Appendix B:
Cultural Resources Report

Plum Family Mammoth Lakes Partnership Mammoth Lakes, California (TPM 10-01) Archaeological Survey and Evaluation

Mary M. Farrell
and
Jeffery F. Burton

Trans-Sierran Archaeological Research
Contributions to Trans-sierran Archaeology No. 68
November 2010

Plum Family Mammoth Lakes Partnership Mammoth Lakes, California (TPM 10-01) Archaeological Survey and Evaluation

Prepared by:
Mary M. Farrell
and
Jeffery F. Burton

With Contributions by:
Richard E. Hughes
and
Thomas M. Origer

Trans Sierran Archaeological Research
332 East Mabel Street
Tucson, Arizona 85705

Prepared for:
Community Development Department
Town of Mammoth Lakes
P.O. Box 1609
Mammoth Lakes, California 93546

TSAR Project No. 114
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Management Summary

Trans-Sierran Archaeological Research conducted survey and testing for the Town of Mammoth Lakes, to determine whether the proposed development of a 5.7-acre parcel owned by the Plum Family Mammoth Lakes Partnership would impact significant archaeological or historical resources. One historic gravesite is located completely within the parcel; two prehistoric lithic scatters are partially within the parcel, extending beyond the parcel boundaries onto other private property and public land administered by the Inyo National Forest. All three sites had been previously recorded; site boundaries and locations were verified and site records were updated.

The gravesite (Plum 1), with the marked graves of Clarence and Joseph Gibbs, will be protected by a preservation easement, and the two graves will be enclosed by a fence. Subsurface testing conducted on the portions of the two prehistoric sites within the parcel (Plum 2 and 3) confirm that they meet the California criteria for sparse lithic scatters; analysis was conducted in accordance with the guidelines in "California Archaeological Resource Identification and Data Acquisition Program: Sparse Lithic Scatters" (CARIDAP:SLS), to recover sufficient information to mitigate the effects of the proposed development. Therefore, as far as archaeological and historical sites are concerned, the proposed project would not have a significant effect on the environment per the California Environmental Quality Act (CEQA).

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Archaeological Survey and Evaluation

Trans-Sierran Archaeological Research conducted survey and testing for the Town of Mammoth Lakes as part of environmental studies conducted to determine the effects of a project proposed by the Plum Family Mammoth Lakes Partnership. The archaeological work was undertaken to determine if the project, the subdivision and development of a 5.7-acre parcel in Old Mammoth, would impact significant archaeological or historical resources, as defined by the California Environmental Quality Act (CEQA).

Project and Environmental Background

Plum Parcel 10-01 is roughly L-shaped: one leg of the "L" stretches from the top of Mammoth Bluffs eastward down the Bluffs' steep slope to the nearly level area at the base, adjacent to Windy Flat; from there, the other leg extends north to Tamarack Street. Legal location is Township 4 South, Range 27 East, within the SE¼ of the SW¼ of Section 3. Elevation ranges from 8,365 feet at the top, western end of the property to 7,970 at the southeastern corner (Figures 1 and 2). The west edge is bounded by LeVerne Street in the Bluffs subdivision, the north edge is adjacent to Tamarack Street. The east edge of the property is adjacent to developed and undeveloped private parcels and the Snowcreek Golf Course, an artificial landscape created in a portion of Windy Flat. Public land administered by the Inyo National Forest borders the parcel on the south.

Modern developments currently within the parcel include a dirt road and trails across the lower, eastern part of the property and fences along the eastern edge (Figure 3). A fence along the south edge of the property is close to, but not precisely on, the boundary. The Town of Mammoth Lakes uses a small drainage in the northern part of the property to deposit snow cleared from nearby roads, and the dirt road through the property from Tamarack Road is used to access a Mammoth Community Water District well. Pedestrians also use the road to reach the Forest Service land to the south.

The proposed project is the subdivision of the 5.7-acre area and the construction of five residences, associated utilities, and an access route in the lower portion of the parcel, south of Tamarack Road, and the construction of one residence in the upper portion of the parcel, adjacent to LeVerne Street. Pedestrians would retain access along the east side of the property to the public land to the south. A quarter-acre parcel at the north end of the property would be granted to the town of Mammoth Lakes for continued snow storage, and an area surrounding a known gravesite would be preserved in perpetuity. No development is planned for the steep slope between the upper parcel and the lower parcels (Figure 4).

Vegetation is dominated by sagebrush, bitterbrush, manzanita, and snowberry, with rabbitbrush, *Eriogonum*, Indian paintbrush, mules' ears, desert dandelion, aster, phlox, serviceberry, and miscellaneous grasses and forbs also present. There are red fir and lodgepole pine in the lower area, including a giant red fir near the northern edge of the property, and scattered fir and Jeffrey pine in the upper area.

Three previously recorded sites are located within, or partially within, the proposed project area (Appendix A and B). One site, consisting of two historic graves located on the lower portion of the property, had been documented and mapped for an existing preservation easement. In this report the

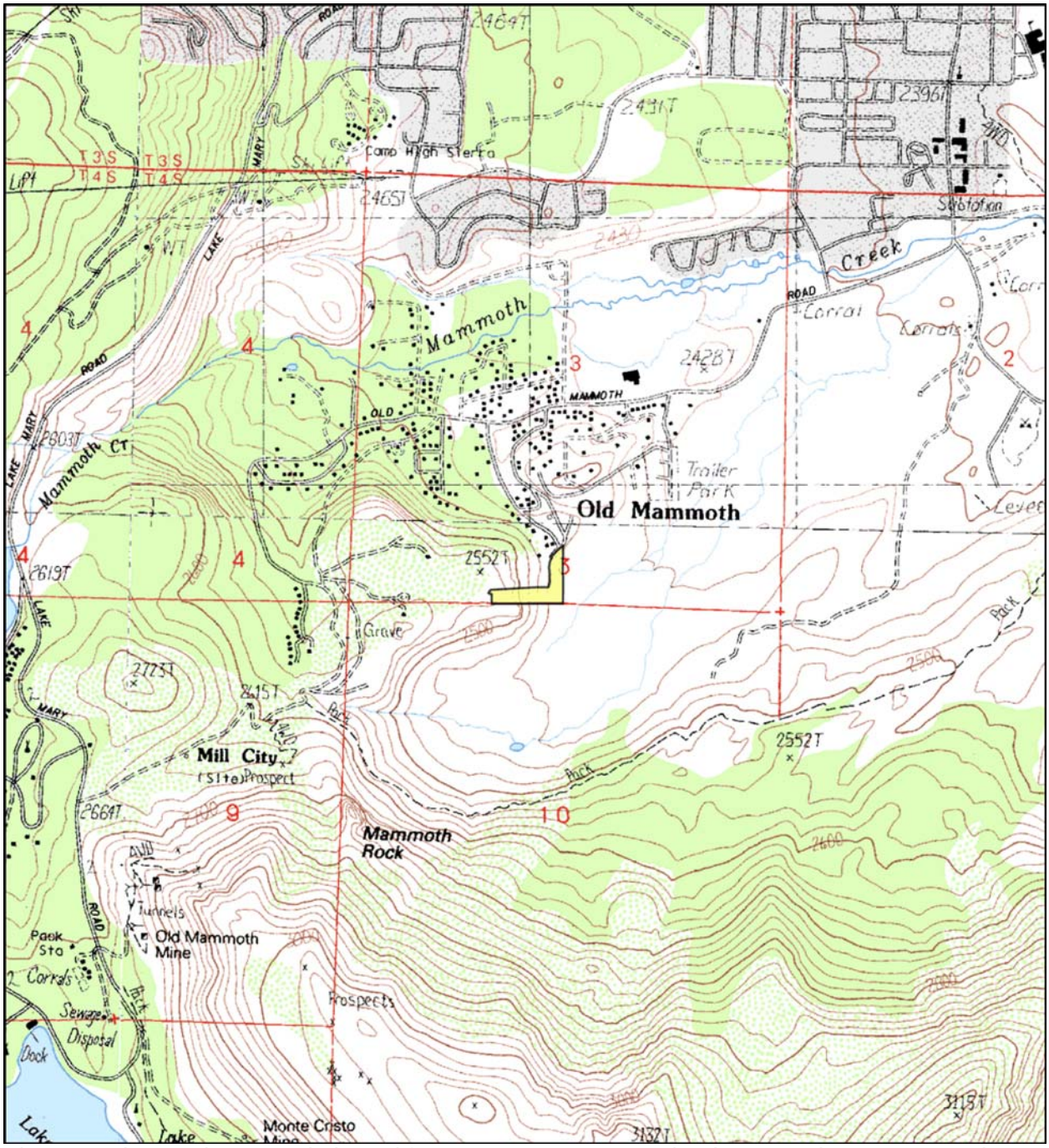

Figure 1. Plum project area (adapted from USGS 7.5' maps: Bloody Mountain 1990, Crystal Crag 1994, Mammoth Mountain 1992, and Old Mammoth 1983).

graves are referred to as Plum 1. Plum 2 is a lithic scatter south of the graves and extending onto the Forest Service land. Both Plum 1 and Plum 2 were recorded by the Forest Service as site 05-04-52-35, and assigned the trinomial designation CA-MNO-871. A small, sparse lithic scatter located at the west, upper end of the property was recorded in 1982 for the proposed Bluffs subdivision (Burton 1982). In this report, this site is referred to as Plum 3.

