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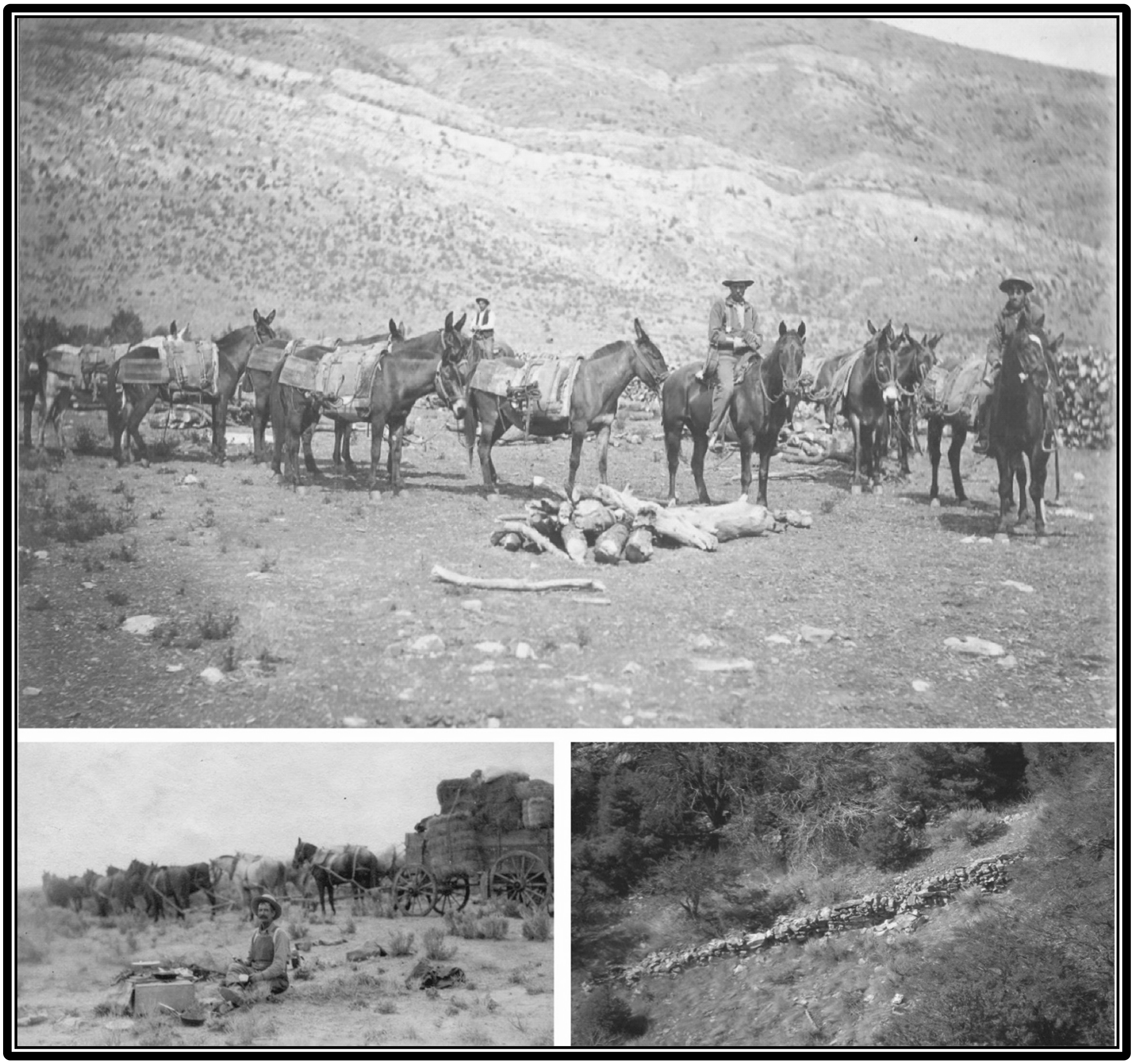

NEVADA ARCHAEOLOGICAL ASSOCIATION

Nevada Archaeological Association

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Cover: modes of transportation in the Cortez Mining District and a mule road. Top photo courtesy of Estelle Shanks, lower left courtesy of Angela Johns

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Editor's Corner

A. Craig Hauer

Well what can I say, I thought the 2016 journal would be easier than the 2015 one. Sadly, it was not the case, as with many things, life seemed to get in the way. I know everyone has been waiting on the journal, and your patience is appreciated.

This volume focuses on historic archaeology, something that Nevada has in a myriad of flavors. As before, Journal articles have been peer reviewed. This volume consists of one article and three reports. In Winnemucca Lake: The Evidence for A Chinese Commercial Fishing Economy, Bob Vierra describes a site 26WA9773 and evidence suggesting that it may have been a Chines fishing camp.

The three reports also focus on historical archaeology. Mark Giambastiani spins a very interesting tale about volunteer work at the possible location of Fort Sage, a small military outpost occupied in the 1870s. Erika Johnson describes Several unique can types that were recovered during recent data recovery effort near the town of Cortez in Eureka County. Finally, Rob McQueen's report article examines transportation systems associated with nineteenth and early twentieth century mining in Nevada, using the Cortez Mining District as a case study for Nevada's numerous mining camps.

ACH

August 2017

Boise, Idaho

Articles

Winnemucca Lake: The Evidence for A Chinese Commercial Fishing Economy

Robert K. Vierra

R. K. Vierra & Associates, Inc.

This paper reports on a site, 26WA9773, that is unique in the state of Nevada, and perhaps in the far west as well. The site is located on the western shore of Winnemucca Lake in Washoe County, Nevada. It is under the administrative control of the Pyramid Lake Paiute Tribe reservation. Site 26WA9773 represents a Chinese fishing camp whose occupants employ a remarkable technological innovation for the capture, retention, and sale of fish to a Trout Cannery in Wadsworth, Nevada. The site dates to the early 1880s.

In the fall of 2014, the Pyramid Lake Paiute Tribe asked for an archaeological survey of an existing site along the western shore of Winnemucca Lake. The site had a unique architectural feature whose function was determined to be pond retention walls for fish caught in Winnemucca Lake. The fish were subsequently transported to a cannery in Wadsworth. No other site like this has ever been documented in Nevada.

ENVIRONMENTAL SETTING

Winnemucca Lake is a dry lake bed located in northwest Nevada. The lake is a sub-basin within the Lahontan Basin and lies east of Pyramid Lake between Washoe and Pershing Counties (Figure 1). The lake is bordered by the Lake Range to the west and the Nightingale Mountains and Selenite Range to the east. Winnemucca Lake measures about 28 miles long by 4.3 miles wide. The lakebed sits at an elevation of 1,150 m (3,770 ft) above mean sea level (AMSL).

The Truckee River is the main water source for the Pyramid and Winnemucca lakes. Mud Lake Slough splits from the Truckee River at an elevation of 1,184 m ASML (Davis 1982:56) to enter Winnemucca Lake. In the past, Winnemucca Lake received water only when the Truckee River or Pyramid Lake crested above 1,184 m ASML (Hattori and Tuohy 1993:31). By the 1880s, Winnemucca Lake reached its maximum depth of 26 m (85.2 ft) and the biota recovered sufficiently to support a Chinese fishing camp along the western shore of the Lake (Hattori and Tuohy 1993:32). With the completion of Derby Dam on the Truckee River in 1905, and the diversion of the Truckee River water into the Carson River Basin, Winnemucca Lake dried out by the 1930s.

CHINESE IN NEVADA

The earliest evidence of Chinese in Nevada dates to 1856. On October 27, 1855, John Reese and his associates were granted a franchise to build a water ditch from the Carson River which carried water to Gold Canyon for the mining industry.

In 1856, Reese hired about 40 to 50 Chinese laborers from California who settled in the town of Dayton. Genoa also laid claim to the first Chinese irrigation workers around 1855 to 1856. More Chinese laborers were added to the work crews between 1856 and 1857. The ditch was completed in August of 1858. In 1859 there were about thirty-five Chinese still living in Dayton (Chan 1982:266).

During the second half of the nineteenth century the Chinese were instrumental in the economic development of Nevada. During this time, economic insecurity was taking place in China's

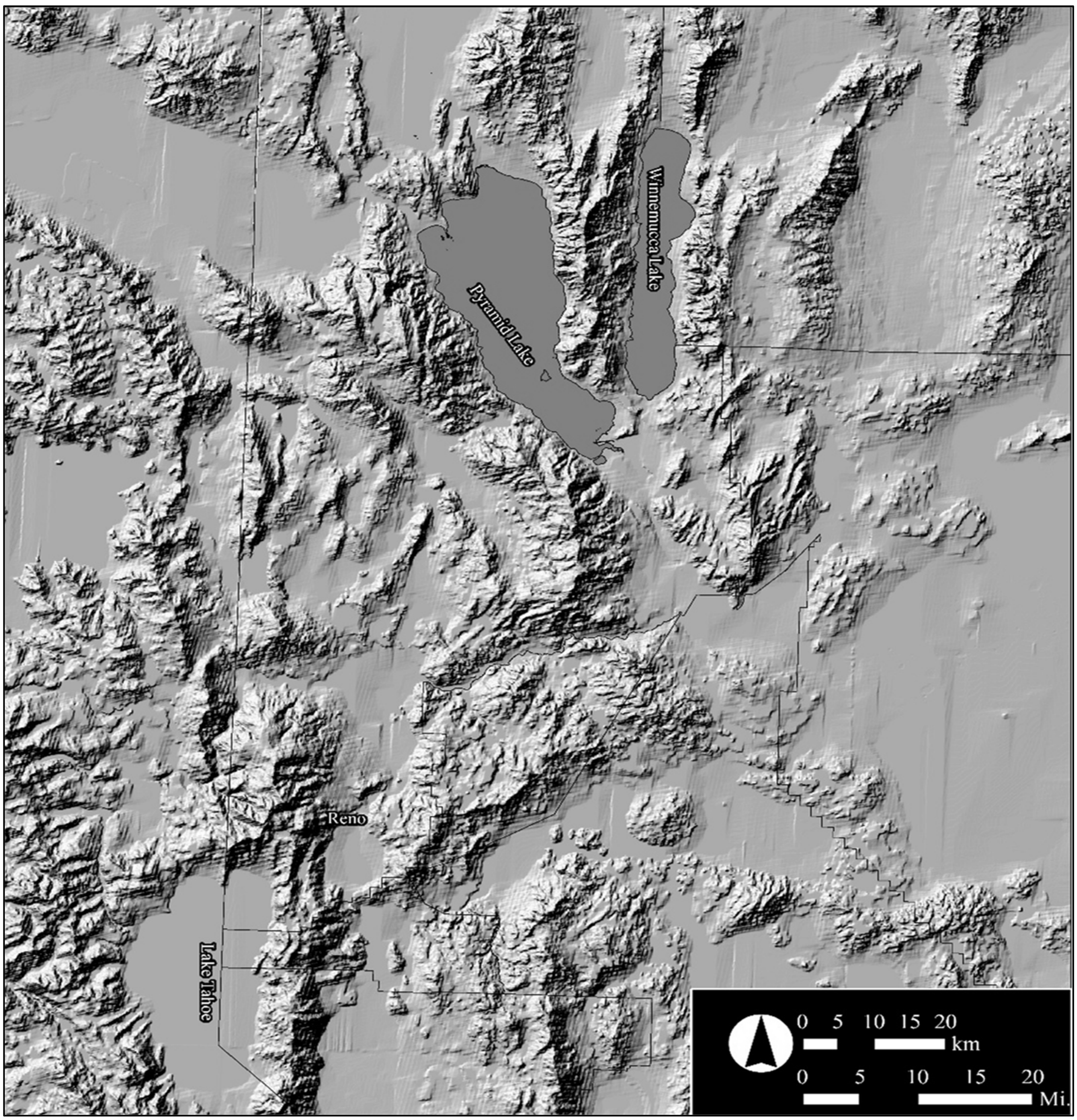

Figure 1. Winnemucca Lake and vicinity.

Guangdong province in southwest China, forcing men to go abroad to secure work and feed their families. However, once abroad, opportunities were limited due to discrimination and persecution from the white unions against Asians.

The discovery of the Comstock Lode in 1859 brought numerous Chinese into the area in 1860. The Chinese were instrumental in the development of Virginia City as they provided Euro-Americans with needed labor and services such as laborers, cooks, laundrymen, woodcutters, and physicians (Hattori 1989:38-5).

With the discovery of the Comstock, economic competition intensified and anti-Chinese agitation began. Unfortunately, the large-scale immigration of Chinese coincided with the birth and rise of the American labor/union movement, leading to the popularized “Chinese must go” slogan in 1860 (Chan 1982:270). Attempts to drive the Chinese out of communities, beginning in Nevada with Unionville and continuing into Virginia City and other towns, was often connected with violence. The Chinese were never completely driven out and some returned as evidenced by the completion of the Old Chinese Masonic Hall in Carson City in 1883 (REG 1943).

In 1863, work began on constructing the Central Pacific Railroad (CPR) with the hiring of thousands of Chinese for labor. In 1868, the Central Pacific Railroad arrived in Wadsworth and the Wadsworth depot was an important transportation point for the movement of people and goods throughout Nevada and the nation (Myrick 1962:24). The railroad was completed in 1869. The completion of the Central Pacific served as a magnet for attracting miners, farmers, and merchants and became a focal point for every mining boom and for the many agricultural developments in the nearby valleys (Elliot 1973:115).

Other railroad construction projects employing Chinese laborers include the Virginia and Truckee Railroad between Virginia City and Carson City completed in 1870. The Nevada-California-Oregon Railroad, a 275-mile-long narrow-gauge line, connecting Reno, Nevada and Lakeview, Oregon began in 1880 and was completed by 1882 (Earl 1989:8-6).

Under the United States naturalization law of 1870, white immigrants were eligible to become naturalized citizens and eligible to vote. Chinese immigrants were barred from becoming U.S. citizens until 1943. The hatred toward the Chinese was expressed at the polls. In the 1880 general election in Nevada, 17,259 voters approved of abolishing further Chinese immigration with only 193 voters opposed. During the latter part of the nineteenth century and the beginning of the twentieth century, Nevada’s politicians, along with those from California, passed the 1882 Chinese Exclusion Act, the 1888 Scott Act, the 1892 Geary Act, and the 1902 Chinese Exclusion Act (Chan 1982:270).

