, are also on the floor near the back of the dugout. The back wall is very clean and marks from a chisel or hand steel are clearly visible. These marks are also evident on portions of the other two walls. Near the back wall are three slight depressions removed from the adjacent walls; these might have served as shelves, braces for shelves, or a bed. Several artifacts were associated with this feature, including a metal stove, a rubber tire with cord and metal reinforcement, and a piece of metal sheeting that might have served as a stove door. Feature 30 is part of Feature System E with Feature 72 (a trash scatter).

**Feature 39** is a one-room, partially buried structure with one door and two windows (see Figure 3). One window is in the north wall, and the door and another window are in the southern wall, with the door along the eastern side. The door is constructed of vertical planks attached to the southeast corner post with two triangular hinges. Part of the frame from the southern

window has fallen toward the interior of the structure. The flat roof is constructed of a single roof beam on the east-west axis of the building. It is made of wooden planks topped with corrugated metal is partially collapsed. The walls contain various-sized vertical posts. The east and west walls have railroad tie posts in the approximate center. The rest of the walls are constructed with horizontal machined wood planks, but considerable slumping has occurred. A pair of shelves is between the window opening and the door. Shelves are also present in the northwest corner running along the east wall. Cardboard and fiberboard insulation is present on the north wall. A metal bed frame is partially buried in the northwest corner of the building. Feature 39 is part of feature system G along with Feature 84, a nearby trash scatter.

The partial collapse of the roof and slumping from the interior walls has allowed considerable sediment to accumulate on the floor of Feature 39, but many of the wall panels are in very good condition. One cardboard panel that insulates the walls reads, "Internal Revenue Tax Paid." Several panels contain legible stencils including: "Longview Fiber Company, Longview, Washington"; "Regal Amber Beer"; and "Scott Auto Camp/Winnemucca Nev." Another panel a handwritten pencil notes that is a radio schedule (Barna 2008). Nailed next to the southern window is a wooden slat with "W. W. Irwin/Sulphur, NE" stenciled in black paint.

**Feature 47** is a two room dwelling. Only half of the front room, which includes a door oriented roughly southeast, is still erect. An articulated wall in the western bank and an embedded timber suggest that the dwelling was originally twice its present size. The walls are composed of railroad ties and timber nailed together. Roofing is corrugated metal suspended by timbers. There is metal siding on some portions, and tar paper is nailed to the outside of the north wall as siding. A fruit box is nailed to the inside of the north wall and a shelf to the east

wall. The back room likely served as storage area or living area, based on evidence of a wood stove. The back room is constructed of timber studs and corrugated metal and automobile grills as lagging. The roof of the back room is constructed of wooden crossbeams and timber rafters covered with earth. There is a second stovepipe hole in the back roof. The western wall is tongue-in-groove, painted green. There is a complete fruit box in an earthen mound on the floor. To the northwest of the dwelling is a partial railroad tie with sheet metal (reused) nailed to it that projects from the southern bank. The western wall has sheet metal nailed to it. Artifacts associated with Feature 47 include a metal stovepipe, a straightened wire coat hook, corrugated metal, a colorless jar finish, a wooden cot frame, metal window screen, colorless bottle glass, amber bottle glass, battery rod, wire nails, electrical part, and an oil can. Feature 47 is part of Feature System H, which also includes with Feature 46 (shaft) and Feature 48 (collapsed structure).

### *Miscellaneous Features*

Several miscellaneous features were identified during the 2006 field season. Features 12 and 21 are anvil bases. Feature 12 has an associated wood lined cellar. Feature 26 is a collapsed structure that was preliminarily identified as a privy. Feature 44 and 45 are survey monuments. Two features, 43 and 67 are remains of cars. Features 34 and 82 are both small-scale gravel processing areas. In addition, a variety of roads were recorded.

### *Observed Artifacts*

Surface survey of the Double O Mine site revealed a wide variety of artifacts representative of a broad range of activities

undertaken in this landscape. Most of the adits had little or no artifacts associated with them. Construction debris – mostly lumber, railroad ties, corrugated metal sheeting, and occasionally flat glass – dominated the assemblages associated with buildings, though domestic artifacts such as bed frames and wood stoves were also associated with many buildings. Dumps contained the widest variety of artifacts, including over 860 cans of various types, glass representing bottles (both alcoholic and non-alcoholic), jars, and food service items, and fragments of ceramics including white improved earthenware and some porcelain. Many features contained battery leads. Automobile parts, mainly seat cushion frames and springs, were also found associated with dumps, dugouts, and dwellings. Three shell buttons were recorded at three different features. Mining-related artifacts include a riffle box near Feature 82 (a placer mining processing area) and gravel-transporting machinery near the two loading platforms designated as Features 4 and 5. Many of the recorded artifacts showed evidence of re-use or modification.