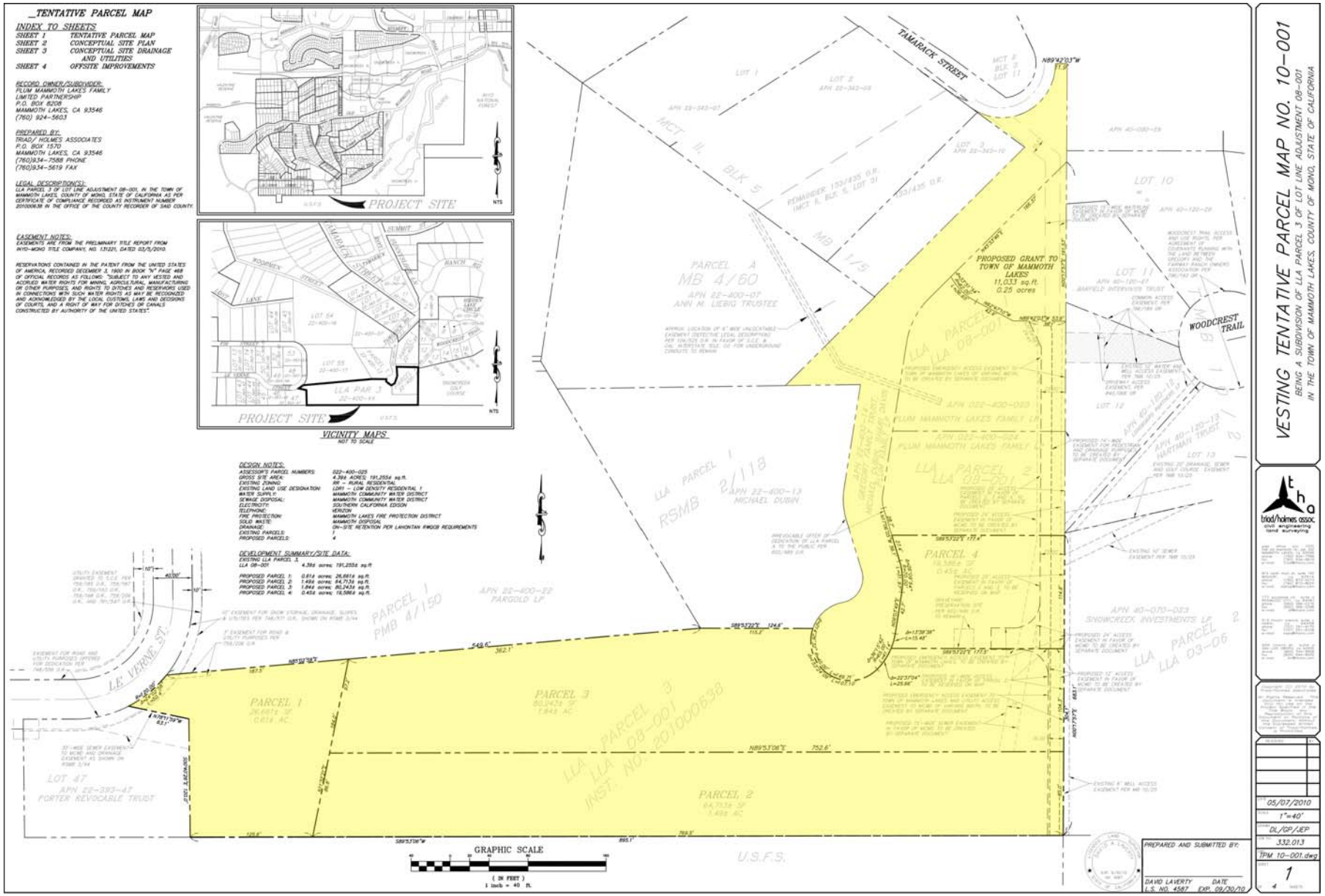

Figure 2. Plum project area (in yellow).

Figure 3. Lower portion of Plum project area.

Figure 4. Mammoth Bluffs.

Methods

An intensive pedestrian archaeological survey was conducted by the authors on August 22, 2010. The property owner met us in the field to show us the staked corners and boundary lines. The lower portion of the property was surveyed with north-south pedestrian traverses 5 to 10 m apart. The upper, western portion of the property was surveyed with east-west traverses about 5 m apart. The steep slope (>30°) between the upper and lower parts of the property was examined from afar for evidence of any features, but was not surveyed on foot. The slope is considered a potential avalanche zone; its inaccessibility correlates with an extremely low likelihood of significant archaeological resources being present, and no development is planned there.

Visibility in an estimated 90 percent of the survey area was good, with 50 to 80 percent of the ground surface visible between the sparse brush. Denser manzanita and other brush in about 10 percent of the project area obscured the ground surface; in these areas, small clearings and rodent burrows were examined closely to partially compensate for the limited visibility. Although outside proposed development areas, a rocky bluff below the upper end of the parcel was also inspected.

Areas where one or more artifacts were found were examined with more closely spaced transects, to determine if additional artifacts were present. Trimble Juno GPS units were used to plot the location of each artifact observed within the property, as well as to plot modern features and trees as reference points. Adjacent areas, outside the property boundary, were also inspected, to better define the archaeological sites and to provide comparative data for interpretations and recommendations. Seven isolates, which do not meet site criteria, were also recorded.

The site records for the three sites that occur within or partially within the proposed project area were updated, following the California Office of Historic Preservation standards (1995). The grave markers were photographed and measured, and background research was conducted to ascertain additional details about the grave site.

The two lithic scatters appeared to meet the criteria for "sparse lithic scatters," as defined by the "California Archaeological Resource Identification and Data Acquisition Program: Sparse Lithic Scatters," (CARIDAP:SLS; Jackson et al. 1988). Sparse obsidian lithic scatters are nearly ubiquitous in the Mammoth Lakes area, due to the proximity of the Casa Diablo obsidian sources, within 4 miles of the project area. Nevertheless, sparse lithic scatters can provide useful information about prehistoric technology, trade, travel patterns, or subsistence. Recognizing their research potential, the California Office of Historic Preservation in collaboration with federal agencies developed a protocol to identify and manage sparse lithic scatters, and to efficiently recover the limited but useful information they can provide ("California Archaeological Resource Identification and Data Acquisition Program: Sparse Lithic Scatters," or "CARIDAP:SLS;" Jackson et al. 1988). To qualify for treatment under the protocol, archaeological sites must:

1) contain only flaked-stone and lack other classes of archaeological materials (e.g., groundstone, fire-affected rock, bone or shellfish remains, pottery);

2) lack a substantial subsurface deposit (as determined by limited excavation);

3) exhibit surface densities equal to or less than three flaked-stone items per square meter.

The sparse lithic scatter protocol was developed to manage archaeological sites on federal land, to fulfill the requirements of the National Historic Preservation Act. However, because CEQA parallels the federal legislation in the evaluation and treatment of archaeological sites, the sparse lithic scatter protocol can be applied to archaeological sites on private land, too. Because survey data indicated

that Plum 2 and Plum 3 met criteria 1 and 3, limited excavation was undertaken to determine if either or both sites also lack substantial subsurface cultural deposits (criterion 2), and corroborate the surface evidence that flaked stone was the only artifact class present (criterion 1).

Subsurface testing was conducted September 14-16, 2010. For sites between 500 and 2000 square meters in size, the protocol recommends the excavation of at least four 50-cm-square or 50-cm-diameter "Subsurface Exploratory Excavation Units" (or "SEEUs"). Five square SEEUs were excavated within the portion of the Plum 2 lithic scatter site on the Plum property (1,200 square meters), and four SEEUs were excavated at Plum 3, which comprises 1000 square meters within the Plum property. All test units were placed purposefully, with locations chosen to test areas of likely subsurface deposit and to achieve maximum coverage of each site. The location of each SEEU was plotted on the site map with a total station instrument. Sediments were excavated in 10 cm levels, and sifted through a 6 mm (1/4") mesh screen. All artifacts encountered in the SEEUs were collected. The units were excavated to sterile soil (operationally defined as at least three levels with no artifacts) or until rocks or decomposed granite precluded deeper excavation. Also in accordance with the CARIDAP:SLS recommendations, obsidian flakes were collected from the surface of both sites, within the Plum property.

Analyses included size sorting and morphological classification of the debitage, visual and chemical identification of obsidian sources, and obsidian hydration measurements. Size classification of debitage was used to provide information on the type, intensity, and stage of lithic reduction (e.g., primary reduction and quarrying versus secondary reduction). Size-sort analysis is based on replication experiments (Patterson 1983, 1990; Stahl and Dunn 1982; Basgall 1983). In replicative experiments biface production produces an exponential curve, with a lot of relatively small flakes, no matter what the stage of reduction (such as preform or finished tool). Size-sorting at sites where the predominant activity was tool maintenance show a truncated distribution, with fewer large flakes (Bettinger et al. 1984; Burton 1986). Size-sorting at biface reduction sites produces a curve similar to that produced experimentally, while at quarry sites, a bell-shaped curve results, with few large and small flakes, and many mid-ones (Patterson 1983; Goldberg et al. 1990). Size-sort results for expedient flake technology at Whisky Creek Rockshelter show a flattened curve with nearly equal amounts of small and medium size flakes (Burton and Farrell 1991).

The types of artifacts used for hunting or processing food and working wood will be shaped differently from the artifacts created as by-products from the manufacture of obsidian tools or trade items. Therefore, morphological analysis was also conducted to provide clues about the activities that occurred at the sites. For the morphological analysis, the flakes recovered, from both surface collection and SEEUs, were divided into one of ten categories: biface retouch flakes with and without cortex, biface retouch flakes with and without use-modification, use-modified flakes with and without cortex, unmodified flakes with and without cortex, and shatter with and without cortex. Biface retouch flakes, produced during the production of bifaces, "are distinguished by platforms that retain part of the bifacially-worked edge of the tool or blank from which they were removed during the course of thinning or resharpening..." (Bettinger 1977).

Use-modified flakes were used without further modification to exploit the existing sharp edge and edge angle. Most likely such pieces were only used for a short time, perhaps for a single task, or until the edge was dulled or no longer suitable for use. This use wear is predominantly in the form of unilateral step fractures, accompanied by edge crushing and abrasion. See Bettinger (1981) for further description of utilized (use-modified) flakes. Unmodified debitage lacks evidence of retouch or use. Shatter consists of small angular pieces generally resulting from the splitting of cores.