These anti-Chinese laws accomplished their intended effects as seen in Ormsby County. Between 1890 and 1900, the Chinese left in droves returning to Guangdong province. After 1880, more Chinese left the county than those entering it. By the 1930s, the Chinese population of Ormsby County was estimated to be between 20 and 31 individuals (Chan 1982:271).

In 1870, the number of Chinese living in Washoe County was 221 (7.1% of the total county population), in 1880 the number was 526 (9.3%), and in 1890 the number of Chinese dropped to 217 (3.4%) (Chan 1982:303). The increase in Nevada’s Chinese population between 1870 to 1880 was a result of the state’s economic growth fueled by the completion of the Central Pacific Railroad and was a western phenomenon. Nevada was attractive for mining, railroad construction, logging, laundry work, and cooking. The economic declines in mining in the late 1870s resulted in migrations to other locations within and outside of Nevada. During this time, the Chinese were present in all of the Nevada counties.

In Elko County during the 1870s, Tuscarora had the largest Chinese population in Nevada outside of the Comstock area, with the release of hundreds of Chinese by the Central Pacific. The Chinese worked the placer claims that had been abandoned by the whites. In 1880, the Chinese became servants or cooks in white households. Other occupations included wood chopping, laundering, gambling, retail trade, traditional medicine, and barbering. Women were employed in Chinese-owned brothels. Lander County got its start as a silver mining district between 1862 and 1863. Most of the Chinese worked as peddlers, cooks, and laundrymen. Chinese were present in Esmeralda County and were living at Candelaria and Columbus. In 1872, the Pacific Coast Borax Company began operations at the Columbus Salt Marsh and hired several hundred Chinese to work at the marsh extracting borax until about 1890. Between 1873 to 1875, several hundred Chinese laborers built the narrow-gauge Eureka and Palisade Railroad in Eureka County. In Lyon County, 200 Chinese Laborers were hired to build the Carson and Colorado Railroad in 1880. Earlier, many of the Chinese placer mined for gold on claims abandoned by whites (Chan 1982:279-293). In Carson City, the Chinese Masonic hall was built in 1883, known as the Chinese Free Masonry hall. The Chinese were employed in logging activities in the 1870s and 1880s and worked on the flume between Lake Tahoe and Carson City (REG 1943).

Exclusion of Chinese was being enforced closer to the project area at Olinghouse Canyon. In 1905, the miners' union of Olinghouse took the first steps toward the enforcement of their law that no "Chinamen" be allowed in the mining camp of Washoe County. In November of that year, the miners drove out two "Chinamen" from Olinghouse Canyon. The first left without incident while the second required considerable force and persuasion on the part of the miners. The second "Chinaman" left for San Francisco to speak with the Chinese consul to intercede on his behalf. The "Chinaman's" cabin burned to the ground on the night that he left camp. The miners' union stated that the burned cabin was an accident and it intended to keep the wages of the camp where they belong and did not want any cheap foreign labor in the mining camp (REG 1905:5 2 Nov. 14).

Chinese Fishing in Nevada

On the reservation, some Paiute families attempted to farm, but fishing was the main source of income. While there was objection, the Central Pacific Railroad ran through the most agricultural part of the reservation. Settlers came into Wadsworth and the natives were forced to the outskirts of town. Eventually, the Numu used the railroad to travel freely, selling produce and visiting other tribes. After construction of the CPR, many of the Chinese settled at Winnemucca Lake near the Kooyooe Tukadu, fishing as they had in their homeland. The Numu allowed the Chinese to fish at Winnemucca Lake until they began to sell their fish to whites without the Numu's consent (I-TC N 1976:69).

The September 23, 1882 Nevada State Journal reported that fish were being caught in Pyramid and Mud Lakes. Mud Lake is another name for Winnemucca Lake. Only the Indians could take trout from Pyramid Lake while White men, Italians, and Chinese were allowed to fish at Winnemucca Lake. Subsequently, the Indians claimed that Winnemucca Lake was to be part of their reservation. It was stated that there was a resort for Chinese fishermen at Winnemucca Lake (NSJ 1884:2).

The Nevada State Journal reported in July 1887 that Winnemucca Lake was regarded as the finest fishing ground on the continent. The trout were large, took a bait readily, and a great number of them could be taken in a day's sport. In 1887, the lake was 80 ft deep, however it went completely dry in 1938 as a result of a reduction in the flow of the Truckee River after completion of the Derby Dam in 1907 (NSJ 1979:58).

Some of the Indians residing on Pyramid Lake Reserve claimed that the original survey of land allotted to them prior to 1865 included Winnemucca Lake, better known as Mud Lake. If this was true and could be established by a new survey, it would be of great benefit to the Indians as they would then have the exclusive right to fish at Pyramid and Mud Lakes, which are both fed by the Truckee River. As it is now, Chinese monopolize Mud Lake and at times overstocked the fish market to the detriment of the Indians fishing at Pyramid Lake (Gibson 1886:273).

In 1885, the Pyramid Lake police chief Captain Dave and his son Robert Davidson, made a map of Pyramid Lake and its surrounding area. Kooyooe Paa was the name given to Pyramid Lake. *Esekooyooee* was the Indian name for Winnemucca Lake. The Chinese were fishing in Esekooyooee lake. The Chinese sites were recorded on Captain Dave's map. The Chinese, who had worked on the Central Pacific Railroad were getting fish at Winnemucca Lake and selling the fish. The Chinese were allowed to sell their fish whereas the Indians were not granted permits. The Indians protested, because they believed the lake belong to them (Harnar 1974).

Fishing at Winnemucca Lake and Pyramid Lake by the Chinese and Indians respectively, was an important economic development during the 1880s. At Wadsworth, Eugene Griswold was experimenting with canning Pyramid Lake cutthroat trout by putting up 2,000 cans. If successful, Mr. Griswold engage in the canning business on a large scale at Wadsworth (NSJ 1880 March 11). On a more pessimistic note, the Nevada State Journal (1880 March 25) reported that the Griswold Trout Cannery at Wadsworth, Nevada, was not likely to prove successful, but be of temporary benefit since the Truckee River could not meet the demands of an extensive cannery for more than two seasons. However, for all of 1882, 200,000 pounds of Pyramid Lake cutthroat trout were shipped from Wadsworth (NSJ 1883 January 24). Tons of trout were being caught in Pyramid and Winnemucca Lakes daily. At Winnemucca Lake, white men, Italians, and Chinese were fishing, while only the Indians were allowed to take trout from Pyramid Lake. Most of the fish were shipped to Sacramento and San Francisco (NSJ 1882 September 23). In 1883, the Reese River Reveille (February 1) reported that the Griswold Trout Cannery at Wadsworth was doing good business with the supply of fish being practically unlimited.

Even in the mid-1880s, fishing was a viable economic pursuit. The Trout Cannery was also doing very well. Fifty thousand dollars' worth of fish was shipped in 1883 and 1886. In 1884, an attempt was made to no avail by US troops to prevent non-Indians from carrying out commercial fishing. In 1889, the Nevada State Journal dated November 22 stated that Indian agent W. Gibson had bought and shipped 23,000 pounds of trout from Pyramid and Mud (Winnemucca) Lakes in the preceding eight weeks. Another hundred tons of fish were shipped in a six-month period between 1888 and 1889 (Mergen 2014:103).

It appears from the above discussion that for most of the 1880s, the Chinese were successful in procuring and selling fish caught at Winnemucca Lake. It is most likely that the fish caught by the Chinese were transported and sold to the Trout Cannery in Wadsworth.

Chinese Households

Chinese male-dominated residences tend to be simple and sufficient for their needs in laborintensive camps. Chinese lumbermen in the Carson Range of the Sierra Nevada Mountains lived primarily in small households of three to ten people in 1870. Technological innovation and adaptation was characteristic of the Chinese communities in the nineteenth century. Chinese builders used locally available materials in their construction activities such as rocks, mud bricks, and cobblestones. Chinese residential structures typically consist of dugouts with household size varying between two to four individuals (Hardesty 2003).

RESULTS FROM SITE 26WA9773

The site is located on an east-facing alluvial fan along the western shore of Winnemucca Lake. Historic remains consist of five features and historic debris. Feature 1 is a habitation structure, Features 2 and 3 are dugout structures, Feature 4 appears to be the remains of a tent platform, and Feature 5 is an L-shaped rock wall alignment (Figure 2). From the historical record, such as the Captain Dave map, the site dates to at least 1885. Artifacts found on the site (e.g., cut nails and Chinese ceramics) also indicate a date near the end of the nineteenth century.

Feature 1 (Figure 3) is a rectangular structure with a depression in the center. The west and north standing walls are constructed with tufa and basalt boulders. A two-foot-deep depression is located in the center of the structure. The dimensions of the feature are 30 ft for the north wall and 22 ft for the west and east walls. The rock walls are approximately 30 inches (in) high and 40 in wide.

The west wall is reasonably intact and constructed with basalt boulders (Figure 4). A notch exists in the west wall with chinking present. Over 50 cut square nails, likely used in the construction of a roof, were found near the feature. Cut nails were primarily used from 1830 to ca. 1890. Approximately 70 ft down slope and to the east are two more features situated parallel to each other. These are dugout features (Features 2 and 3). Feature 3 measures 25 ft by 7.5 ft (Figure 5). From other recorded Chinese sites, dugouts have been reported as being very common.

Feature 4 (Figure 6) represents the remains of what looks like a tent platform. Basalt rocks form the outline of the feature. It measures 10 ft by 15 ft. No artifacts were associated with the feature.

Feature 5 is an L-shaped feature consisting of two rock walls: a south-facing wall and an east-facing wall. The L-shaped feature is marked by a very pronounced corner (Figure 7). The corner is partially collapsed but its original height is estimated to be about 6 ft. Construction is mostly tufa boulders. The south-facing wall is shown in Figure 8. This wall extends for 148 ft. Most of the wall is intact. The height of the wall varies between 6 ft to 7 ft. Tufa is the main material used in construction. The width of the wall is about 6 ft. The east-facing wall extends for 295 ft. Most of the wall is no longer intact. Width is estimated to be about 5 ft and height varies between 3 ft to 5 ft.

In addition to the five features, numerous historic artifacts were noted. Approximately 100+ blue, amber, green, aqua, brown, and purple glass fragments were noted. Another 25 window glass fragments were found in proximity to Feature 1. It is likely that windows were part of the feature. About 50+ cut nails with square heads in lengths of 2 in and 3 in. The pennyweights of 2 inch nails (6d) are used in small construction. Three inch nails (10d) are used for medium construction. One can assume that a roof was constructed for Feature 1.

Five milled lumber pieces were noted measuring 24 in long by 2 in wide. A bucked handle and a shovel fragment were also found. About 10 barrel straps measuring 1 10/16 in wide and 2 in wide along with several barrel staves were noted.

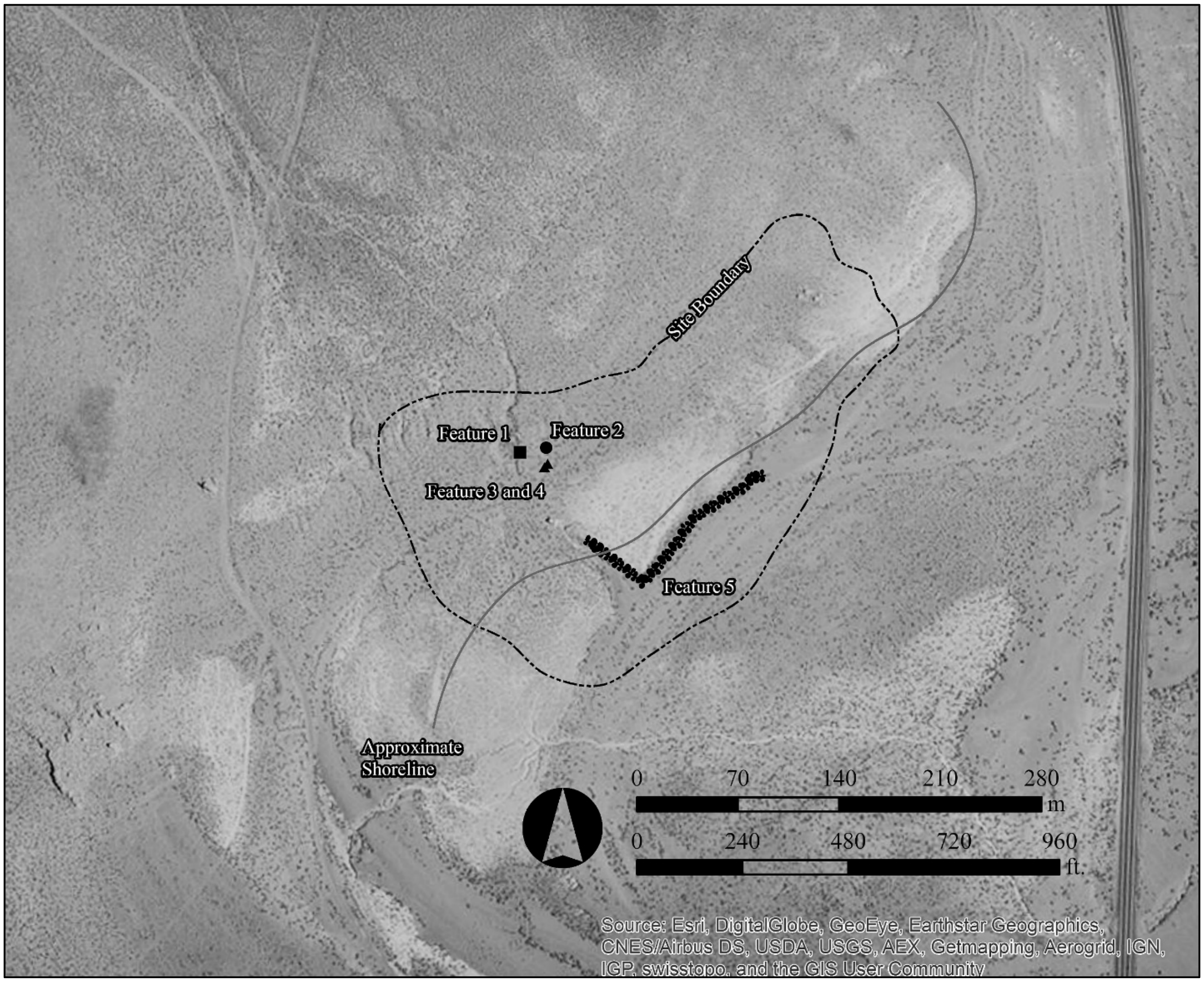

Figure 2. Map of site 26WA9773

We know from the historical records that ceramics and food stuffs were shipped in barrels from China to San Francisco, which were then transported to Chinese camps in Nevada (Gene Hattori, personal communication 2015). Such barrels would be a convenient way to transport the fish from site 26WA9773 to the Trout Cannery in Wadsworth via wagons, mules, or water craft. Just to the west of the site is a two-track dirt road that runs north to south that may have been a possible transportation route. Purple glass fragments dating to at least 1917 would suggest a post Chinese occupation.