### *Collected Surface Artifacts*

Artifacts considered unique or unusual were collected for further study (Hardesty 2006).

During the course of the pedestrian surface survey of the Double O Mine site a total of eight artifacts determined to have potential dating or diagnostic value were collected. These are summarized in Table 1. Three Hills Brother's Coffee cans found inside Feature 30 suggest occupation of the adit ca. 1939 to 1942 (Lanford and Mills 2006). The hand steel recovered near Feature 20 is interesting: the gold deposits at the Double O Mine site were placer deposits in a large alluvial fan, but the *caliche* cementing of the gravels may have necessitated the use of some hard rock mining techniques.

### EXCAVATIONS

Following the survey and recording of the features in the Double O Mine site, excavation focused on Feature 16, a dugout structure (see Figure 4). Students and field crew excavated three units: two inside Feature 16 and one outside the structure's door. The excavations sought to understand the interior layout of the structure and to identify activities undertaken by the residents. Excavations focused on the interior of the structure as well as on the area just outside the building.

Four units (1-4) were laid out inside the structure. A balk buffered the walls from any potential destabilization from the excavations.

**Table 1. Artifacts Collected During Pedestrian Survey of Double O Mine.**

PRIMARY FUNCTION	SECONDARY FUNCTION	DESCRIPTION	n	FEATURE #
Domestic	Food Storage	Coffee Can	3	30
Domestic	Food Storage	Cardboard	1	30
Domestic	Food Storage	Jar	1	63
Domestic	Food Storage	Bottle	1	69
Personal	Medicine	Bottle	1	64
Mining	-	Hand Steel	1	20

The units measured 1.25 m x 1.50 m, which maximized the coverage across the structure's interior. They were oriented with the walls of the structure, and were laid out on a northeast-southwest axis.

Prior to excavation, the surface artifacts in all units were mapped and then collected. Excavations were undertaken in Units 1 and 2, the units on the eastern side of the structure. These units were selected for excavation because they were adjacent to elements present on the walls and roof of the structure that merited investigation. The stratigraphy in both units was distinct, but each contained a portion of the features identified in the excavations within the structure.

### *Unit 1*

Unit 1 was located in the southern quadrant of the structure. A built-in bench was located in the southeastern corner of the unit. The unit had a large amount of artifactual material on the surface. Electrical wire, bottle glass, nails, a fragment of a hacksaw blade, a light bulb, a plastic handle, can lid can parts, a winding can key, washer, nut, asphalt, and a bolt were collected from the surface. Several pieces of structural wood and charcoal were recorded and discarded.

A total of 5 levels were identified in Unit 1. The levels were distinguished by texture and degree of compactness, but the artifacts did not differ significantly in the first four levels. Level 1 was a loose silty sand and contained a variety of materials nails, a dog name tag: "SCOUT," lynch pins, bolts, nuts, sheet metal trimmings, glass, nails with copper attachments, a bracket, a possible perfume bottle, bottle cap, can key, and a rubber cap were among the artifacts recovered in this layer. Textiles, cardboard, and newspaper were also found. Level 2 was densely packed with artifacts. In particular, an

assortment of textiles was found, including red knit, corduroy, denim, and tightly woven black and tan cotton as were large amounts of newspaper fragments. Additional artifacts included a colorless molded glass jar, metal machine parts, a hind, wood with painted stenciling, the neck of the aforementioned perfume bottle, metal lids, a bottle cap, a complete bromide bottle, staples, an eye socket screw, caulking, and a shot gun shell. Level 3 was a very loose soil that contained screws, textiles, newspaper, colorless glass fragments, match sticks, nails, cap, comb fragment, a pencil, metal latch/lock, gear, hardware, and miscellaneous metal fragments. This layer was adjacent to Level 4, which was a hard packed soil with small stones embedded in it. Level 4 interfaced with Feature 16.2, a linoleum floor (see below). Artifacts in this layer were plentiful and included electrical hardware, a hinge, nails, nuts, plastic, matchsticks, battery parts, springs, glass, pencils, a weight, washers, staples, and textiles.

Level 5 lay underneath the linoleum floor (Feature 16.2). This layer consisted of hard packed earth with slightly different textures present across the unit. The layer was hard-packed and we tested the northern and western corners of the unit to assess the presence of cultural materials and no artifacts were encountered below the interface with Feature 16.2.