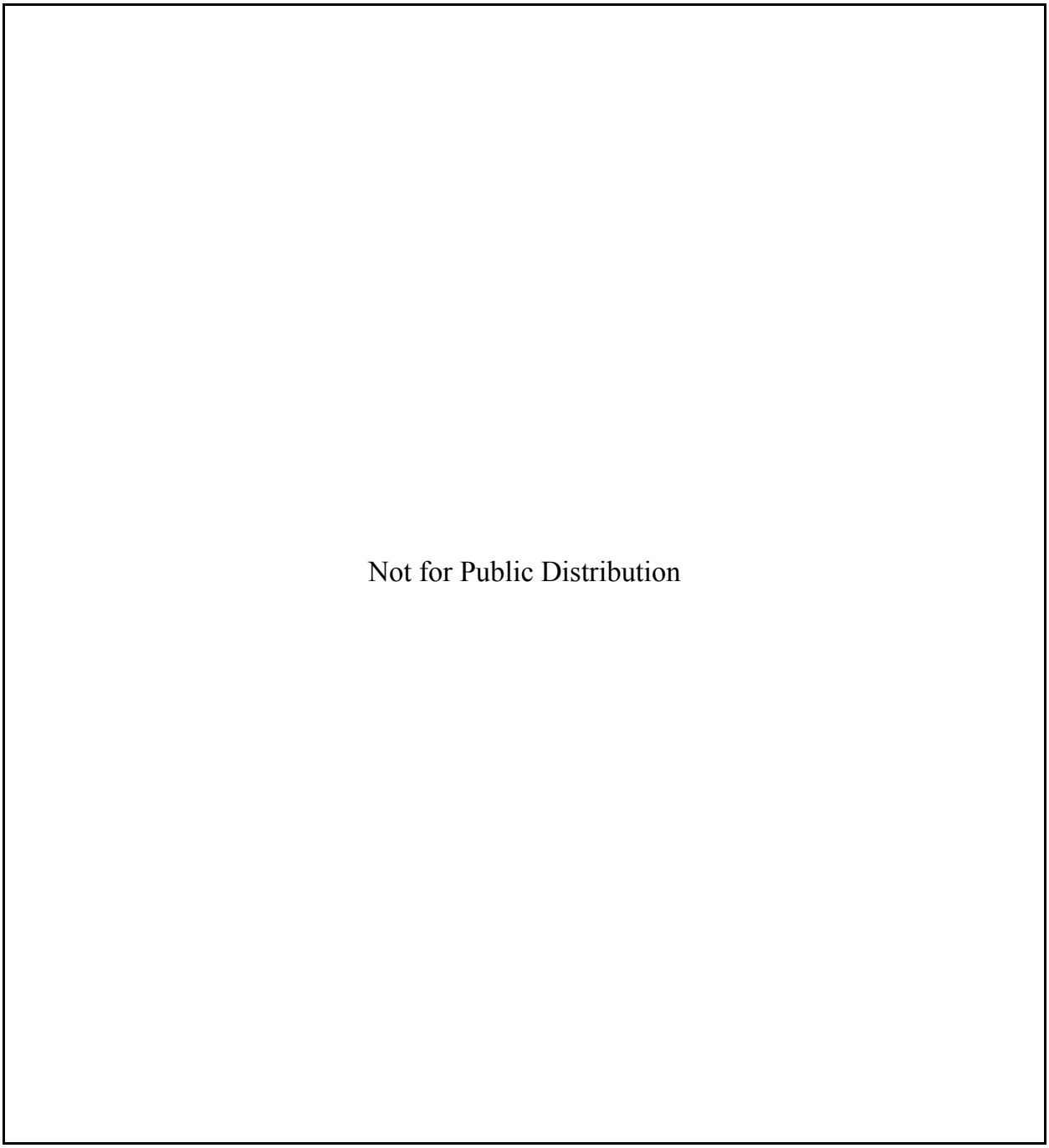

Figure 5. Site and isolate locations, Plum project area (adapted from USGS 7.5' maps: Bloody Mountain 1990, Crystal Crag 1994, Mammoth Mountain 1992, and Old Mammoth 1983).

The morphological classification also included a determination of the relative frequencies of complete vs. fragmentary debitage. Although breakage can be related to post-occupation formation processes, some researchers (e.g., Sullivan and Rozen 1985) have found the relative frequencies of breakage a useful indicator of the intensity of stone-working activities, and therefore, of site use.

To estimate the relative frequency of obsidian from different regional sources, the flakes were classified by visual characteristics (see Bettinger *et al.* 1984; Burton 1990, 2004; Psota 1990). In general, obsidian from the Casa Diablo source near Mammoth Lakes is characterized by its opacity, while obsidian from other sources in the region may be transparent, translucent, or characterized by

color and inclusions. For example, the Queen source northeast of Benton is characterized by its transparency: Queen obsidian is usually clear, smokey-clear, or banded clear and smokey. Obsidian from the Fish Springs source near Big Pine has a greenish tint and inclusions; Mono Glass Mountain obsidian is usually cloudy, and when it is banded, the band edges are indistinct. Almost all of the obsidian was visually sourced to the Casa Diablo obsidian source. Three specimens from Plum 2, including two that did not meet the Casa Diablo criteria, and two specimens from Plum 3 were submitted for x-ray fluorescence chemical source analysis (Appendix D).

To provide chronometric data, 20 specimens from each site were submitted for obsidian hydration analysis (Appendix E). The sample included all debitage collected from subsurface contexts, augmented by a randomly selected sample from the surface collections. Hydration values were converted to calendar dates using a rate developed for the nearby Snowcreek Site (Years B.P. = 555.13 $\mu m^{1.1389}$; Burton 2010).

Results

The three previously identified sites were the only historical or archaeological resources encountered (Figure 5). Seven isolates were also recorded and mapped, but as isolated occurrences of artifacts, these do not meet site criteria and would not qualify as historical or archaeological resources under CEQA. The survey and testing conducted for this project confirmed the findings of the previous site recording: site descriptions and mapped locations for the historic graves (Plum 1) and the two sparse lithic scatters (Plum 2 and Plum 3) were found to be accurate. However, as explained below, Plum 1 and Plum 2 had been recorded as one site by the Inyo National Forest, but separate designations are maintained for the present project to facilitate description, mapping, and management. Updated archaeological site records, which include detailed site maps showing excavation locations, are provided in Appendix C.

Plum 1 (Gibbs Headstones)

Two gravestones are located side-by-side in the lower portion of the parcel, above Windy Flat and approximately 500 feet south of the end of Tamarack Road (Figure 6). The graves lie within a 20 ft by 20 ft conservation easement granted to the Town of Mammoth Lakes in 1991 (Figure 7). The proposed project was designed to avoid impacting the easement area, and to provide pedestrian public access to a nearby area from which they can be seen. Brass plaques set into concrete headstones are inscribed (Figure 8):

CLARENCE M. GIBBS
OCT. 2, 1880 - AUG. 13, 1922

FATHER
JOSEPH H. GIBBS
1843 - 1883

According to Adele Reed (1982:56), Clarence Gibbs was one of the first campers in Shady Rest, now a developed campground on Forest Service land near the Mammoth Lakes Ranger District office. Reed quotes Fred Brooks as saying "He decided Mammoth was to be his home, even tried to buy out Charlie Summers. He did buy an acre or so from Charlie near Windy Flat. He had his father's body brought there from southern California for reburial in their private graveyard."

Fred Brooks was one of Reed's primary consultants for her book, and she identifies Brooks as a "historian of Old Mammoth," who lived at the town beginning in 1917 (Reed 1982:48). As a local resident and apparent contemporary of Clarence M. Gibbs, Mr. Brooks is likely a credible source.

Figure 6. Gibbs headstones, front view (towards northwest).

Both concrete headstones are inscribed with crosses, and bear traces of paint and earlier repairs. The headstones are set into a concrete base marked "B.W.A. Wells Rosi 6 - '60" (Figures 9 and 10). Reed (1982:56) notes that smaller graves in the area were for family pets. The pet graves are no longer apparent, and may not have been evident when the easement for the graves was granted in 1991.

The concrete headstones are each 26½ inches tall and 4 inches thick. Clarence's headstone, on the left as viewed from the foot of the graves, is 28 inches wide; Joseph's, on the right, is 30 inches wide. The two headstones are set side by side 3 inches apart in the concrete base, which measures 64 inches long, 14 inches wide, and about 3 inches high. The brass plaque set into the concrete headstone marking Clarence's grave measures 12 by 24 inches. Joseph's plaque is a little larger, at 16 by 28 inches, and appears to be held in place, at least partially, by stubs of rebar above and below it. A single cross is inscribed into the concrete of each headstone above the plaque; Clarence's cross measures 8 inches by 4½ inches, and Joseph's is 7½ by 4¾ inches. The back of each headstone is inscribed "BY SERVENTI." According to Reed (1982:57), Louis and Joe Serventi were Bishop residents who maintained a cemetery between Mill City and Windy Flat during the 1950s, erecting a concrete monument. The Serventis may have placed the two Gibbs's concrete headstones at about the same time: the headstones clearly predate the concrete base with the 1960 date.

Plum 2 (CA-MNO-871, FS #05-04-52-35)

This lithic scatter is 110 by 65 m (5,200 square meters) in size, and is located in the relatively level area at the bottom of Mammoth Bluffs and above Windy Flat. The site appears to have been first identified during a 1973-1974 archaeological survey for the Snowcreek development. Leonard (1974) depicted an archaeological site number ("T2" on Leonard's map of "Archaeological Reserves") in the general vicinity of the lower part of the Plum parcel. The site was not within the Snowcreek project area, so its extent was not outlined on the map. In the text, the site is described as a projectile point and a few flakes. The base map used in the Snowcreek environmental assessment appears to have been generated specifically for that project, and it is difficult to correlate