Figure 3. Feature 1 overview.

Figure 4. West Wall Chinking in Feature 1.

Figure 5. Feature 4 tent platform.

Among the artifacts are several fragments of a ¼ inch wire mesh shown in Figure 9. The wire mesh shown below was found in the corner of Feature 5. It measures 7.5 in by 8 in. In addition, six more smaller wire mesh fragments were noted in the corner of the feature. What is of interest is that these pieces of mesh are near the notch in the east-facing wall (approximately 2 m from the corner) of Feature 5. It appears that these mesh fragments were part of a grate placed vertically in the notch. This would allow lake water to pass into the catchment area while at the same time providing oxygen for the fish stored in the catchment area. It is a method of aeration. This is typical of fishing ponds observed in the Guangdong where aeration was common (Sue Fawn Chung, personal communication 2015). Water could pass through the mesh while constraining fish behind it. This is another example of Chinese technological innovation. An unnamed spring is located approximately one mile northwest of Feature 5. This spring may have provided another source of oxygenated fresh water as it connects to a drainage which feeds into Feature 5.

Finally, Chinese ceramics were found in the southeast corner of Feature 2 as shown in Figure 10. Chinese ceramics make their appearance in Nevada during the middle of the nineteenth century along with tobacco pipes, opium pipes, medicinal vials, coins, and gaming pieces.

Archaeologists have classified Chinese ceramics into two categories of “porcelain and porcelaneous stoneware tableware” (PPST) and

Figure 6. Feature 4 tent platform.

Figure 7. Corner of Feature 5.

Figure 8. Feature 5 south-facing wall .

"Chinese brown glazed stoneware" (CBGS) vessels (Choy 2013:1). These ceramics were exported from China to overseas Chinese communities. A common export area was the Guangdong

province located in southeast China. As early as the 1850s Chinese ceramics were exported to the American scene for use by Chinese sojourners to the mining and railroad camps of the west. Common among the ceramics was the Bamboo blue grey rice bowl with a field of bamboo, and a blossom and a rock alongside the bamboo. It is sometimes referred to as Three Circles and Dragonfly based on its design characteristics. In work camps in the mines and railroads, only males were present where each worker had his own porcelain rice bowl (Choy 2013:3). Chinese brown glaze stoneware is often known as Jian

Figure 10. Chinese ceramics.

Figure 9. Wire mesh.

You which refers to the ceramic produced in the Southern Sung (960-1280) in the kilns of Shuiji near Jianyoung (Choy 2013:4). Soy pots are characterized by a dark brown, coarse glaze with imperfections. Noticeable about Chinese utilitarian wares is the fact that there exists very little stylistic change over long periods of time as a mark of traditionalism in Chinese culture (Olsen 1978:45).

In the upper right corner is a fragment of a blue grey rice bowl. As discussed above, this is commonly referred to as Bamboo or Three Circles and Dragonfly. In some cases, it has been called Swatow.

SITE FUNCTION OF 26WA773

The interior of Feature 5 shows what looks like lake sediments (Figure 11). This explains the function of Feature 5. This feature was built as a catchment area for fish. The two walls are constructed in a manner that they would not hold water but they would restrict anything such as fish inside the feature. This is based on the evidence from the historical records that this site represents a Chinese fishing camp. This also means that the feature had to be built while standing in the lake. Transporting the tufa boulders for the construction of the walls had to be done manually or by using some sort of water craft.

Figure 11. Interior of Feature 5.

Figure 12 shows the topographic setting for all 5 features. This is important for understanding the placement of Feature 5 and the function of the site. The corner of Feature 5 sits at an elevation of 3,850 ft AMSL. Features 2 and 3, the dugouts, sit at an elevation of 3,860 ft ASML. If Feature 5 was constructed by standing in the lake, the lake shore level had to be lower than 3,860 ft ASML and greater than 3,850 ft ASML. That is, the edge of the lake had to be between Feature 5 and Features 2 and 3. When viewed from the ground at Feature 5, the east-facing wall terminates on an uphill slope, therefore, precluding any need to build a north-facing rock wall. Similarly, since the site slopes downhill toward the southeast with an aspect measured at 140 degrees, there would be no need to build a west-facing rock wall as well. Based on where the south-facing wall ends upslope at the large tufa boulder, we can reasonably assume or project that the lake shore was at an elevation of 3,855 ft ASML when the site was occupied. This would result in a lake depth of 5 ft at Feature 5. This would explain why the corner of Feature 5, located at the lowest point on the site, had standing walls 6 ft in height. The shore level at 3,855 ft would be 6.5 ft below the 3,861.5 ft AMSL high stand as reported earlier.

It appears that the Chinese were aware of the landscape and capable of technological innovation in constructing Feature 5 as a catchment area for fish.

It is assumed that the Chinese used similar methods for catching lake trout as the Paiutes used at Pyramid Lake. Lake fishing at Pyramid Lake was accomplished using set lines, gill nets, harpoons, and spears. Set lines used in 1875 were described as a line measuring 15 m long with 75 composite hooks. Larger set lines were about 20 to 30 m long with about 30 barbed bone or greasewood hooks.

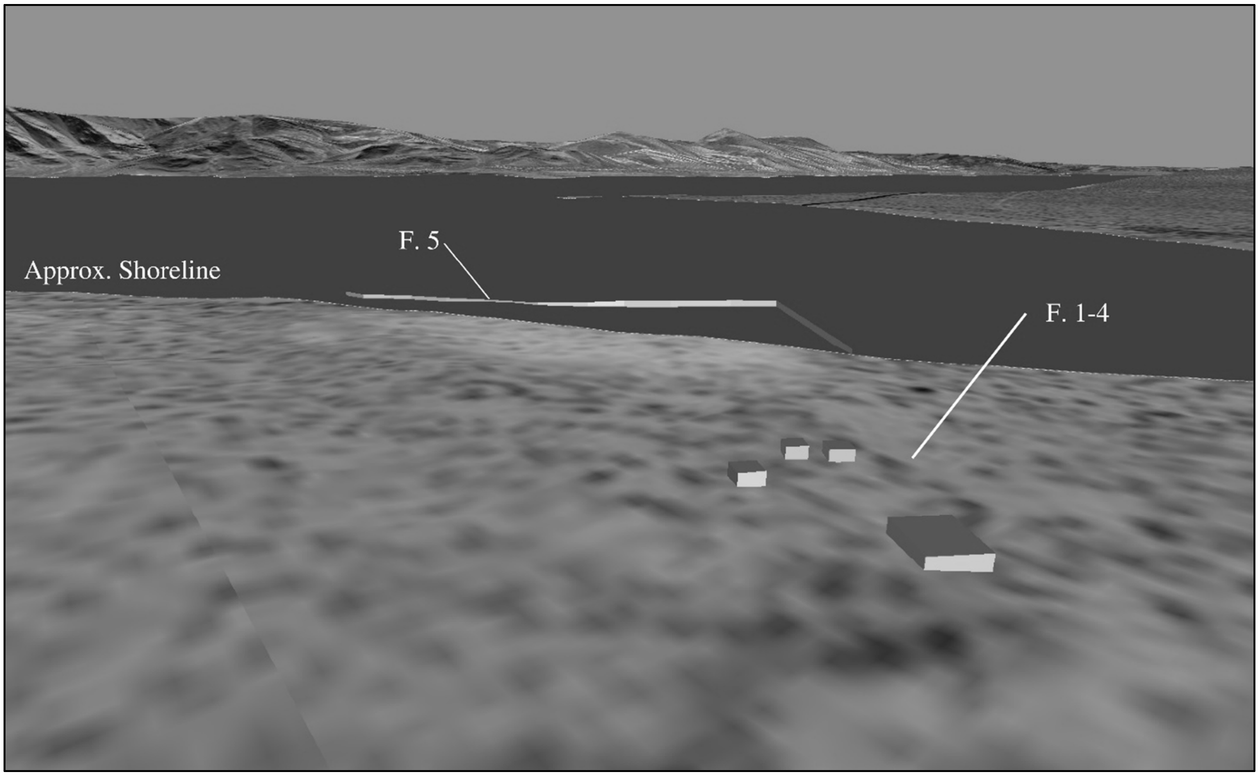

Figure 12. Topographic setting of site 26W9773 looking east ca. 1890 A.D.

Baskets were used for transporting the fish. Gill netting was another method used in lake fishing. Gill nets were about 1 m in height and 40 to 80 m in length. These nets were placed in 10 to 20 m of water to snare fish below the surface. Lake fishermen also used harpoons and spears in shallow water (Fowler and Bath 1981:183-185).

For the occupants of site 26WA9773, the Chinese presumably were efficient at catching lake trout in that portion of Winnemucca Lake east of Feature 5 where the water was much deeper. Once the fish were caught, they were most likely transported to the catchment area of Feature 5. Fish could be kept in this area for some time before they were sold, presumably, to the Trout Cannery in Wadsworth. Transporting the fish to Wadsworth may have been accomplished by wagons, mules, or water craft. The Nevada State Journal (1878 2:3) refers to a fishing steamer on Winnemucca Lake. The Silver State (1877 3:3) reports that a little steam boat built in the east arrived on railroad cars at Wadsworth. It was fitted for sea use and launched on Mud Lake where it was used for fishing purposes. The little steamer traveled ten miles per hour, and brought fish from the lower end of the lake to the upper end where the fish were then sent to market.

Based on the historical records, site 26WA9773 is defined as a Chinese fishing site. The 1885 map produced by Captain Dave shows the locations of Chinese fishing sites (Harner 1974:56). Site 26WA9773 corresponds to one of these locations. This is supported by the presence of Chinese ceramics on the site.

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REPORTS

A Forgotten But Persistent Place - Fort Sage, Nevada

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Once in a while, fortune drops interesting research projects at the feet of unsuspecting archaeologists. Such was the case in 2006 when we found out about a "missing" military fort during a test excavation project by ASM Affiliates, Inc. (ASM) in Dry Valley, just north of Red Rock Valley and about 30 miles north of Reno, Nevada. One of the sites we tested during that project, CrNV-03-1664, contains a series of stacked rock walls and was rumored to be the location of Fort Sage, a small military outpost occupied in the 1870s (McLane 1982). According to local lore, Fort Sage was built by Euro-American settlers in the early 1860s during a period of conflicts with local Native American groups. Supposedly, the fort was later manned by a military guard and eventually became a popular stopover location for military and civilian travelers along the Reno to Fort Bidwell Road. The idea that site CrNV-03-1664 is the location of Fort Sage was only speculative, based mainly on the presence of fairly substantial rock walls (McLane 1982) and the site's location at the south end of the Fort Sage Mountains.

Our archival research demonstrated that published information on Fort Sage is extremely scarce. The site is not mentioned in any major references on western military forts, and outside a few brief references (e.g., McLane 1982; Ruhlen 1964) the only other mention of Fort Sage found during pre-field research for testing at CrNV-03-1664 was in a book by Stephen P. Jocelyn II, the son of a U.S. Army officer assigned to the West in the early 1870s (Jocelyn 1953). In this book, the notes of General Stephen Perry Jocelyn recount a journey he made from Reno to Fort Bidwell in the spring of 1872. Most importantly, Jocelyn's notes provide distances between locations depicted on various historic General Land Office (GLO) maps. In one instance, there is a brief mention of a stop at Fort Sage

> June 2, 1872. Rev. at 3. First wagon mired within one hundred yards of camp. At 8 o'clock train has not advanced more than one half mile. Cross large hill where it is necessary to double the teams. Newcomb's ranch just on the other side with lake nearby. Four miles further with still heavier hills, Fort Sage is reached. The whole distance 8 miles [Jocelyn 1953: Appendix C (page 401)].

From these notes we inferred that Fort Sage might instead be the site of "Sessions House" depicted on the T25N R18E GLO and located a few miles north of Dry Valley. However, the results of further archival research and of discussions with archaeologists at Far Western Anthropological Research Group, Inc. - who had excavated at

Sessions House a year or two previously (Young 2006) – determined that this site was probably was not the location of Fort Sage.

Working from the hypothesis that site CrNV-03-1664 could still be the location of Fort Sage, ASM commenced testing and data recovery work at the site between 2006 and 2008 (Figure 1). Lacking any descriptions of Fort Sage, we expected this military site to represent a small, well-built stacked rock structure, perhaps even a simple "redoubt" wall, that was positioned in a defensible spot somewhere on or near the settlers' homesteads. We also anticipated Fort Sage to have a fairly limited artifact deposit reflecting short-term use of the site by a small group of enlisted men and/or volunteers. Artifacts dating to the early 1870s, especially bullet casings, military coat buttons, coins, and other men's items were expected to be present or even dominant in the site assemblage.

The site of CrNV-03-1664 lies within the shallow basin of North Fork Dry Valley Creek, fronted by a steep hill to the south and a vertical creek terrace on the north - hardly the defensible location we anticipated. It does have seven stacked rock features; however, all of them are walls except for a small dugout (Feature 1) and a squared, stacked rock platform (Feature 2) that sits along the north (downslope) edge of the historic road that runs through the site.

As noted by McLane (1982), the rock walls at CrNV-03-1664 are indeed substantial, some reaching four feet in height and over 100 feet in length (Figure 2). Each is unmortared and made of rounded creek cobbles stacked in as many as eight courses. The two main wall alignments, Feature 3 and Feature 4, do not form an obvious barricade but instead represent some type of enclosure. Indeed, surface artifacts between the two walls have been trampled by stock animals, while artifacts outside the walls have not. Also, there are several remnants of cut branch posts within some of the walls and one atop the cutbank between Feature 3 and Feature 4, implying the former presence of wire fencing in between. These data indicate that the main walls at site CrNV-03-1664 served as a stock corral rather than a fortification of any kind. Feature 2 was interpreted as the foundation for a tent cabin and/or a stock loading area.