### *Unit 2*

Unit 2 was a 1.25 x 1.5 m excavation unit placed in the eastern corner of the building (Feature 16) below an exterior wall that has wood shelving and deteriorated sheet metal roofing. The surface was not disturbed, but was covered with debris, like the rest of the building's interior. Among the recovered surface artifacts were textile fragments,

cardboard, tar paper, a metal can, leather fragments, wire, a large portion of an amber glass jug, rubber sheeting, bolts, and a leather strap marked "SHERWOOD'S/LOS ANGELES/HOLLYWOOD" in gold lettering.

The soil in the eastern corner of the unit was higher than the rest of the unit, and initial excavations focused on this area. Three levels were identified in the unit. Level 1 was a light tan soil with gravel. Artifacts in this level were concentrated in the southeastern portion of the unit. Artifacts included newsprint, cardboard, tar paper, bolts, sheet metal, nails, a washer, a tool handle, glass, an ointment tube, and bone. Level 2 was similar in color and texture to Level 1 and had similarly high artifact density. Many artifacts were enmeshed in paper or cloth and were recovered in the southern corner of the unit. Artifacts included Levi Strauss rivets, rubber, copper tubing, light bulb base, colorless bottle glass, and woven, knit, and corduroy textiles. Level 3 was a compact silty sand with a low clay content with some pea-sized gravel. Excavations began in the northern corner of the unit where several pieces of cardboard, leather, and ferrous hardware lay on top of a hard-packed earthen surface. This was the final excavated strata in Unit 2.

### *Features in Units 1 and 2*

Three features were identified in Units 1 and 2. An ash lens (Feature 16.1) was identified in the northern corner of Unit 1 and in the western corner of Unit 2. This feature was interpreted to be the ash and debris from the stove placed in the structure. The identification of Feature 16.1 provided information about the placement and size of the stove in the interior of the structure. The matrix of Feature 16.1 contained screws, textiles, newspaper, colorless glass fragments, match sticks, nails, cap, comb fragment, a pencil, metal latch/lock, gear, hardware, and

miscellaneous metal fragments. This was a thin layer of discolored soil, which ended on the surface of the linoleum (Feature 16.2).

The remains of a linoleum floor were identified across the eastern portion of the structure. This feature (Feature 16.2) was identified in Units 1 and 2. The feature was identified under Level 4 in Unit 1 and under Level 1 in Unit 2. The configuration of the feature was different in each unit, but it was contiguous. The linoleum possessed multiple areas where the color was preserved. In Unit 1, a dark border was present in the southwestern portion of the unit. A diamond pattern cut in the linoleum formed the southwestern edge of the flooring. At the center of the flooring in Unit 1, a band of red color was preserved. Large pieces of black linoleum were also preserved, suggesting a patchwork quality to the linoleum when it was in use. The linoleum was also not set flush with the walls of the structure, but was slightly angled. In Unit 2, the linoleum lay over compacted earth, with a layer of cardboard underneath the linoleum in some portions (the cardboard was most intact nearest the stove). The linoleum was laid in irregularly shaped tiles. In the western corner of Unit 2 there were several instances of patching over low spots in the floor by filling the low spot with earth and laying the linoleum over it. Artifacts collected from the excavation of this feature included cartridge casings, a shoelace fragment, colorless glass, and cardboard. The shape and configuration of the linoleum outlined the presence of the stove area within the structure and also suggested a possible work area. The very high density of artifacts, essentially preserved on the linoleum floor is also very intriguing, and many of the artifacts in Level 4 lay just on the surface of the linoleum. Following the clearance of the soil and artifacts from the surface of the linoleum, what remained of the feature was lifted from the floor of the building.

The stove area was identified as Feature 16.3. The only artifact identified in this feature was a single nail from the interface with Feature 16.2. This feature has been interpreted as the area where the stove was placed within the structure as it corresponds with the stovepipe and flashing on the southeastern wall.

### *Unit 3*

Unit 3 was a 1.25 m x 1.5 m unit located in the northern corner of Feature 16. The northwest side of the unit was obscured by accumulated windblown soil and wall fall. This unit was not excavated, but artifacts were collected from the surface before excavation commenced in other areas of the building. Surface artifacts included paper, textiles, cardboard, wood, bottle glass, electrical wire, rubber tubing, a buckle, linoleum, a metal spring, and string.

### *Unit 4*

Unit 4 was a 1.25 m x 1.5 m unit located in the western corner of Feature 16. This unit also had a significant amount of accumulated soil along the northwestern portion of it. This unit was not excavated. Artifacts collected from the surface included wood (from building construction), a fruit box fragment, boot heel, aluminum mining claim tag, a cylindrical sanitary can, colorless bottle base, gutter-type object, iron bolt, iron ring, and leather strap with a buckle.