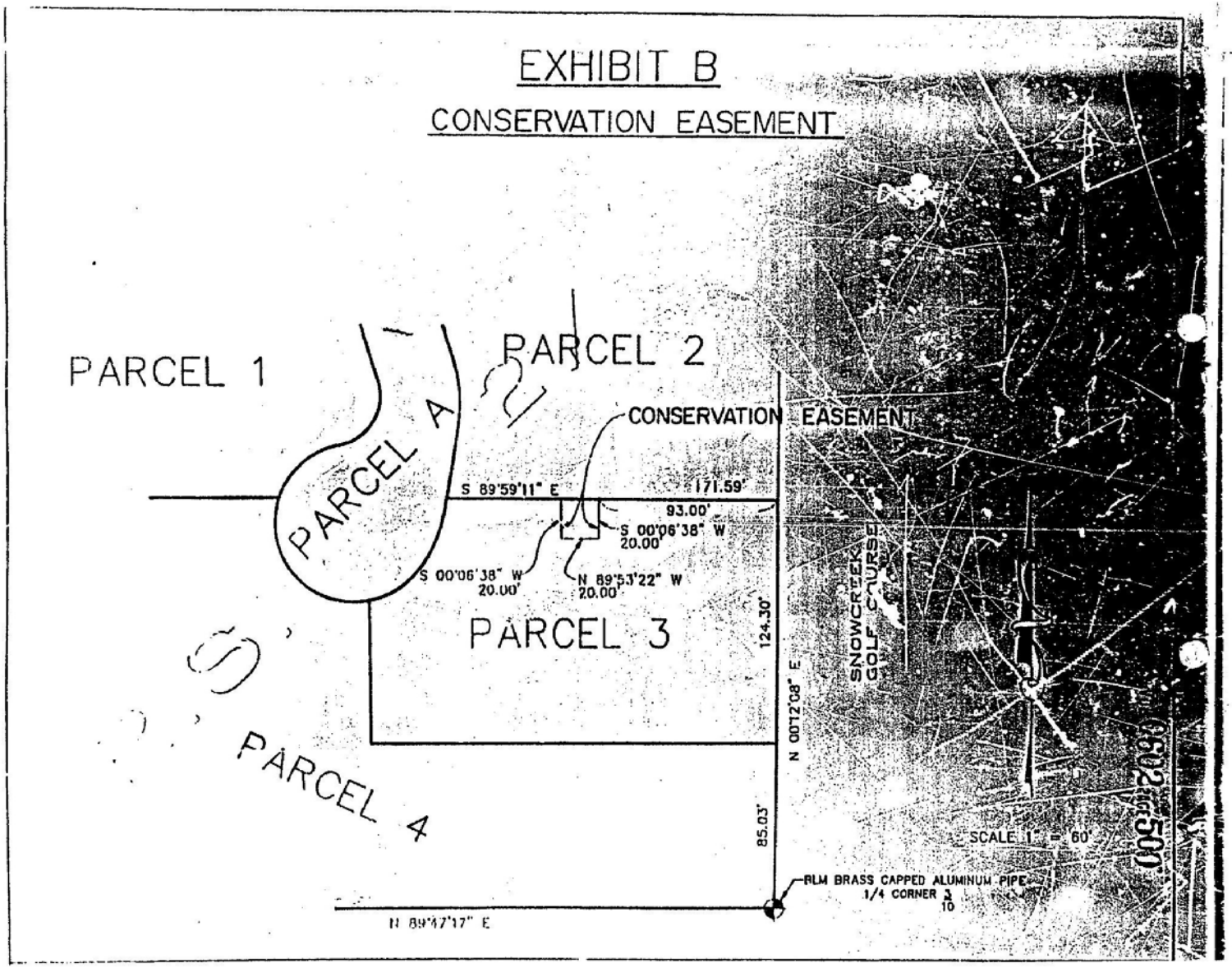

Figure 7. 1991 conservation easement.

Figure 8. Gibbs headstones.

Figure 9. Gibbs headstones, left inscription detail.


Figure 10. Gibbs headstones, right inscription detail.

its contour lines with the topography of the current or previous U.S.G.S. topographic quadrangles. However, by correlating drainages depicted on Leonard's map, one can infer that Leonard's "T2" is on or near the lower part of the Plum property. In this report, it is referred to as Plum 2.

The site was officially recorded as CA-MNO-871 in 1974 by Dee Simpson and Roland Wissler (Simpson 1974), but its location was misplotted by Simpson and therefore was misplotted in the Eastern Information Center database (CHRIS). The site record was updated in 1983 by Steven Bouscaren (Wilke 1983). In the original site record descriptions and maps, the boundary is south of the graves, so that the graves are not included. In 2009 both Plum 1 and Plum 2 were combined by

Crystal West as Forest Service site 05-04-52-35 (West 2009). Separate site designations are retained for this report to facilitate management recommendations. Besides differing in type of site and time period, the historic graves are wholly on private land, and the prehistoric lithic scatter straddles the public-private land boundary. Our site boundary for Plum 2 differs slightly from West's, but because of the nearby obsidian sources and the abundance of obsidian flakes in the Mammoth Lakes area, the delineation of site boundaries is admittedly somewhat arbitrary. West mapped three flakes north of the graves and included them in her site boundary; in the current field work, conducted before her site record was available, we considered those flakes as isolates and mapped the north edge of the flake scatter as farther south.

Extending across the Forest boundary onto public land, Plum 2 includes several hundred obsidian flakes, including biface retouch flakes, an Elko Eared projectile point, and a biface midsection. Approximately 1,200 square meters of the site lie within the Plum property, but the densest concentration of artifacts (up to 8 to 10 flakes per square meter), the projectile point, and the biface midsection are on public land administered by the Forest Service. Slope varies from 0 degrees (on small terraces or benches) up to about 10 degrees. Cobbles and volcanic boulders are present on the site surface, some of which appear to have tumbled down from the bluffs above. Several flakes were found in the existing dirt road through the site.

Within the project area, all observed surface artifacts were collected. The total, 117 obsidian flakes, yields an average of slightly less than one flake per every 10 meters. However, most of the debitage was actually recovered from two concentrations, one around a large boulder and one within the dirt road that traverses the site.

Five SEEUs were excavated at the site (Figure 11). Two of the SEEUs (#1 and 3) were placed where surface debitage was relatively dense, near the southern edge of the private property; two SEEU's (#2 and 4) were placed in areas of typical density; and one (#5) was placed within the northern area recorded as part of the site by the Forest Service, but outside the site boundary as recorded for this project.

Sediments consisted of grayish brown (Munsell color 10YR 5/2) silts, sands, and gravels, increasingly compact and rocky with depth. A total of 13 flakes was encountered subsurface (Table 1), with the subsurface density reflecting surface density: the two SEEUs placed in areas of relative concentrations of artifacts yielded relatively more flakes (three from SEEU 1, and seven from SEEU 3) than the two placed in other areas of the site (two from SEEU 2, one from SEEU 4). The unit placed outside the site boundary as defined in this work but within the Forest Service site boundary yielded no subsurface artifacts.

The size-sort pattern of the 13 flakes recovered subsurface and the 117 flakes recovered from the surface creates a rough bell-shaped curve (Table 2), with the mode at size class 3. That is, about 33 percent of the flakes were between 12 and 18 mm in size, 26.9 percent were within the next smaller size class (6 to 12 mm), and 26.2 percent were in the next larger size class (18 to 24 mm). Although bell-shaped curves in size-sort data are generally associated with quarries and early-stage obsidian workshops, the lack of smaller flakes in the assemblage from Plum 2 is likely due to collection bias. The sediments from the SEEUs were screened with 6 mm mesh, so it is not surprising that no flakes smaller than 6 mm were found in the SEEUs. The surface collection is also likely skewed toward larger flakes, which would have been easier to see.

The morphological analysis suggests that biface production would have been a primary focus of the Plum 2 site inhabitants. Eight percent of the assemblage consists of biface retouch flakes, and less than 2 percent use-modified (Table 3).

Figure 11. Excavating SEEU at Plum 2.

Results of x-ray fluorescence analysis of three of the Plum 2 flakes are presented in Appendix D. One piece of core shatter (specimen #2-3) from the surface was sourced to Inyo Craters. One unmodified flake from the surface (#2-4) was chemically sourced to Mono Glass Mountain. Both of these had no visible hydration. An unmodified flake fragment (#2-14) from the surface was identified as from Sawmill Ridge, one of the main sub-sources of the Casa Diablo obsidian quarry. It had a hydration rim of 2.0 microns. The x-ray fluorescence results corroborate the visual inspections, and can be extrapolated to the entire collection: two other unmodified flake fragments from the surface have the cloudy translucent appearance of Mono Glass Mountain obsidian, and the rest (save for the one Inyo Craters piece of shatter) are black opaque, characteristic of Casa Diablo obsidian.

All 13 flakes recovered from SEEUs and seven flakes recovered from the surface collection were submitted for obsidian hydration analysis. Four had unreadable rims (two with diffuse hydration bands, two with no visible hydration). The other 16 had rims ranging from 1.2 to 4.8 microns, with a mean of 3.0 microns (Appendix E).

Plum 3

The upper site is an artifact scatter covering an area 90 by 45 meters (about 3,400 square meters) on the edge of Mammoth Bluffs at the west, upper end of the property. The site was recorded in 1982 as part of environmental studies conducted for the proposed Bluffs subdivision (Burton 1982). A small, sparse lithic scatter, the site is referred to in this report as Plum 3.

About 1,000 square meters of the site is within the Plum property. Slope varies from 3 to 20 degrees. Soils consist of pumice gravels with brownish gray silts and sands. Although only about 50 obsidian flakes were observed across the site as a whole, a few areas within the property have up to 3 flakes per 2 square meters. The site as currently defined was previously disturbed by construction of LeVerne Street, associated utilities, a small pumping station, and a rock-lined drainage feature, as

Table 1. Debitage Recovered from Excavation Units at Plum 2.					
Depth (cm)	SEEU 1	SEEU 2	SEEU 3	SEEU 4	SEEU 5
0-10	2	1	0*	1	0
10-20	0	0	0	0	0
20-30	1	1	5	0	0
30-40	0	0	1	0	
40-50		0	0		
50-60			1		
Total	3	2	7	1	0

* SEEU 3, 0-10 cm, had a .22 c cartridge with a "SUPER X" headstamp. The headstamp indicates the cartridge was made after World War I by the Western Cartridge Company of East Alton, IL. The "Super X" brand is their most widely known product.

well as the removal of a few trees depicted on the original site record. It is possible that ground disturbance associated with these developments exposed additional flakes, or altered their distribution: more flakes were observed at this recording, in a larger area, than in 1982.

At Plum 3, as at Plum-2, testing was conducted within the boundary of the Plum parcel in accordance with the guidelines of CARIDAP:SLS (Figure 12). The 100 percent surface collection within the project area yielded 34 obsidian flakes, an average of about one flake for every 30 square meters. Three SEEUs were excavated within an area of relatively high flake density, and one was excavated outside this concentration. In two of the SEEUs (#3 and #4), abundant rocks or decomposing granite precluded excavation below 30 cm. SEEU #1 was excavated to a depth of 80 cm, and SEEU #2 was excavated to 70 cm. Sediments in all units consisted of dark grayish brown (Munsell color 10YR 4/2) silt with gravels and small rocks, with rocks increasing with depth. Only 10 obsidian flakes were recovered from the SEEUs (Table 4).

The lithic analysis reveals some similarities between Plum 3 and Plum 2, the site below the slope next to Windy Flat. As at Plum 2, the distribution of size classes appears to be a bell-shaped curve (Table 5). Also as at Plum 2, the bell-shaped curve may reflect the bias of the standard archaeological methods employed: the smaller size classes may be underrepresented because both surface collection and screening with 6mm mesh favor larger flakes. Because of the small number of total flakes, the 6 biface retouch flakes account for 12 percent of Plum 3's total assemblage, higher than the percentage of that flake type at Plum 2. The proportion of flake fragments (as opposed to complete flakes) is similar, with over 76 percent at Plum 2 and almost 66 percent at Plum 3. The slightly greater percentage of broken flakes at Plum 2 may indicate more intensive obsidian working there, but it might also be due to post-occupation formation processes: Plum 2, adjacent to Windy Flat, may have been more heavily grazed than Plum 3, up on the bluff.