Artifacts recovered during the excavation of CrNV-03-1664 are not typical of a military occupation either (Table 1). Not only are they present in greater numbers than might be expected of a small garrison, they are mostly of domestic nature. Artifacts from the Feature 1 dugout and from excavation units north of Feature 2 are dominated by nails, small hardware, food containers, and kitchenware. Also recovered from the site, are several personal items, including fragments of a perfume bottle, a crochet needle, and a corset stay, that were most likely used by women. No buttons, clothing parts, or spent ammunition from the site are of military issue. Most telling is that the range of production dates for artifacts at CrNV-03-1664 is decidedly post-1900, much too late to have been discarded during the 1870s or even earlier. Taken together, data from excavations at CrNV-03-1664 suggested that this site was not Fort Sage.

FINDING FORT SAGE

With our interest piqued, we turned to additional research involving place names and early survey maps in Washoe County. The name search indicated that a place called "Sage Fort" was located in southern Honey Lake Valley near Fish Springs. We also found a reference in an 1863 report by surveyor J. F. Kidder to the California Legislature, regarding his survey of the eastern California-Nevada state line, which indicates that a "Sage Fort" was indeed present in that vicinity:

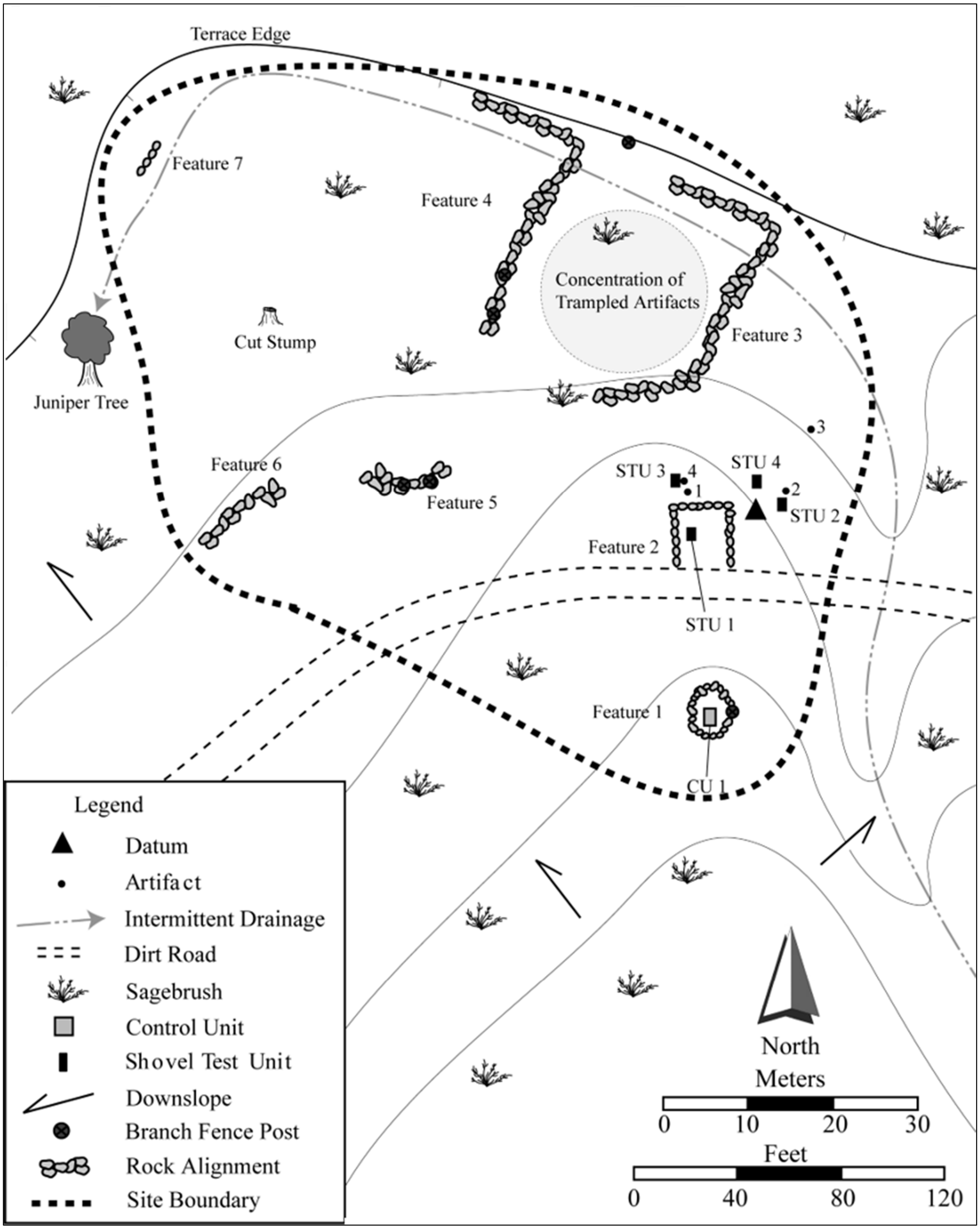

Figure 1. Site CrNV-03-1664 sketch map.

Figure 2. Detail of rock wall.

> From Long Valley to Honey Lake Valley, the line passing over a high dividing ridge, and twenty-four chains east of well marked peak, which we designated Boundary Peak, descends into Honey Lake Valley about two miles west of a camping place known as Sage Fort, near a small stream (Kidder 1863:52).

The accompanying map, prepared by Butler Ives, shows the location of "Sage Fort" east of the stateline (Figure 3). While the map lacks the detail needed to find the site on the ground, it places the fort a few miles northwest of Sessions House and approximately that much farther north than General Jocelyn had indicated. It also means that Fort Sage must have been constructed prior to or sometime during 1863 if its name was already known by the time Kidder arrived there.

The most critical piece of evidence, however, was Von Schmidt's 1872 boundary survey map of Honey Lake Valley (Figure 4). Although Von Schmidt's (1872) field notes imply he may never have actually set foot at Fort Sage, both "Sage Fort Creek" and the "Ruins of Sage Fort" are plotted on his map.

Table 1. Artifacts recovered from CrNV-03-1664.

	Non-Feature Units	Dugout Structure	Platform	Total
Building/structural				
Stovepipe	1	-	-	1
Door hardware	1	3	-	4
Cut nail	1579	103	133	1820
Wire nail	469	1	13	483
U-fence nail	6	1	-	7
Windowpane shard	32	8	47	87
Window shade bracket	3	-	-	2
Misc. Sm. Hardware	42	1	5	48
Containers				
Bev. And Liquor Bottle	229	24	9	263
Cond. Bottle/food jar	6	-	-	6
Pharmaceutical bottle	12	-	-	12
Sanitary food can	113	54	2	169
Household items				
Plate and glassware, crockery	113	3	1	117
Utensil, colander, washtub	4	1	-	5
Bedsprings	-	2	-	2
Kerosene lamp glass	29	-	1	31
Upholstery nail	1	9	-	10
Personal items/clothing				
Clock	1	-	-	1
Harmonica plate	1	-	-	1
Perfume bottle	3	-	-	3
Safety pin	1	-	-	1
Crochet needle	1	-	-	1
Button (Shirt or Pants)	6	8	3	17
Shoe parts	2	21	-	23
Corset stay	1	-	-	1
Other Items				
Padlock	1	-	-	1
Horseshoe Nails and Tack	38	14	1	53
Bullet Casings	24	3	3	30
Automobile Spark Plug	-	-	1	1

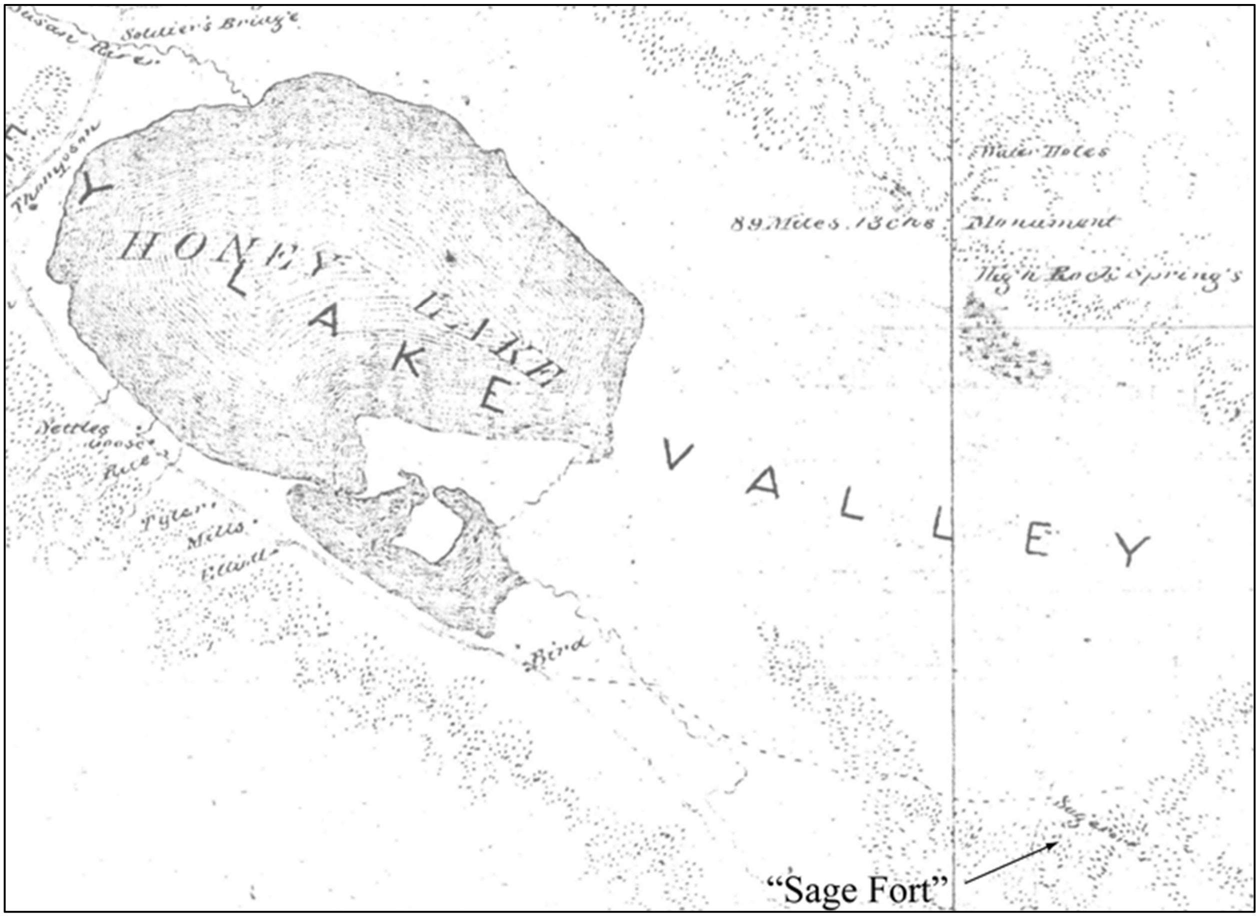

Figure 3. Buttler's 1863 map showing Fort Sage.

Von Schmidt's use of the word "ruins" implies that Fort Sage was abandoned and perhaps even demolished by 1872, a fact which explains why it does not appear on the corresponding 1872 GLO map for T25N R18E. Von Schmidt may have only known of its location based on Kidder's previous notation and by the plot provided on the 1863 Houghton-Ives map.

Several things depicted on the Von Schmidt map ultimately allowed us to pinpoint the location of Fort Sage. First, the map shows three drainages between Fish Springs and the revised California-Nevada line. Second, it shows the fort on the west side of Sage Fort Creek, which Von Schmidt stated was "a fine body of running water"; his survey was completed in late summer, making it notable that the creek was still running strong. Third, we know that Von Schmidt's revised boundary line is the same one used on current USGS topo maps. Fourth, the map shows a "trail" running just north of the site, part of the Reno to Fort Bidwell Road. Finally, Von Schmidt's map shows mileposts along the boundary line that could be used as a scale. As such, we were able to reconcile the details on 1981 State Line Peak, Nevada 7.5-minute topographic map Von Schmidt's map with those on the current USGS topo map. Von Schmidt's renderings of the three drainages west of Fish Springs are consistent with drainages shown on the USGS, and a section of unimproved road near the site's location roughly correlates with the route of the "trail" drawn by Von Schmidt. Most importantly, the "133" and "135" mileposts on Von Schmidt's map are incorporated onto the USGS background.

By converting the Von Schmidt scale to that of the USGS topo, we were able to measure the distance and degree to the site from the "133" mark and plot a rough location for the site.

An online search at the Washoe County Assessor's Office indicated the possible location of Fort Sage lies on private but unoccupied land. As it turns out, the location was part of a land patent filed by Mr. William B. Lake in 1919; this is supported by the depiction of a building and fence attributed to "Wm. B. Lake" on the 1917 (surveyed in 1915) GLO map for T25N R18E (Figure 5). We thus expected to find additional cultural deposits at the site dating to a much later period. Data from the assessor's office provided information on the current landowner (the parcel is still in the Lake family), and through direct contact we received permission to visit the site and look for the remains of Fort Sage.