### *Unit 5*

Unit 5 was a 1 m x 1m unit located just south of the front door of Feature 16. Artifacts recovered on the surface included window glass

throughout the unit, shell casings, metal rings, a metal screw, rubber, wire, a nut, hardware, and electrical parts. Four stratigraphic layers were identified in the unit along with two features.

Level 1 was a fine and very dry light brown silt with some rock inclusions. Nails, cotter pins, window glass, metal fragments, insulation, tar paper, textiles, cartridge casings, wire, and cardboard were found in the unit. Small fragments of charcoal were also recovered. Level 2 was a mottled dark brown soil that rapidly gave way to a number of contrasting areas in the unit. This layer contained metal screws, nuts, nails, window glass, a valve, washers, metal tubes, a spring, and cotter pins. At the base of Level 2 three different soil types were present: (1) medium brown loose fine soil with some rock inclusions (western portion); (2) hard packed clay with large rock inclusions (northeastern quadrant); and (3) hard packed medium gray-brown soil and clay with few rocks inclusions. Level 3 was a hard packed soil with few rock inclusions. This level contained metal brackets, window glass, slag, nails, and rubber. At the top of this level a single metal nail was collected. Level 4 was a hard packed soil with large rock inclusions. Following identification of the base levels in the interior of Feature 16, Level 4 was identified as subsoil and was not excavated.

Feature 110 was identified in the northwest corner of Unit 5. The feature was a 16 cm x 10 cm, yellow-brown rectangular stain. The soil was a sandy silt, contrasting with the hard-packed rocky matrix that surrounded it. This feature was tentatively interpreted as a posthole and did not contain any artifacts.

Feature 111 was identified in the northwest quadrant of the unit. This feature was a lobed possible posthole/pit feature just south of Feature 110. It measured 36 cm x 20 cm; no artifacts were recovered from the feature.

### *Artifacts*

The five excavation units in Feature 16 yielded 4,754 artifacts. Table 2 lists these according to primary functions as determined using a modified version of the classification system put forth by Sprague (1981). Of note is the low number of artifacts classified as “Mining” (Figure 5). Other artifactual evidence of mining activities is likely to be found as artifacts with other potential functions, and as such may be hidden in the data collected as the various pieces of hardware or automobile parts that were so prevalent in Feature 16. Vanderburg (1936:150-151) describes and illustrates two styles of home-made dry-washing apparatus that borrow components from other machines. Due to the ambiguity associated with the multifunctional nature of such artifacts, most of these have been classified as “Unidentified Hardware.” The number of artifacts classified as “Domestic” is also proportionally low, comprising less than two percent of the total artifacts recovered (Figures 5 and 6). Bottle glass fragments represent 40 percent of these, and 30 percent are tin can fragments. Two pour-

spouts resembling the type used on paperboard salt containers and a baking powder lid suggest some food preparation activities, although no other artifacts related to food preparation were observed in or around Feature 16.

The catalog currently contains 2,400 artifacts of yet to be determined function. In some cases, such as the 202 fragments of corroded ferrous metal, 405 fragments of rubber, 145 glass fragments, and 380 fragments of textile recovered, they are too fragmentary for functional inference. Others, such as 354 hardware items potentially have multiple functional applications or would be components of larger machines of unknown function (Figure 7). Feature 16 yielded 18 automobile parts potentially dating to the early 1930s (Figure 8). This suggests that some automobile repair occurred in or around the cabin. In light of the historical descriptions of dry-washing machines and the descriptions of large-scale placer mining involving trucks (Lovelock Review-Miner 1933), it is tempting to assign many of these to the “Mining” functional category, but further analysis is needed to determine their functions with certainty.

**Table 2. Number of Artifacts Recovered from Feature 16 Sorted by Primary Functional Category.**

<b>PRIMARY FUNCTION</b>	<b>n</b>	<b>MASS (g)</b>
Architectural	1,653	3,826.94
Communications	402	74.520
Domestic	89	1,588.950
Indulgences	5	21.690
Mining	2	901.410
Other	7	16.740
Personal	80	474.560
Sanitation	6	292.600
Transportation	19	169.470
Utilities	46	193.800
Unidentified	2,400	9,278.304
Arms	45	70.920
<b>Total</b>	<b>4,754</b>	<b>16,909.904</b>



Figure 5. Mining and domestic artifacts recovered in Feature 16. From left: mining claim tag; colorless glass bottle base; blue bromide bottle; and racing payout stub.



Figure 6. Domestic artifacts recovered in Feature 16. From left: bone toothbrush head; pencil nub; wisdom tooth; strap buckle; and porcelain button.