There are also some key differences between Plum 3 and Plum 2. The Plum 3 flakes are slightly larger, with the mode in size class 4 (that is, 14 flakes, or over 30 percent, were 18 to 24 mm long) instead of size class 3, as at Plum 2. However, the most striking difference between the two sites is in the proportion of use-modified flakes (Table 6). Over 30 percent of the flakes at Plum 3 have been modified by use, compared to less than 2 percent of the flakes at Plum 2.

Table 2. Debitage Size Sort Plum 2.

	1 <6 mm	**2** 6-12 mm	**3** 12-18 mm	**4** 18-24 mm	**5** 24-30 mm	**6** 30-36 mm	**7** 36-42 mm	**8** >42 mm	Total
Surface	2	29	39	32	12	2	0	1	117
SEEU	0	6	4	2	0	1	0	0	13
Total	2	35	43	34	12	3	0	1	130
%	1.5	26.9	33.1	26.2	9.2	2.3	0.0	0.8	100.0

Table 3. Debitage Analysis Plum 2.

	biface retouch		biface retouch w/cortex		BRF use-modified		BRF w/cortex use-modified		use-modified		Use-modified w/cortex		unmodified		unmodified w/cortex		core shatter	core shatter w/cortex	Total
	complete	fragment	complete	fragment	complete	fragment	complete	fragment	complete	fragment	complete	fragment	complete	fragment	complete	fragment			
Surface	4	4								2			20	77	3	3	1	3	117
SEEU	1			1									3	8					13
Total	5	4	0	1	0	0	0	0	0	2	0	0	23	85	3	3	1	3	130
	9		1		0		0		2		0		108		6		4		

BRF	10	use-modified	2	unmodified	114	shatter	4	Total	130
	7.7%		1.5%		87.5%		3.1%		100%
w/o cortex	120	w/cortex	10	complete	31	fragment	99	C:F	0.3
	92.3%		7.7%		23.8%		76.2%	F:C	3.2

Figure 12. Excavating SEEU at Plum 3.

Table 4. Debitage Recovered from Excavation Units at Plum 3.

Depth (cm)	SEEU 1	SEEU 2	SEEU 3	SEEU 4
0-10	0	0	0	0
10-20	0	2	1	0
20-30	0	1	1	1
30-40	1	0		
40-50	2	0		
50-60	0	0		
60-70	1	0		
70-80	0			
Total	4	3	2	1

Obsidian hydration of 20 specimens included the 10 flakes recovered from the SEEUs and 10 from the surface collection (Appendix E). Four had diffuse hydration rims, one had no visible hydration rim, but the 15 with readable rims ranged from 1.1 micron to 5.0 microns, with a mean of 3.47 microns.

All of the flakes from Plum 3 fit the visual criteria for the Casa Diablo obsidian source. Two submitted for x-ray fluorescence analysis confirmed the Casa Diablo ascription; both (#3-26 and #3-

Table 5. Debitage Size Sort Plum 3.

	1 <6 mm	**2** 6-12 mm	**3** 12-18 mm	**4** 18-24 mm	**5** 24-30 mm	**6** 30-36 mm	**7** 36-42 mm	**8** >42 mm	Total
Surface	0	1	6	10	9	5	2	1	34
SEEU	0	3	2	4	1	0	0	0	10
Total	0	4	8	14	10	5	2	1	44
%	0.0	9.1	18.2	31.8	22.7	11.4	4.5	2.3	100.0

Table 6. Debitage Analysis Plum 3.

	biface retouch		biface retouch w/cortex		BRF use-modified		BRF w/cortex use-modified		use-modified		Use-modified w/cortex		unmodified		unmodified w/cortex		core shatter	core shatter w/cortex	Total
	complete	fragment	complete	fragment	complete	fragment	complete	fragment	complete	fragment	complete	fragment	complete	fragment	complete	fragment			
Surface		1			3	1			5	4			6	11		2	1		34
SEEU						1				1			1	7					10
Total	0	1	0	0	3	2	0	0	5	5	0	0	7	18	0	2	1	0	44
	1		0		5		0		10		0		25		2		1		

BRF	6	use-modified	15	unmodified	27	shatter	1	Total 49
	12.2%		30.6%		55.1%		2.0%	100%

w/o cortex	42	w/cortex	2	complete	15	fragment	29	C:F 0.5
	95.5%		4.5%		34.1%		65.9%	F:C 1.9

27) were from the Sawmill Ridge subsource of the Casa Diablo source (Appendix D). The specimens were among the four from the site with diffuse hydration rims.

Isolates

Seven artifacts and features were also encountered during the survey (Table 7). These isolates do not meet site definition criteria, and are not considered significant archaeological or historical resources under CEQA. The location of each was plotted with the GPS units and is depicted in Figure 5. Isolates 1-3 are within the site boundary of Forest Service Site 05-04-52-35 (CA-MNO-871) as recorded in 2009, and may be the reason that the Forest Service archaeologist recorded that site boundary where she did, resulting in the inclusion of the historic graves.

Table 7. Isolates Recorded during the Plum Property Survey.

1. obsidian flake.
2. obsidian flake with cortex.
3. obsidian flake.
4. galvanized metal tub and a piece of plywood.
5. chunks of concrete and asphalt, probably dumped recently as part of snow-clearing operations.
6. two modern rock cairns by a large tree at the north end of the project area.
7. pet grave (?) indicated by a rock outline, located on private land just outside of the project area.

Interpretations

The Gibbs gravesite, designated in this report Plum 1, was first used to inter Joseph Gibbs sometime before 1922, and to bury Clarence in 1922. The installation of the concrete headstones created by the Serventis in the 1950s, the new base constructed in 1960, and the easement granted in 1991indicate recurrent care, suggesting that the headstones are in, or very close to, their original location, and correctly mark the two graves.

Within the Plum parcel, both Plum 2 and Plum 3 meet the criteria for sparse lithic scatters. Both were probably occupied only sporadically, each time for a short duration and by a small group of people. Plum 2 extends onto public land administered by the Forest Service, where the site appears to have a greater quantity and diversity of artifacts, and perhaps more potential for subsurface cultural deposits. Obsidian hydration data for the two sites overlap, with dates ranging from about 3700 to 500 years ago. However, use of Plum 2, at least as indicated by the hydration data, appears to have peaked in the mid- to late-Newberry period, sometime between about 2500 to 1500 years ago. Hydration data suggest that the main use of Plum 3 occurred earlier, sometime between 3500 and 2250 years ago (Figures 13 and 14).

Analyses indicate other differences between the two sites. At Plum 2, the morphological analysis of debitage indicates that biface production occurred there; at Plum 3, there was more emphasis on subsistence activities. At Plum 3, all the obsidian came from the Casa Diablo source, less than 4 miles away. The occupants of Plum 2, on the other hand, brought with them obsidian from Mono Glass Mountain, 18 miles northeast.

The portions of Plum 2 and Plum 3 within the project area are representative of patterns of prehistoric use that have been found at archaeological sites elsewhere in the Mammoth Lakes area.

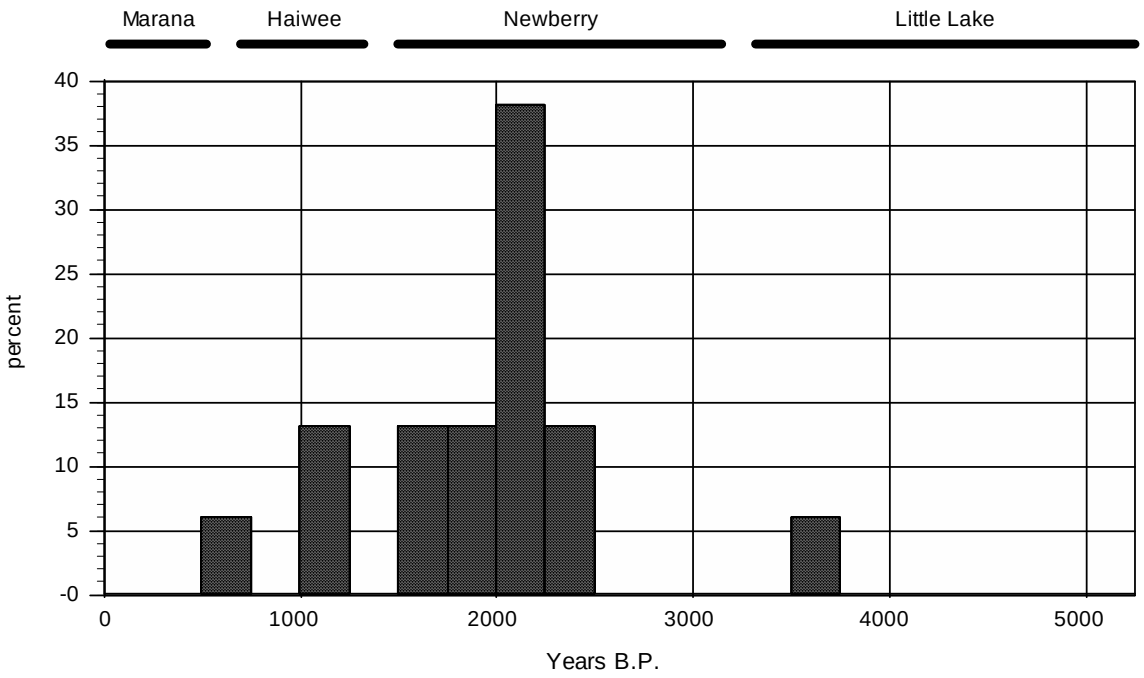

Figure 13. Plum 2 obsidian hydration results (n=16).