We made our first visit to the Lake family parcel in September 2008. The stateline was easy to find, marked by a sign and paralleled by a north-south fence. The site's presumed location was easy to spot, being one of only a few unimproved places on the south side of the valley that has any trees. We parked at the trees and surveyed up along both sides of the existing creek, which

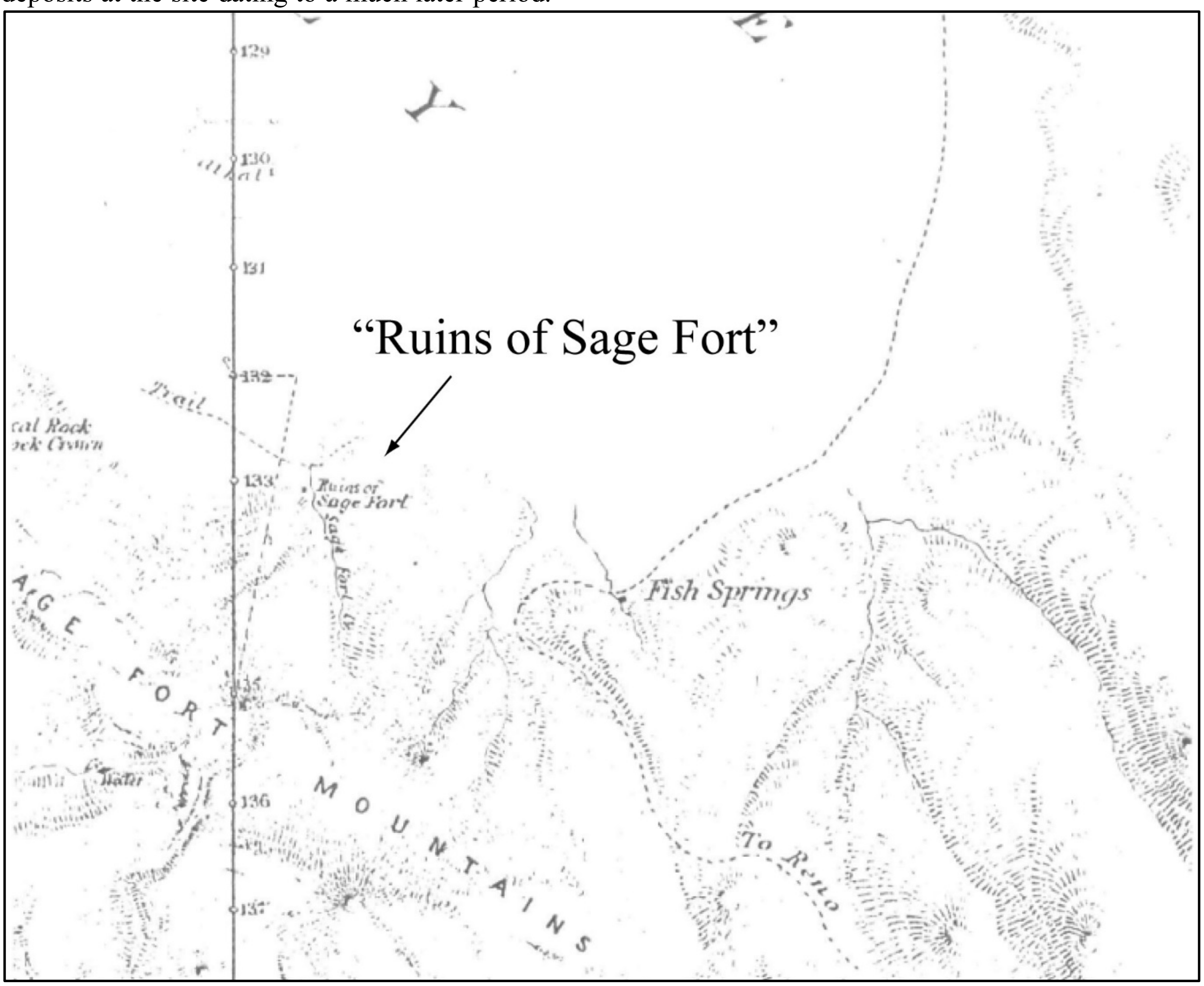

Figure 4. Von Schmidt's 1872 boundary survey map of Honey Lake Valley.

at the time ran down through the trees with considerable flow. Although the alluvial fan at this location is dotted with large boulders and rocks, and vegetation along the creek was dense, we found plenty of evidence that the area was used for a long period of time. Not surprisingly, we located a millingstone, a handstone, and some debitage in the vicinity of the trees and farther upslope, indicative of at least some prehistoric occupation. We also found a large arrastra less than 75 meters upslope from the trees on the west side of the creek (Figure 9). Its walls are constructed of upright stones and concrete, and an automobile axle served as its vertical center post. There is a concrete drag stone outside the perimeter of the feature that was once attached to the axle by a long metal rod. This feature resembles Depression-era arrastras which are typified by the repurposing of materials such as the automobile axle. Downslope near the trees, we identified a series of long fencelines around the inferred location of Fort Sage that were marked by rock alignments, some wood posts, and remnants of rabbitwire or chickenwire. We also found a broad scatter of historic and modern artifacts around the trees, and a well shaft made from a large irrigation pipe, but could not locate stacked rock walls or foundations to represent any type of temporary fortification.

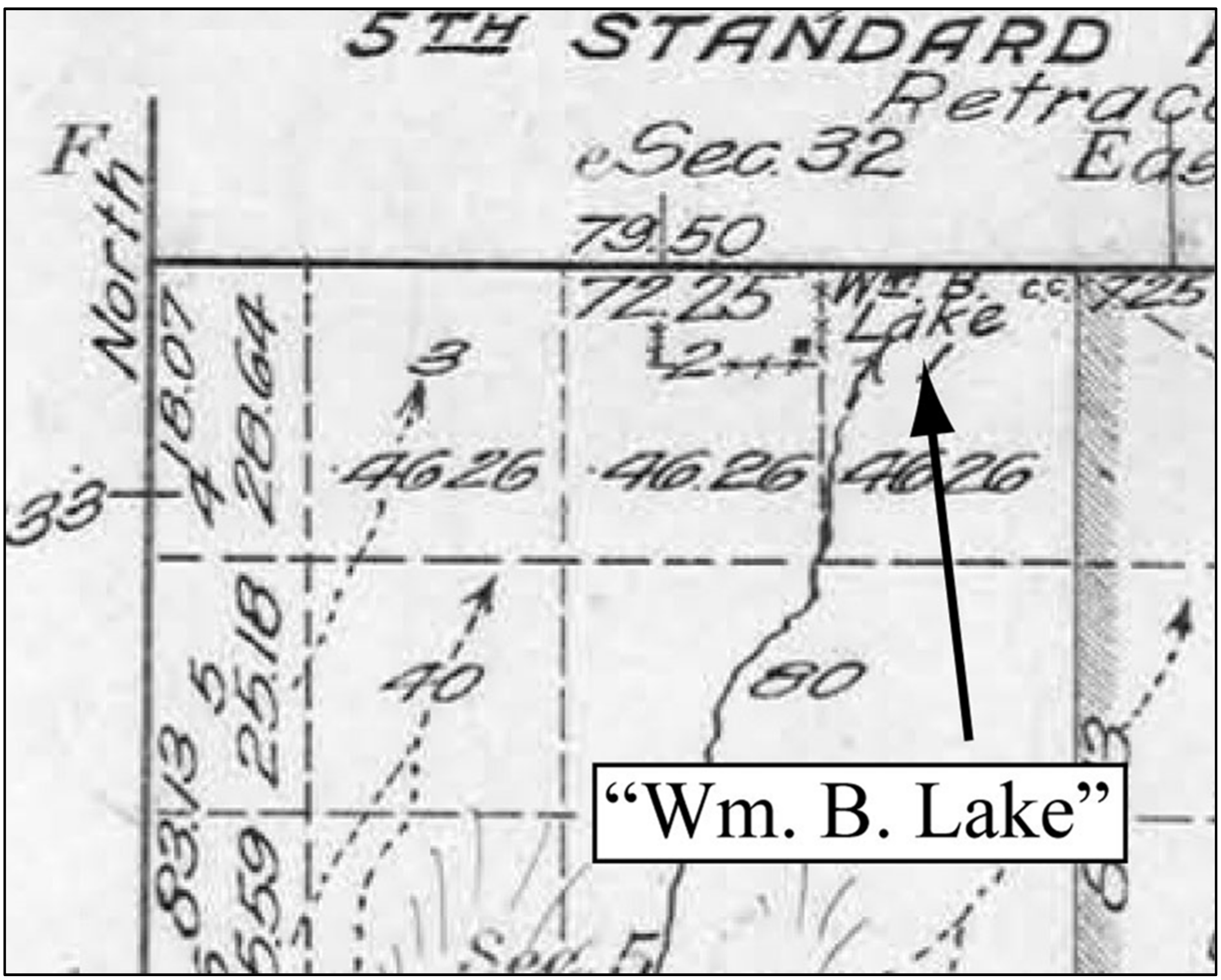

Figure 5. 1917 GLO map for T25N R18E.

Convinced we were in the right place, we made a second attempt to find Fort Sage in early March 2009 with a slightly larger group. Luckily the area had been recently grazed and, being at the end of winter, there was little vegetation on the ground. This time we found some rock alignments and a dense artifact deposit almost immediately, east of the creek and surrounding the well shaft. Figure 7 shows the layout of the features we observed. On the right is the deeper, original drainage of Sage Fort Creek (now dry), and on the left is the shallow, current course of the creek. Several hundred meters south and above the main site area there is an earthen dam that has diverted the water flow from the old drainage into the new one. This explains why Von Schmidt placed Sage Fort west of the creek and why it is now located on the east side of the current waterway.

Two of the features appear to be small building foundations. Adjacent to the well shaft (designated Feature 3) is a single course of aligned rocks surrounding a shallow depression (Feature 2). It is roughly 24 x 12 ft. in diameter and may have had an entry on the north side. A light scatter of structural and domestic artifacts was visible inside the feature and outside downslope to the north, items including a Tepco China vessel base, various nails, aqua and amethyst (solarized) bottle glass, a door hinge, a ceramic doorknob, shards of windowpane glass, pieces of burnt animal bone, and a 1917 Lincoln penny. These materials reflect a manufacturing date range from the 1890s to the early 1920s. The other foundation, Feature 4, is also a single course of aligned rocks around a slight depression but is less clearly defined. It measures about 24 x 20 ft. in size and does not have an obvious interior artifact deposit. Artifacts occur outside the foundation to the west, and while most are the same age as materials at Feature 2 there are others that probably date to the 1930s and 1940s. The main surface artifact de-

Figure 6. Arrasta overlooking the Lake Family Parcel.

posit lies at the site lies between these two structures and contains a wide range of hole-in-top and hole-in-cap cans, ceramic dishware, bottle glass, cut nails, wire nails, and small hardware, automobile parts, buttons, belt and suspender buckles, shoe parts, window pane glass, and many other items. Taking all this together, we suspected that both Feature 2 and Feature 4were small outbuildings associated with ranching activities at the Lake family homestead.

Located north and downslope from the previous features was the most impressive structural remnant at the site (Figures 8 and 9). Feature 1 consists of two, east-west trending rock alignments that outline a possible structure 60 feet long and 16 feet wide. The south, upslope wall is a single course of aligned rocks, similar to those at Features 2 and 4. The north wall, however, is much more formidable. It is built of two parallel lines of large, tightly set rocks with some smaller rocks placed in between, measures 60 feet long and three feet wide, and is highly consistent in layout and composition. The wall appears to have no entryway, but may have a support-like step feature at its west end. no major artifact deposit visible within or immediately around Feature 1, although the ground was largely obscured by dirt and vegetation. The north wall of Feature 1 was certainly much more substantial than the foundations at Feature 2 and Feature 4 and seemed of

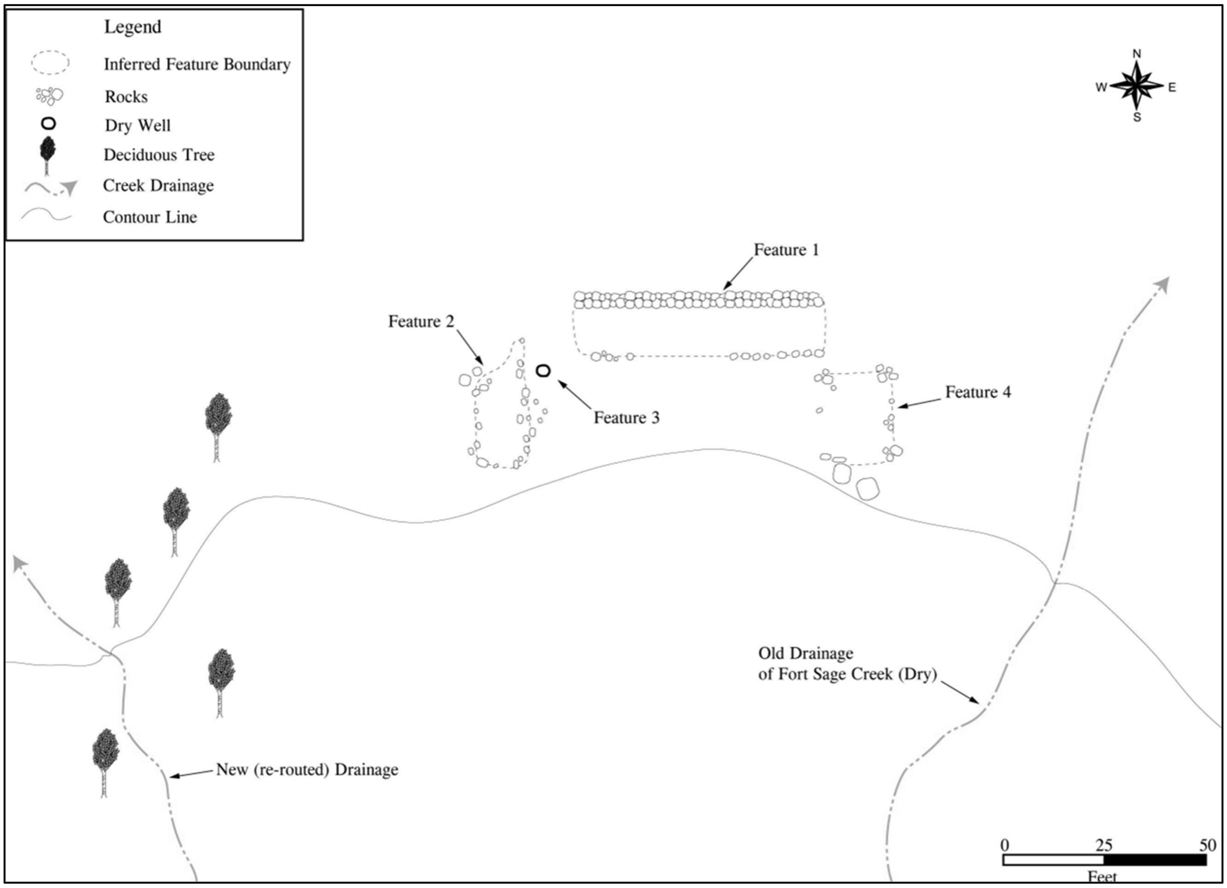

Figure 7. Sketch map of features at fort sage.

much greater size than was typical for a single- family home.