Figure 7. Miscellaneous hardware recovered in Feature 16.



Figure 8. Automobile parts recovered in Feature 16.

## CONCLUSIONS

The survey and excavations at Rabbithole Springs have begun to elucidate a variety of aspects of life during the depression in this area. This article presents preliminary results of the 2006 field season, and suggests the varied exploitation of the landscape as well as the ways that the miners and their families subsisted in the area.

To date we have recorded over 100 features, collected samples of diagnostic artifacts from the various features, excavated a portion of a structure, and identified and catalogued almost 5,000 artifacts. Analysis of the artifacts and features is ongoing, but preliminary analysis suggests the immense potential of this area for understanding the way that people made their way during a very difficult economic period in American history.

## REFERENCES

- Barna, Benjamin  
 2008 A Material Culture of Making Do: Historical Archaeology of the Rabbithole Mining District, Pershing County, Nevada 1929-1941. Paper presented at the annual meetings of the Society for Historical Archaeology, January 12, 2008.
- Bird, Caroline  
 1966 *The Invisible Scar*. David McKay Company, New York..
- Bureau of Land Management  
 2004 Black Rock Desert-High Rock Canyon Resource Management Plan. Electronic document [http://www.nv.blm.gov/Winnemucca/blackrock/RMP\\_form.htm](http://www.nv.blm.gov/Winnemucca/blackrock/RMP_form.htm) accessed February 10, 2008.
- Bradbury, Caroll E., and Associates  
 1964 Rosebud Canyon Deposit. Nevada Mining District File 37500003. Electronic document <http://www.nbmng.unr.edu/scans/3750/37500003.pdf> accessed February 8, 2008.
- Coode, Thomas, and John F. Bauman  
 1981 *People, Poverty and Politics: Pennsylvanians during the Great Depression*. Associated University Press, East Brunswick, NJ.
- Goldston, Robert  
 1968 *The Great Depression: The United States in the Thirties*. The Bobbs-Merrill Company, Indianapolis, IN.
- Hardesty, Donald L.  
 1998 Power and the Industrial Mining Community in the American West. In *Social Approaches to an Industrial Past: The Archaeology and Anthropology of Mining*, edited by A. Bernard Knapp, Vincent C. Pigott, and Eugenia W. Herbert, pp. 89-96. Routledge, New York.
- Hoeper, George  
 1988 *Bacon and Beans from a Gold Pan*. Panorama West Publishing, Fresno, CA.
- Johnson, Maureen G.  
 1977 Geology and Mineral Deposits of Pershing County, Nevada. *Nevada Bureau of Mines and Geology Bulletin* 89.

Kyvig, David E.

2002 *Daily Life in the United States, 1920-1939: Decades of Promise and Pain*. The Greenwood Press, Westport, CT.

Lanford, Steven, and Robin Mills

2006 *Hills Bros. Coffee Can Chronology Field Guide*. BLM-Alaska Open File Report 109. Bureau of Land Management, Fairbanks, AK.

Lovelock Review-Miner

1932 Landis Strikes Good Flow of Water at Rabbit Hole Springs: Prepares to Start Run of Gravel from 900 Acres of Claims. *In Lovelock Review-Miner*. Pp. 1. Lovelock, NV, July 22.

1933a Landis Mining Co. Buys Seventh Truck. *In Lovelock Review-Miner*. Pp. 1. Lovelock, NV, January 20.

1933b Next Session of Court to Last Several Days. *In Lovelock Review-Miner*. Pp. 1. Lovelock, NV, March 17.

1938 Says Snipers of Rabbit Hole are on Clear Claims. *In Lovelock Review-Miner*. Pp. 1. Lovelock, NV, December 30.

1941 Would Eject Miners From Rabbit Hole. *In Lovelock Review-Miner*. Lovelock, NV, December 4.

Miller, Charles Wallace

1998 *The Automobile Gold Rushes and Depression-Era Mining*. University of Idaho Press, Moscow.

Sprague, Roderick

1981 A Functional Classification for Artifacts from 19th and 20th Century Historical Sites. *North American Archaeologist* 2(3):251-261.

Twitty, Eric

2002 *Riches to Rust: A Guide to Mining in the Old West*. Western Reflections Publishing Company, Montrose, CO.

Vanderburg, William O.

1936 Placer Mining in Nevada. *Nevada Bureau of Mines Bulletin* 27.

Venable, Doris

2006 Interview, Rocky Canyon, Nevada, April 14, 2006.

Wector, Dixon

1948 *The Age of the Great Depression 1929-1941*. The MacMillian Company, New York, NY.