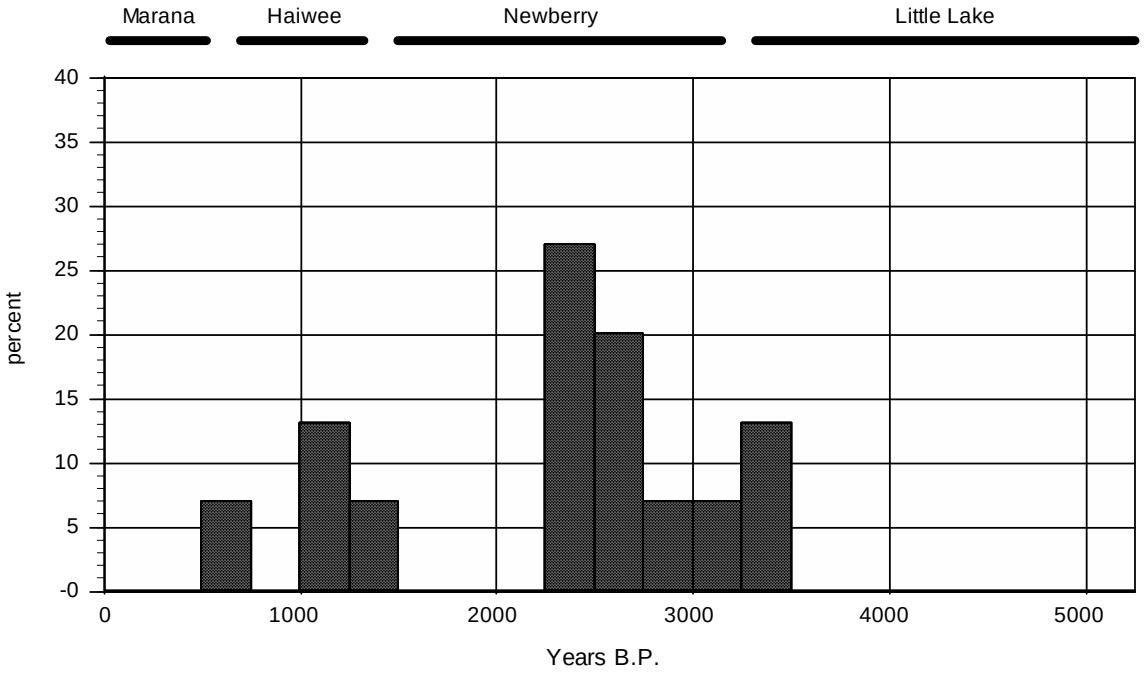

Figure 14. Plum 3 obsidian hydration results (n=15).

During the Newberry period, from 1200 B.C. to A.D. 600, quarrying of Casa Diablo obsidian and the production of bifaces became intensive. Numerous sites in the Mammoth Lakes area are considered to be primarily obsidian workshops. At these sites, bifaces were made for trade or personal use from larger pieces of obsidian brought from the quarry sites. As at Plum 2, many of these sites lack evidence of food preparation or other subsistence activities, suggesting short-term and specialized use. However, a variety of subsistence activities, such as hunting and plant processing, have been revealed through excavations at other sites (Bettinger 1980; Burton 1989). Edge-modified flakes, as found at Plum 3, are common at temporary camps where butchering or short-term plant processing occurred (cf. Burton 1986).

Recommendations

There are three sites within Plum Parcel 10-01: Plum 1, consisting of two historic graves, and Plum 2 and Plum 3, both sparse prehistoric lithic scatters. Plum 1 is completely within the parcel, while both prehistoric sites extend beyond the project area. According to guidelines developed by the California State Historic Preservation Officer (CARIDAP:SLS), the testing completed, along with analysis and reporting, mitigates the effects of the proposed project on the two prehistoric sites.

Plum 1

Given the evidence of recurrent care of the graves it is likely that the headstones are in, or very close to, their original location, and correctly mark the two graves. Therefore, the existing easement is deemed adequate to protect the headstones and graves (Figures 15 and 16). The proposed development, as depicted in Tentative Parcel Map 10-001, would avoid impacting the graves.

However, as an additional measure of protection, it is recommended that the graves be enclosed with a low, permanent fence constructed of weather-resistant materials (e.g. wrought iron, or stone pillars and wooden rails). A fence would not only guard against inadvertent damage during construction, it would mark the graves appropriately. The fence could be placed along the easement boundary, or alternatively, could enclose a smaller 7 ft by 8 ft area as depicted on Figure 17.

It should be noted that grave-tenders do sometimes erect grave markers in incorrect locations. See, for example, Burton et al. (2001), documenting mismarked graves at Manzanar National Historic Site, or a similar headstone placed by Louis Serventi for Rosa May in Bodie in what has been determined the incorrect place (DeCloedt 2009). In this contingency, that is, an error in the marked location, California law and regulation provide insurance to protect the graves: Public Resources Health and Safety Code § 7050.5-7055 and § 5097.98 require that if any human remains are encountered during construction, all work in the vicinity of the discovery must be halted and the Town of Mammoth Lakes notified.

Plum 2 and Plum 3

No further archaeological work is recommended within the project area at these two sites. The effects of the proposed project have been mitigated through the site testing and collection, and analysis of artifacts as prescribed in the CARIDAP:SLS protocol.

Note that these recommendations are for the project area, only. Surface evidence indicates that the main part of Plum 2 (CA-MNO-871 / FS #05-04-52-35), on public land to the south of the project area, may have greater information potential. South of the private land, the site has more artifacts and includes tools as well as debitage, and may contain significant subsurface cultural deposits. Plum 3, on the other hand, does not appear to have any significant information potential beyond the Plum parcel, because artifact density appears to be even lower outside the project area.

In summary, with the protection of the graves at Plum 1 through the current preservation easement and with the recovery of the archaeological information potential at Plum 2 and Plum 3, potential impacts to archaeological and historical resources are mitigated. No further archaeological work is recommended.

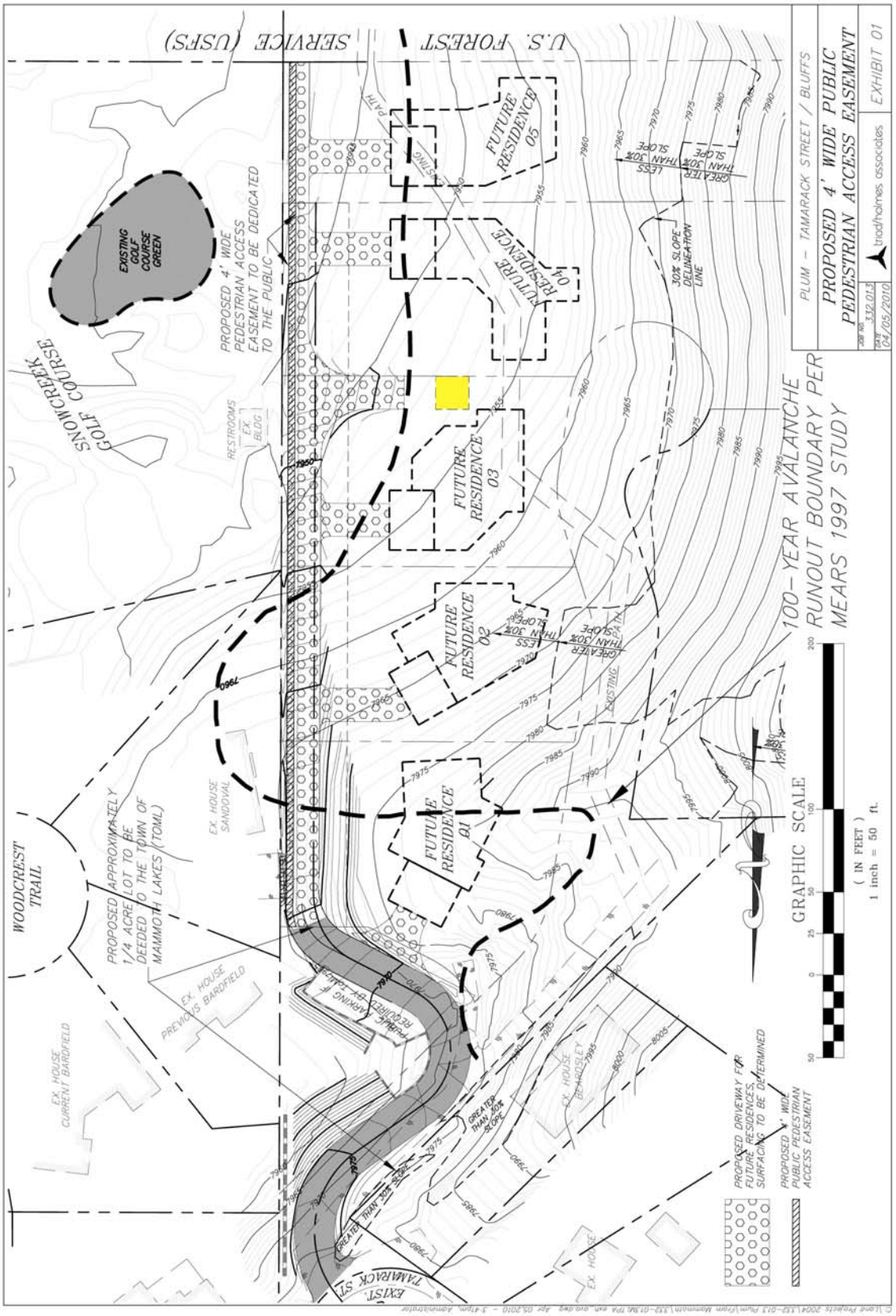

Figure 15. Proposed construction (conservation easement in yellow).