Considering all this, we posited that this site was reoccupied many times since the 1860s, perhaps first by local settlers, then by the Lake family, and perhaps last by local miners during the 1930s. Features 2 and 4 were probably built after 1900, consistent with the construction of a building shown on the 1917 GLO map (see Figure 8 below). Given the layout of various features, we also surmised that William Lake could have reused the north wall of Fort Sage as part of the foundation for his house – an act that might have actually capped and preserved any original 1860s artifact deposit within the fort's interior and beneath the house.

THE LAKE FAMILY HOUSE

After relaying the results of our findings to the landowner, we received several scanned photographs of the Lake family house – shown newly constructed by William Lake in 1910 (Figure 10) and renovated by his son Elsmore Lake in the early1920s (Figure 11) – and also a scanned Polaroid SX-70 from the early 1970s showing the house long abandoned and in a serious state of decay. The early photographs show a two-room house measuring roughly 24 feet long (east-west) and 12 feet wide (north-south), built on a slight, north-facing downslope. The rear, upslope side of the house had a small additional room at its southwest corner (perhaps a bathroom) while the front, downslope side had a wooden porch and awning

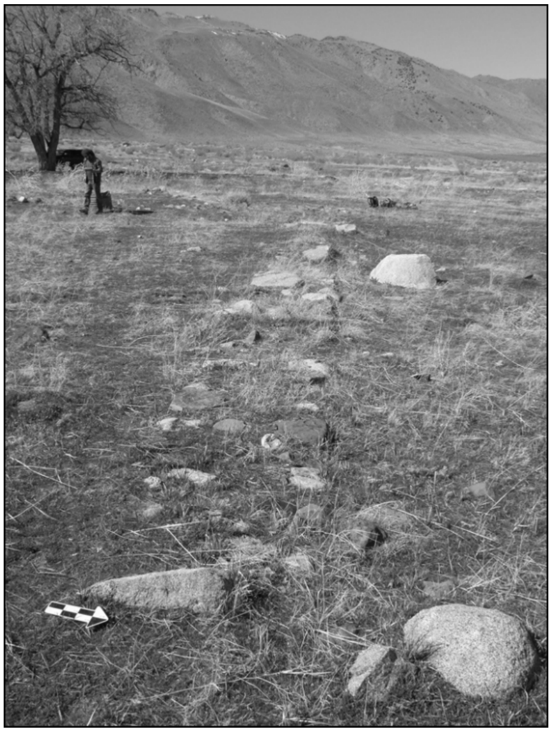

Figure 8. A portion of Feature 1, a possible structure.

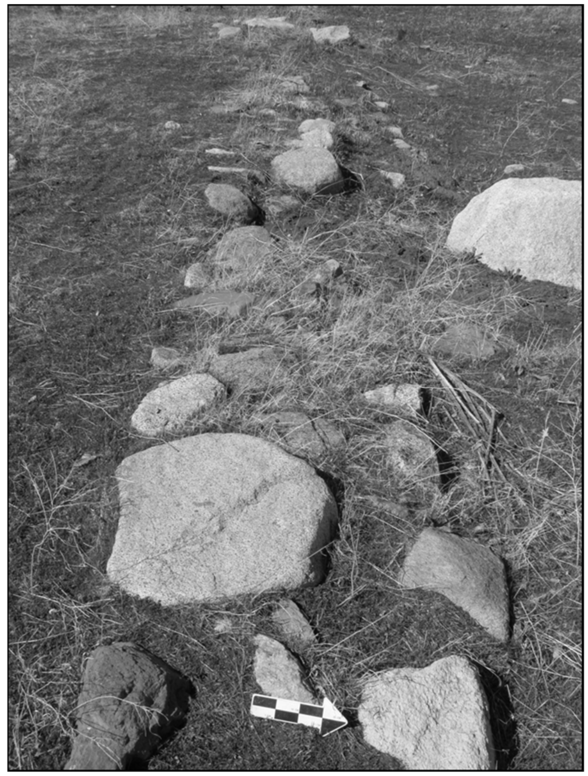

Figure 9. A portion of Feature 1, a possible structure.

supported by wooden posts and a stacked rock foundation beneath the front wall. A set of wooden front steps descended from the porch. The original 1910 house was built next to a single (evidently dead) cottonwood tree at its northwest corner, and its stacked rock foundation does not visibly extend beyond the walls of the house (making it no more than 24 feet long). There was a small outbuilding to the west, perhaps 30-40 feet from the west side of the house, and some low fencing at the rear of the house extending east and west. The photo of the renovated house in the mid-1920s shows two trees, one each at the east and west sides of the house, and what appears to be a set of stone steps that replaced the original wooden ones. William died in 1920, and Elsmore and his wife Helen moved to Oakland in 1927; afterward the house was no longer occupied, although Elsmore had built a small cabin behind the house and used it for visits to the property until about 1960. All of this is consistent with the heavily deteriorated state of the house as depicted in the early 1970s Polaroid photograph.

Ultimately, the photos provided by the Lake family were extremely useful in helping to interpret the functions of Features 1-4 and in developing a set of expectations for how the site of Fort Sage might have been used between 1860 and 1960. Most importantly, the 60-foot long north wall of Feature 1 was considered much too long to have been an original foundation for the Lake family house. This supported the possibility that Feature 1 is actually a remnant of a larger defensive structure built at Fort Sage in the 1860s.

EXCAVATING FORT SAGE

In 2011 we proposed conducting test excavations at the site and were favorably received by the landowner, with the condition that artifacts be returned to the Lake family when our analyses were completed. We returned to Fort Sage in May for a long weekend with an all-volunteer crew to do some surface collection and excavate alongside the major rock wall at Feature 1.

Figure 10. Photograph of the Lake Family House ca. 1910.

Surface collections were implemented in the vicinity of identified features but outside feature confines (Figure 12). Twelve items were collected individually from the site surface and 53 others were recovered from a 15 x 15 m controlled surface collection unit placed south of Feature 1 and in between Feature 2 and Feature 4 (Table 2). These collections focused on the recovery of chronologically sensitive materials; consequently, the resulting assemblage of 65 artifacts consists mainly of glass container fragments

Figure 12. Surface collecting outside features.

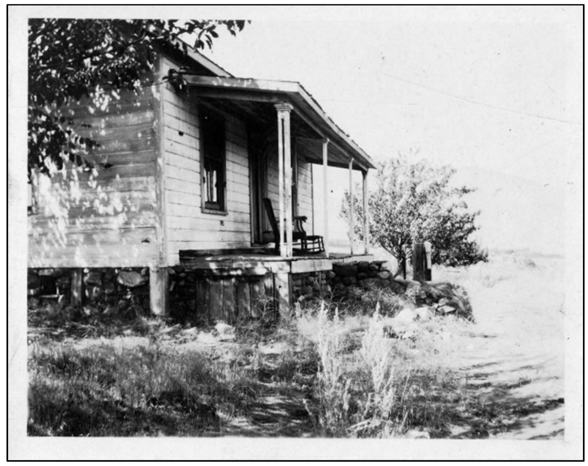

Figure 11. Photograph of the Lake Family House ca. 1910.

having maker's marks or other identifying labels. Although no quantitative functional analyses can be completed with surface materials due to recovery bias, production and manufacturing attributes on various glass and metal artifacts imply that the surface assemblage dates primarily between the 1930s and the early 1960s, with a mean age of ca. 1945. No evidence of a former residence was identified among surface materials (e.g., concrete fragments, wooden structural remains) but domestic and personal artifact classes dominate the recovered assemblage. Fragments of cooking oil bottles, home canning jar lids, and cosmetic items are abundant, and along with a low-to-average number of alcohol containers these findings imply that at least one woman may have been living at the site in addition to one or more men.Children are not represented in the surface artifact assemblage. In addition, the marked frequency of canning jar and lid fragments implies that a vegetable garden or fruit orchard was maintained at the site or that home-canned foods were obtained elsewhere

Table 2. Identifiable and Diagnostic Artifacts Recovered from Fort Sage.

Artifact Function	Surface	Feature 1	TOTAL
Building/ Structural			
Cut Nail	1	3	4
Wire Nail	-	13	13
U-Fence Nail	-	3	3
Finishing Nail/Brad	-	31	31
Roofing Nail	-	3	3
Windowpane Glass	1	-	1
Ceramic Insulator	2	-	2
Unidentified Sheet Metal	1	1	2
Containers			
Beverage or Liquor Bottle	22	8	30
Milk Bottle	-	2	2
Condiment Bottle/Food Jar	8	-	8
Canning Jar Lid/Shard	6	16	22
Sanitary Food Can	1	2	3
Beer Can	1	4	5
Household Items			
Earthenware, Glassware	2	2	4
Coffee Mug	1	-	1
Shaker Jar Lid	1	-	1
Personal Items/Clothing			
Kerosene Lamp Part	-	1	1
Cosmetic Jar	2	-	2
Talcum Tin	1	-	1
Cologne Bottle	1	-	1
Shoe Parts	-	8	8
Hinge for Box or Chest	1	-	1
Bakelite Fragment	-	1	1
Other Items			
Faunal Bone	-	13	13
Seeds/Nuts	-	2	2
Barrel Hoop	1	-	1
Fuel Can	2	-	2
Bullet Casings	24	6	30
Automobile Part	2	-	2
Generator Wheel	-	1	1

and brought to the site in lieu of easy access to a food market.

Testing focused on Feature 1 and involved the excavation of three trenches, two of them perpendicular to the foundation (Trench 1 and Trench 3) and one parallel to its interior (south) face (Trench 2). Each trench was 50 cm wide and was excavated in 50 cm wide units ranging from 0.9 to 2.50 m in length (Figure 13). Several units in Trench 1 were of non-standard lengths due to their placements between the larger north wall and thinner south wall of Feature 1 or on the exterior side of the north wall. All units were excavated to 30 cm depth, with artifacts generally restricted to depths of 15-20 cm in each unit. Excavated matrix was screened through 1/8 in. (3 mm) mesh and all cultural materials were collected.

Excavations unearthed a relatively sparse deposit of cultural materials.

Figure 13. Trench Excavation at Feature 2.

All the excavated test units contained a more or less equal mix of small metal artifacts and glass container fragments, along with a small quantity of uncut faunal bone and a few miscellaneous (botanical and leather) specimens. In all, some 185 artifacts were recovered from test units totaling just over 1.5 cubic meters (m^3) in volume. Most of the artifacts are metal items representing fragments of food and beverage (beer) cans, nails, and spent ammunition casings. Both wire and cut nails were recovered, and most glass fragments are small, unweathered pieces with no dateable labels or embossed marks. Some glass shards are heavily patinated, implying greater age, but only one solarized glass artifact (a bottle base) was recovered from the 10-20 cm level of Unit 1B. Recovered faunal bone represents mostly non-food animals such as bird, snake, and dog (coyote?), remains that are likely incidental or non-cultural materials. Two macrobotanical specimens include a burned squash seed and a whole nut, the latter possibly a California buckeye. A minor prehistoric component at the site is implied by the presence of three small lithic flakes, one each of obsidian, red chert, and basalt.

A cursory functional analysis of combined surface and excavation assemblages reflects a balanced mix of domestic, structural, personal, and activity-based artifacts. Structural material, mostly nails and wire staples, indicate the presence of wood construction and possibly corrals or other fencing on and around the rock wall feature at the site.

Domestic artifacts are largely represented by food and bleach container fragments and two very small fragments of ceramic tableware (both improved and older earthenware). Personal artifacts are represented by beer and liquor containers as well as several specimens of clothing and footwear remnants. The only external activity in evidence is hunting or shooting, as represented by a single 40-65 Winchester shell casing and six .25 caliber pistol shells. The 40-65 shell for Winchester repeating rifles was manufactured between 1887 and 1935 (Barnes and Amber 1972), but a large quantity of this type of ammunition was produced and some is still available for contemporary use in collector's guns.

The .25 caliber pistol shells are largely Remington brand and cannot be dated to any specific manufacturing period, but small "vest" pistols of this brand and size were so popular during the 1920s that their use is generally attributed to that time period. Unlike the rifle, however, such small pistols were not used for hunting and likely represent the use of firearms for personal protection.

More importantly, no temporal or functional differences are apparent between artifacts recovered from units either inside or outside the confines of Feature 1. Unfortunately, only three recovered artifacts have sufficiently narrow production date ranges to be useful in dating the overall assemblage. The oldest of these is a B&H (Bradley & Hubbard Manufacturing Co.) "Radiant" model lamp "stamp" or emblem from the 10-20 cm level of Unit 2B, having a period of manufacture between 1868 and 1913, but the mean age implied by all recovered diagnostic artifacts is ca. 1910 – the year William Blake constructed the house at Fort Sage. Any features or deposits containing refuse from an earlier (pre-1900s) occupation of the site were not discovered during the testing phase or simply may not exist.

CONCLUSIONS AND FUTURE DIRECTIONS

The material assemblage yet recovered from the site of Fort Sage is indicative of a single family occupation essentially spanning the first half of the twentieth century. This period is consistent with the chronology of the Lake family homestead, established by William Lake and later inhabited by Elsmore Lake, and reflects fairly typical activities associated with light ranching and agriculture. Although we firmly believe that the massive rock foundation at Feature 1 is indeed the remains of Fort Sage, we have no hard evidence yet for any nineteenth-century use of the site. Although we expect that any cultural deposit associated with the 1860s-1870s use of Fort Sage to be ephemeral, such remains likely persist undiscovered at the site. It is also possible, however, that the early component at Fort Sage has been destroyed by later occupations at the site. We hope that further excavations at Fort Sage (planned for Spring 2018) will generate more information about the Lake family's tenure and uncover the early remains of settlers' defensive occupations at this interesting site.

ACKNOWLEDGEMENT

Special thanks to Alison Lake, current landowner and great-granddaughter of William Lake, for providing access to the site, photographs, and information. We could not have done this work without her support.

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Unusual Cans from Central Nevada

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The Cortez Mining District is on the border of present-day Lander and Eureka counties in central Nevada. Prominent in the district is Mt. Tenabo, a peak whose rich silver deposits lie below a visible dolomite ledge called the "Nevada Giant." The district was established in the summer of 1863 when a prospecting party originating in Virginia City came north from Austin and discovered silver deposits. Soon, a small mining camp with a mill was created in Mill Canyon north of Mt. Tenabo. Shoshone Wells was another camp located near a spring southwest of Mt. Tenabo. It is at Shoshone Wells that the mine owner Simeon Wenban built his modest Victorian house with a view of the Nevada Giant from his front porch. After operating in the canyon for 23 years, Wenban constructed a new mill on the other side of Mt. Tenabo and the adjacent town of Cortez was laid out and became the largest and longest-lived camp in the district. Although a large portion of the population shifted to Cortez, small communities continued to thrive at Shoshone Wells and in Mill Canyon.

Cortez soon became the main commercial center for the mining district, boasting a company store that supplied goods and a company boarding house that provided lodging. The town also had a post office, school, hotel, saloons, numerous residences, and the main shops associated with the mill. Wenban died in 1901, but his estate continued operation until 1919 when the family sold their holdings to another company. The mill that Wenban built burned down in 1915, and was replaced with a new one farther to the east in 1923. After silver prices crashed in the late 1920s, only small lessee operations occurred. The population declined to a few residents by the 1930s, with the last family leaving Cortez just before World War II. Exploration activities continued, and large scale mining for gold began in the 1960s and continues to this day.

Historically, the Cortez Mining District boomed from the 1870s to the late 1890s. During this period a large population of Chinese, estimated to be several hundred (Hardesty 2010:140), were hired to work in the mill and as hard rock miners (positions usually banned in other districts). This group, along with other nationalities, constituted a diverse population. The demand for familiar and exotic products was met through the company store and a couple of individual merchants. Canned foods expanded considerably during this time and proved invaluable in remote mining communities because they were easily transported, did not need refrigeration, were rodent-proof, and the food required minimal preparation (Ritchie and Bedford 1985:109). Canned products available for sale at Cortez were often purchased through a wholesaler in California, but originated from a variety of other states, countries in South America and Europe, and China. These cans held an assortment of food items, including meat, vegetables and fruit, tea and coffee, condensed and evaporated milk, lard, spices, syrups, and oils.

Once the products were consumed, the cans were discarded at hillside camps, along trails and wagon roads, and in large dumps outside businesses and homes. Many of these were investigated over 100 years later during data recovery efforts for the Cortez Hills Expansion Project. From October 2008 to July 2009, Summit Envirosolutions, Inc. mitigated 140 archaeological sites within the mining district (Johnson and McQueen 2016). This effort resulted in the collection of over 26,800 artifacts, including 3,500 can specimens. The majority of cans were typical mass-produced varieties, but a few unusual types were noted that lacked comparable examples in research references. These include cans with more than one vent hole and cans with atypical seams (Johnson 2014).

"DOUBLE VENT" HOLE CANS

More than one vent hole was noticed on some cans, occurring on both hole-in-cap cans and "normal" vent hole cans of varying sizes and shapes (Figure 1). Each has two drops of solder, one at the center vent hole and one at a slightly offset vent hole. One can had four vent holes in the cap, while two cans had one vent hole in the end cap and one possible vent hole in the side/body. At first glance, the extra drop of solder appears to be a sloppy manufacturing mistake that occurred while soldering the central hole. On closer inspection we noticed that the extra solder was in fact sealing a second vent hole purposefully punched into the can. Almost all of the cans were half way or completely opened indicating they contained some kind of solid or semi-solid food.

Vent holes were used in the canning process to help force out excess air and moisture, thus eliminating bacteria in the process. After the cans were filled with their contents they were capped and placed in a bath of boiling water for several minutes. Once the heated air exhausted through the vent hole, the cans were removed and the vent hole was sealed or "tipped" with a drop of solder (Rock 1989:62). Then the cans were placed back in hot water for a length of time depending on the contents. Once processed, the cans were plunged into cool water. If the cans were sealed correctly, they bulged at the ends during processing but these were drawn back in after cooling (Pack 1919:14-15).

A second vent hole was made in the processing of "double bathed" canned foods, which occurred with the canning of beef, salmon, and various fruits and vegetables (Russell 1909:88; Scientific American 1885:38; Trade 1908:50). After the first cooking process, the vent hole was either unsoldered or a second hole was punctured in the can (usually within half an inch from the first) to allow the hot air and steam to escape. Creating a second vent hole was faster and easier. Sometimes the solid food inside the can prohibited another hole from being made. In this case, a third or even a fourth hole was made until the can was fully vented (Bigelow 1916:1005). The additional hole(s) was then sealed with solder and the cans were returned for a second cooking. The practice of using two vent holes appears to be most prevalent between the mid-1880s and the late 1900s, and may be more common on beef and salmon cans during the latter period.

More than one vent hole on cans occurred for other, although less prevalent, reasons. A second vent hole on cans was sometimes necessary when cans were not properly sealed during the first processing and could only be patched with an open vent hole (Bigelow 1916:1006). One account describes the result of a misunderstanding during shrimp canning where the workers "dry" packed the meat without brine, which was added through two vent holes later (Bigelow 1916:1006).

Vent holes also occurred on sanitary cans. One packer preferred vented sanitary cans for crabmeat so that he could continue his former practice of giving the cans a retort exhaust with an open vent. Therefore, the presence of vent holes is not necessarily indicative of a certain type of canned food or a particular factory, and seems to be a necessary feature during specific canning techniques or mishaps.

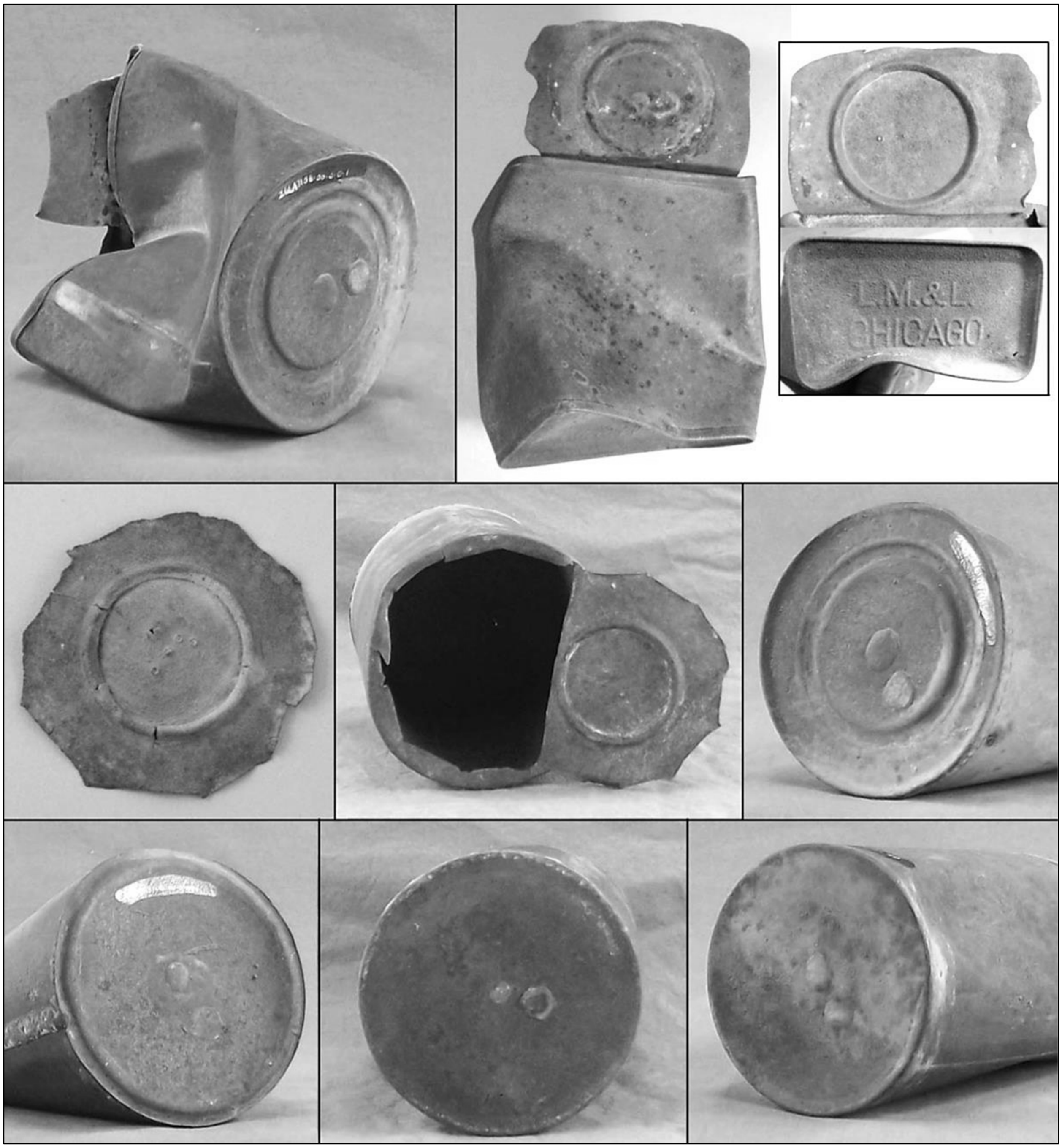

Figure 1. Example of cans with more than one vent hole.

Concern about more than one vent hole on cans and whether it indicated reprocessing or an inferior product were raised in the mid-1880s, but were quickly discounted by those in the business. Illnesses associated with the consumption of spoiled canned food were not rare. One unscrupulous method prior to the Pure Food and Drug Act of 1906 involved the reprocessing of "swells," a term used for cans when the food had turned causing the ends of the can to bulge or swell (Baker 1910:80). Many people thought the presence of two vent holes meant the second hole was used to release the gas from the fermenting food, allowing the can to shrink back to its original shape. In fact, during the 1880s New York City's health inspector advised people to not purchase cans with more than one vent hole; however, others advocated that two vent holes were a "badge of proper preparation and entire freedom from danger of poison" (Scientific American 1887:9654). This apprehension by consumers, nonetheless, may have caused some canners to "hide" the second vent hole on the side of the can under a paper label.

Figure 2. Example of hole-in-cap cans with internally flanged ends.

"INTERNAL FLANGE OR WRAPPED" END CANS

A few hole-in-cap cans were collected that have both ends wrapped by the body (Figure 2). The ends are internally flanged under the body and the side seam is a simple lap joint with machine solder. The cans average 3 6/16 in. in diameter and 4 8/16 in. tall with 2 in. diameter caps. Another set of cans has one stamped end (external flange) and one internally flanged or wrapped by the body of the can (Figure 3). This occurs on vent hole and hole-in-cap cans, including some of the "double vent" hole cans described above.

The wrapped end is at the filler end of the can. Some cans have a pronounced indentation or crimping around the upper portion on the end of the can possibly to serve as a ledge for the end piece and to help seal the can. Most of the cans were cut with a knife in a semi-circle or completely around to extract a solid or semi-solid product.

Very little information about cans with ends wrapped by or inserted into the body of the can could be found. Horn (2005:4) states that hole-in-cap cans with the sides fitted around the ends have been found "on occasion," but does not elaborate. A similar can was recorded at a site near Lake Tahoe as having the "sides lapped over the can ends" (Long 1995:50). Cans with two different end seams were noted by Scott et al. (1989:216-221), where one end of the can consisted of a machine soldered stamped end and the other end described as "insert[ed] in body and hand soldered." Rock (1993) notes when discussing stamped ends that the filler end of some cans was sometimes "fitted inside the can at least through the 1870's." Attempts were made to improve cans, including prototypes for "open top" cans (Fontana and Greenleaf 1962:72). Some can patents allude to sealing a can with an internal flange, such as one for a fruit can in 1872 that claimed an open mouth can "gives greater facility for filling and cleaning than cans made with breast and small cover, as the cans mostly in use" (U.S. Patent Office 1872). The inserted end of the can wedged tightly into the can and it was proclaimed to alleviate the loose issue seen in common stamped ends. Whether the cans recovered from the Cortez Mining District used this type of patented closure could not be completely determined. The can ends do appear hand soldered, which would occur after they were filled. The

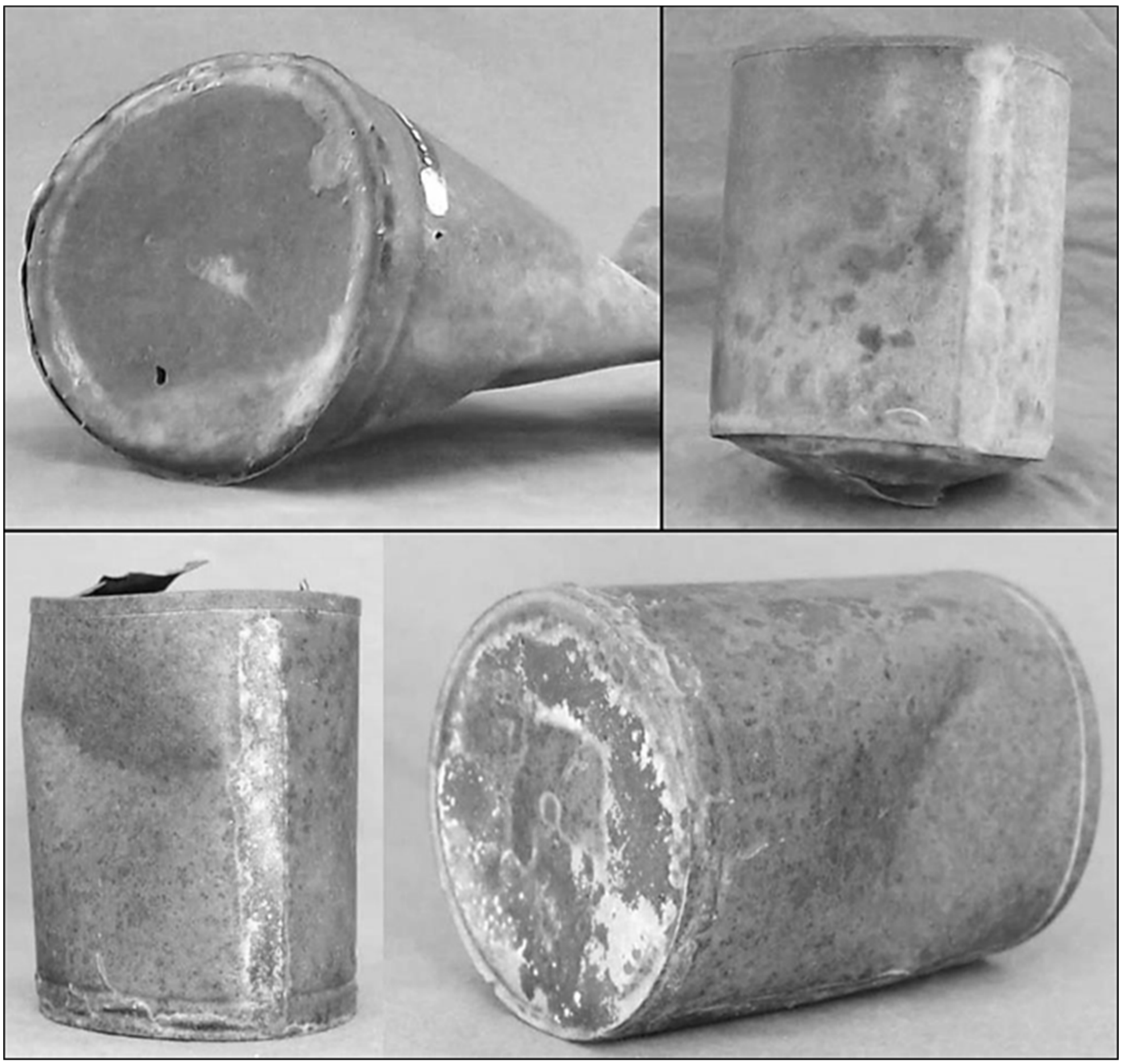

Figure 3. Example of cans with one internally flanged end and one stamped end.

cans may represent a precursor to the sanitary can, where a wider opening was desired, especially with the packing of large fruit.