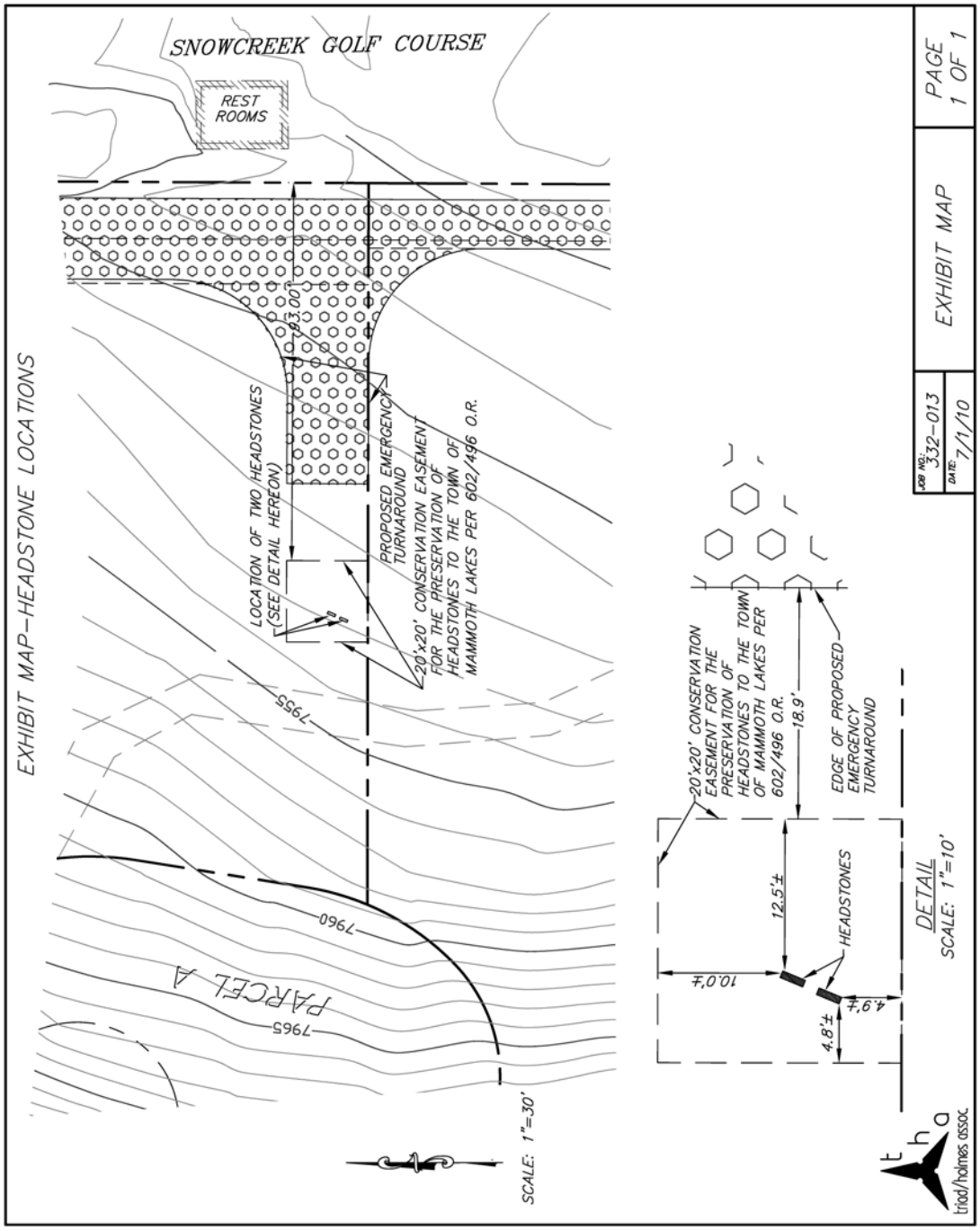

Figure 16. Gibbs headstone locations.

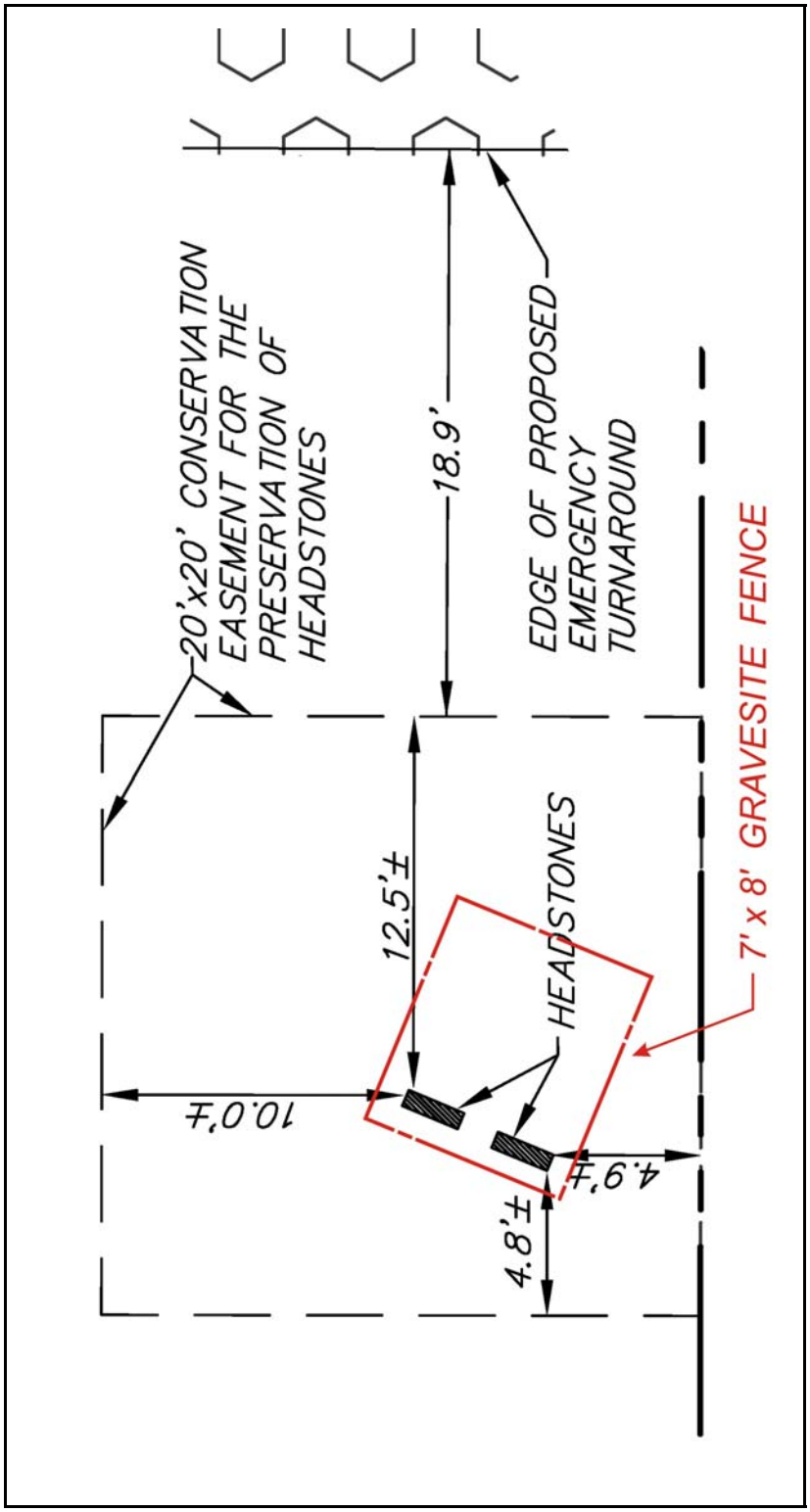

Figure 17. Alternative gravesite fence location.

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Appendix A

CHRIS Records Search

NOT AVAILABLE FOR
PUBLIC DISTRIBUTION

Appendix B

Previously Recorded Archaeological Sites

NOT AVAILABLE FOR PUBLIC DISTRIBUTION

Appendix C

Plum Archaeological Sites Records

NOT AVAILABLE FOR PUBLIC DISTRIBUTION

Appendix D

Obsidian Source Analysis

Richard E. Hughes

Geochemical Research Laboratory Letter Report 2010-79

November 5, 2010

Mr. Jeffery Burton
Trans-Sierran Archaeological Research
332 East Mabel Street
Tucson, AZ 85705-7455

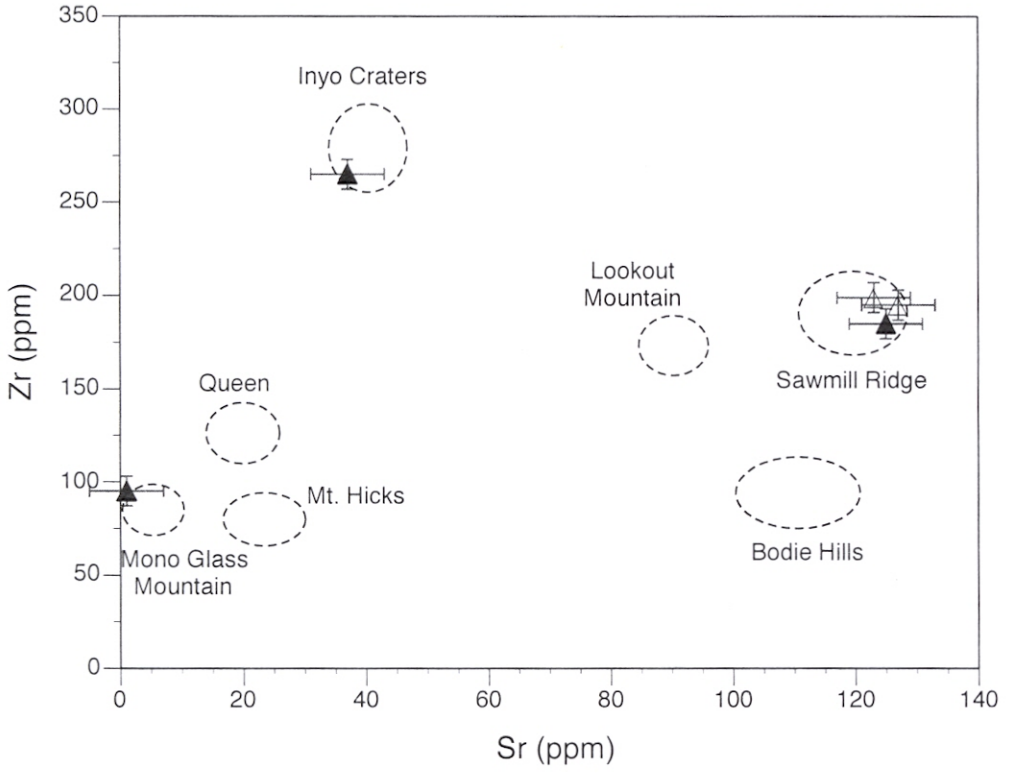
Dear Jeff:

Enclosed with this letter you will find a table and figure presenting energy dispersive x-ray fluorescence (edxrf) data generated from the analysis of five obsidian artifacts from archaeological sites Plum 2 and Plum 3 located south of Old Mammoth in Mono County, California. This research was completed pursuant to your email request of September 30, 2010, forwarded to me by Tom Origer.

Laboratory equipment and analysis conditions, artifact-to-source (geochemical type) attribution procedures, element-specific measurement resolution, and comparative literature references applicable to these samples are the same as I reported for obsidian from Iny-6609 (Hughes 2005) and from Mno-3 (Hughes 2008).

Figure 1

Zr vs. Sr Composition for Obsidian Artifacts from Plum 2 and Plum 3



Dashed lines represent range of variation measured in archaeologically significant geologic obsidian source samples from the Mono Basin area. Filled triangles are the plots for Plum 2 samples and open triangles plot Plum 3 artifacts from Table 1. Error bars are two-sigma (95% confidence interval) composition estimates for each specimen.

Table 1

Quantitative Composition Estimates for Artifacts from Plum 2 and Plum 3, Mono County, CA

Cat. Number	Trace Element Concentrations											Ratio	Obsidian Source (Chemical Type)
	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Fe/Mn	
Plum 2, Plum # 3	nm	nm	121 ±4	37 ±3	25 ±3	265 ±4	28 ±3	1184 ±32	nm	nm	nm	18	Inyo Craters
Plum 2, Plum # 4	nm	nm	190 ±5	2 ±3	30 ±4	95 ±5	32 ±3	0 ±24	492 ±26	402 ±12	.80 ±.02	26	Mono Glass Mountain
Plum 2, Plum # 14	nm	nm	149 ±4	125 ±3	14 ±3	185 ±4	16 ±3	1107 ±30	nm	nm	nm	49	Sawmill Ridge, Casa Diablo area
Plum 3, Plum # 26	nm	nm	150 ±4	123 ±3	17 ±3	199 ±4	17 ±3	1233 ±30	nm	nm	nm	47	Sawmill Ridge, Casa Diablo area
Plum 3, Plum # 27	nm	nm	148 ±4	127 ±3	16 ±3	195 ±4	17 ±3	1262 ±32	nm	nm	nm	48	Sawmill Ridge, Casa Diablo area
U.S. Geological Survey Reference Standard													
RGM-1 (measured)	nm	nm	150 ±4	110 ±3	24 ±3	221 ±4	10 ±3	806 ±28	1623 ±32	284 ±10	1.86 ±.02	63	Glass Mountain, CA
RGM-1 (recommended)	32	15	149	108	25	219	9	807	1600	279	1.86	nr	Glass Mountain, CA

Values in parts per million (ppm) except total iron [in weight %] and Fe/Mn intensity ratios; ± = two σ expression of x-ray counting uncertainty and regression fitting error at 120-360 seconds livetime. nm= not measured; nr = not reported.

Edxrf data (in Table 1 and Figure 1) indicate that the both specimens from Plum 3 were made from obsidian of the Sawmill Ridge chemical type, while the three artifacts analyzed from Plum 2 each represent a different chemical variety of volcanic glass: Inyo Craters, Mono Glass Mountain, and Sawmill Ridge.

I hope this information will help in your analysis and interpretation of these artifacts. Please contact me at my laboratory (phone: [650] 851-1410; e-mail: rehughes@silcon.com) if I can provide any further assistance or information

Sincerely,

Richard Hughes

Richard E. Hughes, Ph.D., RPA
Director, Geochemical Research Laboratory

References

Hughes, Richard E.

2005 Energy Dispersive X-ray Fluorescence Analysis of Obsidian Artifacts from CA-Iny-6609 Located in Bishop, Inyo County, California. Geochemical Research Laboratory Letter Report 2005-70 submitted to Jeffery Burton, Trans-Sierran Archaeological Research, November 4, 2005.

2008 Energy Dispersive X-ray Fluorescence Analysis of Obsidian Artifacts and Culturally Unmodified Obsidian Cobbles from CA-Mno-3, Mono County, California. Geochemical Research Laboratory Letter Report 2008-71 submitted to Jeffery Burton, Trans-Sierran Archaeological Research, August 29, 2008.

Appendix E

Obsidian Hydration Analysis

Thomas M. Origer

ORIGER'S OBSIDIAN LABORATORY

P.O. BOX 1531
ROHNERT PARK, CALIFORNIA 94927
(707) 584-8200, FAX 584-8300
ORIGER@ORIGER.COM

October 20, 2010

Jeff Burton
Trans-Sierran Archaeological Research
332 East Mabel Street
Tucson, Arizona 85705-7455

Dear Jeff:

I write to report the results of obsidian hydration band analysis of 40 specimens from two sites referred to as Plum 2 (n=20) and Plum 3 (n=20) located on the southern outskirts of Old Mammoth, Mono County, California. CA-MNO-3 in Mammoth Lakes, Mono County, California. This work was completed as requested and all specimens have been forwarded to Richard Hughes, Geochemical Research Laboratory, for XRF analysis of five specimens.

Procedures typically used by our lab for preparation of thin sections and measurement of hydration bands are described here. Specimens are examined to find two or more surfaces that will yield edges that will be perpendicular to the microslides when preparation of each thin section is done. Generally, two parallel cuts are made at an appropriate location along the edge of each specimen with a four-inch diameter circular saw blade mounted on a lapidary trimsaw. The cuts result in the isolation of small samples with a thickness of about one millimeter. The samples are removed from the specimens and mounted with Lakeside Cement onto etched glass micro-slides.

The thickness of each sample was reduced by manual grinding with a slurry of #600 silicon carbide abrasive on plate glass. Grinding was completed in two steps. The first grinding is stopped when each sample's thickness is reduced by approximately one-half. This eliminates micro-flake scars created by the saw blade during the cutting process. Each slide is then reheated, which liquefies the Lakeside Cement, and the samples are inverted. The newly exposed surfaces are then ground until proper thickness is attained.

Correct thin section thickness is determined by the "touch" technique. A finger is rubbed across the slide, onto the sample, and the difference (sample thickness) is "felt." The second technique used to arrive at proper thin section thickness is the "transparency" test where the micro-slide is held up to a strong source of light and the translucency of each sample is observed. The samples are reduced enough when it readily allows the passage of light. A cover glass is affixed over each sample when grinding is completed. The slides and paperwork are on file under File No. OOL-542.

The hydration bands are measured with a strainfree 60-power objective and a Bausch and Lomb

Hydration band measurements have a range of +/- 0.2 microns due to normal equipment limitations.
Six measurements are taken at several locations along the edge of each thin section, and the mean of the measurements is calculated and listed on the enclosed data pages.

Nine specimens failed to yield useful hydration band measurements. Six of the nine were marked by diffuse hydration (DH). Diffuse hydration is a condition where the inner portion of the hydrated zone is indistinct; therefore, the band cannot be accurately measured. Three of the nine failed specimens exhibited no visible hydration band (NVB). In many instances, the lack of visible hydration bands can result from hydration removal (e.g., from proximity to fire) or because of recent knapping events or damage.

Please don't hesitate to contact me if you have questions regarding this hydration work.

Sincerely,

Thomas M. Origer
Director

Submitter: J. Burton - Trans-Sierran Archaeological Research October 2010

	Lab#	Sample#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
Plum Site 2									
	1	Plum 3	Debitage		Surface	none		NVB	
	2	Plum 4	Debitage		Surface	none		NVB	
	3	Plum 5	Debitage		Surface	none	3.1 3.2 3.2 3.2 3.3 3.3	3.2	
	4	Plum 6	Debitage		Surface	none	3.5 3.6 3.6 3.7 3.8 3.9	3.7	
	5	Plum 7	Debitage		Surface	none	3.1 3.1 3.1 3.2 3.2 3.2	3.2	
	6	Plum 8	Debitage		Surface	none	2.6 2.7 2.7 2.7 2.7 2.8	2.7	
	7	Plum 9	Debitage		Surface	none	3.5 3.5 3.6 3.7 3.8 4.0	3.7	
	8	Plum 12	Debitage	SEEU 1	0-10	none		DH	
	9	Plum 13	Debitage	SEEU 1	0-10	none	4.7 4.7 4.7 4.7 4.8 5.0	4.8	
	10	Plum 14	Debitage	SEEU 1	20-30	none	2.0 2.0 2.0 2.0 2.0 2.0	2.0	
	11	Plum 15	Debitage	SEEU 2	0-10	none	2.8 2.8 2.8 2.9 2.9 2.9	2.9	
	12	Plum 16	Debitage	SEEU 2	20-30	none	3.1 3.1 3.2 3.3 3.3 3.4	3.2	
	13	Plum 17	Debitage	SEEU 3	30-40	none	2.7 2.8 2.8 2.8 2.8 2.8	2.8	
	14	Plum 18	Debitage	SEEU 3	50-60	none	2.5 2.5 2.6 2.6 2.7 2.7	2.6	
	15	Plum 19	Debitage	SEEU 4	0-10	none		DH	
	16	Plum 20	Debitage	SEEU 3	20-30	none	3.4 3.4 3.4 3.4 3.5 3.5	3.4	
	17	Plum 21	Debitage	SEEU 3	20-30	none	1.6 1.6 1.7 1.7 1.7 1.8	1.7	
	18	Plum 22	Debitage	SEEU 3	20-30	none	1.1 1.1 1.1 1.2 1.2 1.2	1.2	
	19	Plum 23	Debitage	SEEU 3	20-30	none	3.2 3.3 3.3 3.3 3.3 3.4	3.3	
	20	Plum 24	Debitage	SEEU 3	20-30	none	3.1 3.1 3.1 3.2 3.2 3.4	3.2	
Plum Site 3									
	21	Plum 26	Debitage		Surface	none		DH	
	22	Plum 27	Debitage		Surface	none		DH	
	23	Plum 28	Debitage		Surface	none	3.5 3.5 3.6 3.7 3.8 3.8	3.7	
	24	Plum 29	Debitage		Surface	none	1.7 1.7 1.8 1.8 1.9 2.0	1.8	
	25	Plum 30	Debitage		Surface	none	3.5 3.6 3.6 3.7 3.7 3.7	3.6	
	26	Plum 31	Debitage		Surface	none		DH	
	27	Plum 32	Debitage		Surface	none	3.4 3.6 3.6 3.6 3.7 3.7	3.6	
	28	Plum 33	Debitage		Surface	none	4.0 4.0 4.0 4.2 4.3 4.3	4.1	
	29	Plum 34	Debitage		Surface	weathered	1.0 1.0 1.1 1.1 1.1 1.1	1.1	
	30	Plum 35	Debitage		Surface	none		NVB	
	31	Plum 36	Debitage	SEEU 1	30-40	none	4.5 4.5 4.6 4.6 4.7 4.8	4.6	
	32	Plum 37	Debitage	SEEU 1	40-50	none	4.7 4.8 4.9 4.9 4.9 4.9	4.9	

Lab#	Sample#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
33	Plum 38	Debitage	SEEU 1	40-50	none	2.0 2.1 2.1 2.2 2.2 2.4	2.2	
34	Plum 39	Debitage	SEEU 1	60-70	none	3.9 3.9 4.0 4.0 4.0 4.0	4.0	
35	Plum 40	Debitage	SEEU 2	20-30	none	3.8 3.8 4.0 4.1 4.1 4.1	4.0	
36	Plum 41	Debitage	SEEU 2	10-20	none		DH	
37	Plum 42	Debitage	SEEU 2	10-20	none	4.9 4.9 4.9 5.0 5.1 5.1	5.0	
38	Plum 43	Debitage	SEEU 3	10-20	none	1.9 1.9 2.0 2.0 2.0 2.0	2.0	
39	Plum 44	Debitage	SEEU 3	20-30	none	3.8 3.9 3.9 4.0 4.0 4.0	3.9	
40	Plum 45	Debitage	SEEU 4	20-30	none	3.5 3.6 3.6 3.6 3.6 3.8	3.6	

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