CHINESE CANS

Numerous cans from Cortez are possibly Chinese. The majority of these are rectangular cans, although small cylindrical cans with slip cover lids may also originate in China. Chinese-made canisters or boxes have been identified at archaeological sites throughout the western United States. Brass opium cans are the most readily recognized, but other Chinese cans have been recorded throughout the West (Johnson 2016). These are characterized by sheets of metal bent and soldered together. The seams are often asymmetrically placed on the can. Some cans are bent at the top to form a flat narrow ledge on which a large sheet of metal is soldered for the lid. Another distinguishable characteristic seen on some Chinese cans is a circular filler hole with a square sealing patch soldered over it. Almost all have a thick application of solder on the seams.

The Chinese have a history of making metal containers. Tea was packed in the wooden tea chests often lined with thin metal. Early accounts describe the making of this lining or "sheet-lead canister" by folding and soldering thin metal around a block of wood (Asiatic Journal 1840:30; Tiffany 1849:117); the process continued into the 1920s (Chinese Economic Bulletin 1928). Perhaps this method evolved into making tin cans. In 1887 the Cheung Kwong Yuen factory was established in Guangdong Province and by 1917 became an important exporter of canned foods geared toward Chinese emigrants (Tsai 1993:30). China did not have large-scale canning factories until the 1910s when the consumption of such goods began to increase in that country (Arnold 1919:366; Wood 1917:21). During this period, cans were still made mostly by hand, with only a few factories using outdated machinery from Britain and Germany (Department of Commerce and Labor 1912:141). The Chinese canned a variety of food, including bamboo shoots, bitter squash, green peas, lily seeds, lotus, water chestnuts, mushrooms, pineapples, pears, lychees, carambolas (star fruit), longan fruit (dragon eye), ginger, Chinese onions, rice birds, partridges, stewed duck, stewed eel, roast goose, pork chops and stewed pork breast, frog cutlets, dried oysters and oyster oil, fresh shellfish, and stewed fish.

The use of cans for Chinese products is not well documented. Most imported Chinese food during the nineteenth century was preserved and packed in stoneware jars. Perhaps cans were used for dried items and liquids. Some common types of cans found at overseas Chinese sites are a small squat rectangular can thought to contain tea, bean paste, or even tobacco (Ritchie and Bedford 1985:101; Rogers 1997:57; Wegars 1995:102), and a larger rectangular can thought to contain cooking oil (Asian American Comparative Collection 2013; Lindström 1993:35; Markley 1992:34; Stapp 1990:196; Wegars 1995:103). Our studies at Cortez did not identify any of the small squat cans, but some have been found at Chinese construction camps along the Eureka and Palisade Railroad to the east (Zeier 1985:144). A larger squat rectangular can was collected from Cortez that may be Chinese (Figure 4).

The can is made with two sheets of metal measuring 14 8/16 in. long. Each sheet is bent to form two sides of the can, and overlap each other at opposite corners by 8/16 in. The top is unknown, but was probably a large sheet soldered on a flat narrow ledge formed by the bent top edges of the sides. The single can of this type from Cortez has the presumed ledge folded inward for reuse. The bottom of the can is flanged over the body, with the corners trimmed to accommodate the bend. Overall, the dimensions of the can are 6 in. wide, 8 in. long, and 2 4/16 in. tall. No references outside of Cortez have been found for this type of can, although other large squat cans have been identified in Oregon and

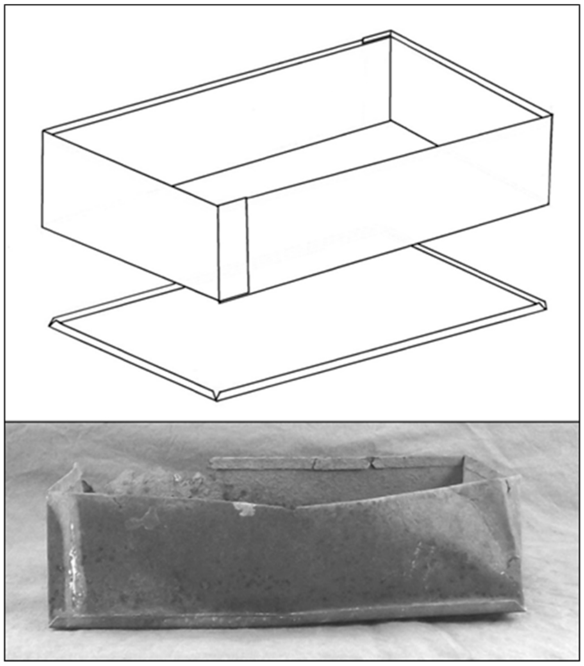

Figure 4. Example of large squat Chinese can. Illustration at top shows how the can is constructed.

may have contained tea and/or medicinal herbs (Friends of Kam Wah Chung Museum 2016; Wegars 1995:102-103). We did collect several

Chinese cooking oil cans (Figure 5). The most complete can measures 6 3/16 in. wide, 9 in. long, and 9 9/16 in. tall. Three sheets make the body of the cans: one varies from 6 8/16 to 6 12/16 in. long, one is 11 2/16 to 11 12/16 in. long, and one is 13 8/16 to 13 13/16 in. long. The sheets are bent and overlap each other 3/16 to 6/16 in" in a counter-clockwise direction, with the seams offset from the corners of the can by 2 in. Some of the cans had lapped side seams and some had internally folded seams. The top edges of the sides are bent to form a flat narrow ledge on which one or two sheets of metal are soldered to make the top. A circular filler hole is located on top and sealed with a square patch of metal. The bottom is flanged over the can body, sometimes with the corners cut and folded over in a clockwise direction and soldered. D-rings are attached to the sides. None of the cans in our collection have visible marks; however, examples from sites in Oregon have been stamped with Chinese marks on the lid that translate to "East/Grow/Mild/Oil," "Dongshenghe Oil," and "Made by Xinlong" (Malheur National Forest 2014:11; Rock 1992:14; Wegars 1995:103-104). One similar can from Lovelock, Nevada was painted on the side in Chinese translating to "Soybean Sticks" (Callaway 1979:275). It is unknown if that can was reused or if that was the original contents.

We also collected several tall rectangular cans with a similar filler hole and square patch seal (Figure 6). The cans measure 4 10/16 to 4 12/16 in. wide, 5 10/16 to 5 12/16 in. long, and 9 to 9 14/16 in. tall. The body is made from two sheets: a short one measuring 7 to 8 in" long folded over a sheet measuring 13 4/16 to 14 8/16 in. long. The side seams overlap 4/16 to 8/16 in. and are offset from the corners 4/16 to 8/16 in. The top and bottom sheets are flanged over the ends of the can, often with the corners trimmed to accommodate the bend. A circular hole soldered with a metal patch is located on top and may be slightly larger than those observed on the cooking oil cans. Similar cans have been found at a Chinese mining site in Oregon (Mead 1996:7-16). Another can with similar construction style but only one side seam was also identified at Cortez (Figure 7). It is presumed that this can type is of Chinese manufacture. The tall rectangular can has almost the same dimensions, but was slightly shorter at 8 14/16 to 9 in" tall. The body is made from one sheet of metal varying from 20 10/16 to 21 4/16 in. long that is folded into a rectangle. The side seam overlaps 2/16 to 6/16 in. and is offset from the corner by 1 6/16 to 1 8/16 in. The top and bottom ends are flanged over the body of the can. A large circular filler hole (3 10/16 to 4 in. diameter) on the top is soldered with a circular cap that is stamped with a five-pointed flower or star (sometimes inside two circles). No references to this can type have been found, and the contents of

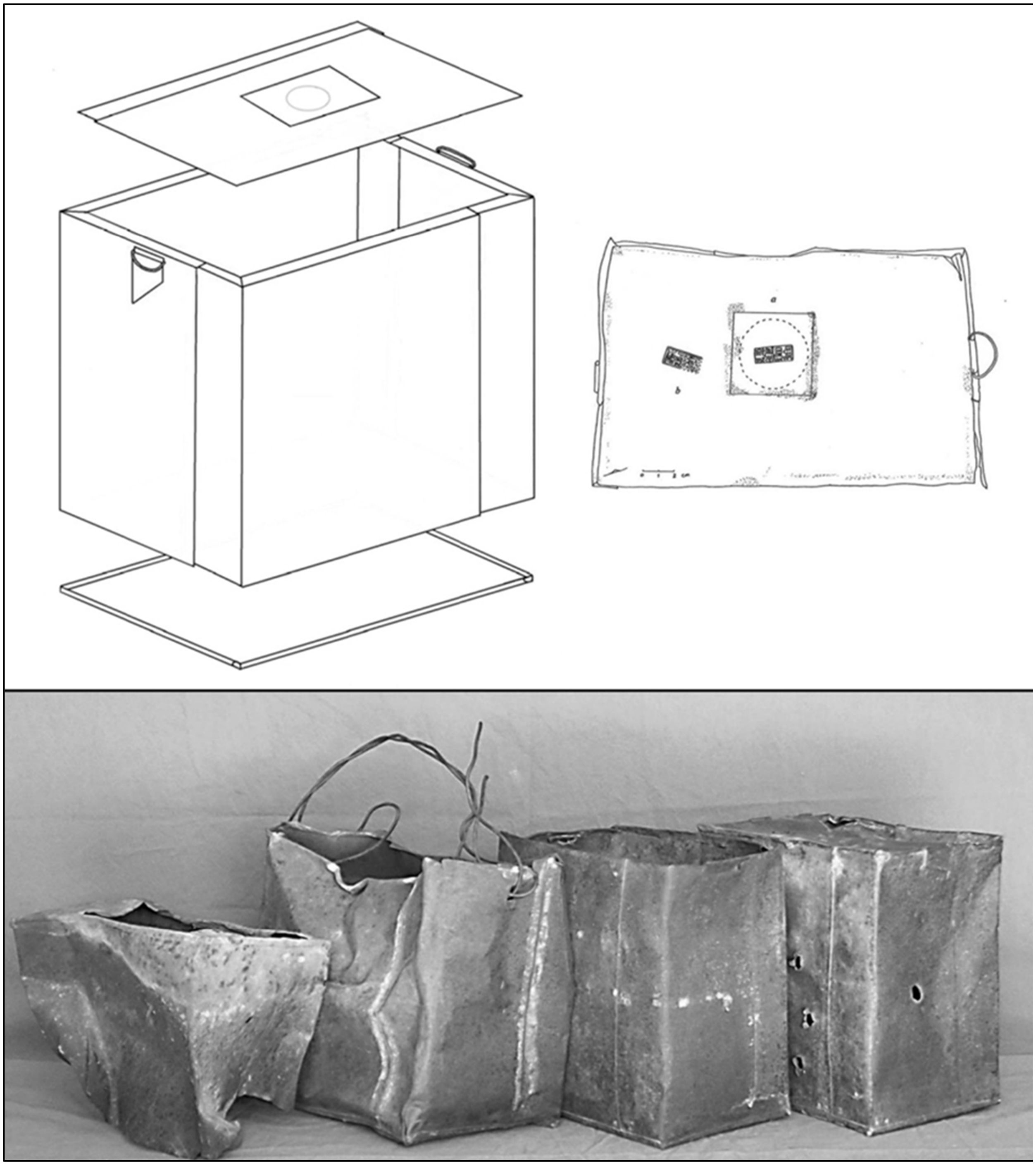

Figure 5. Example of Chinese cooking oil cans. Illustration at top left shows how the can is constructed, and illustration at top right shows an example of marks from Oregon (Wegars 1995:104).

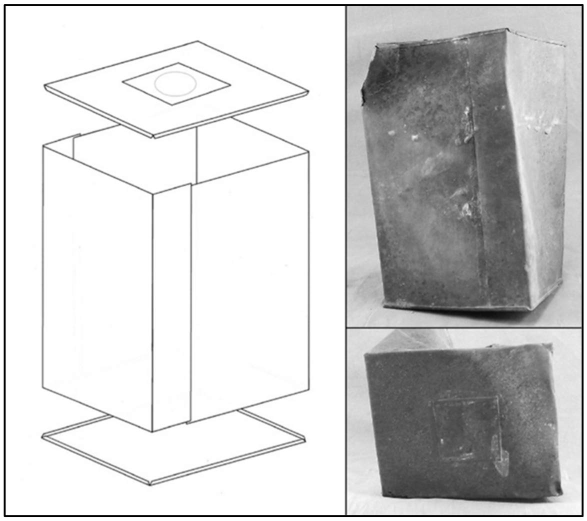

Figure 6. Example of rectangular Chinese cans with square sealing patch. Illustration at left shows how the can is constructed.

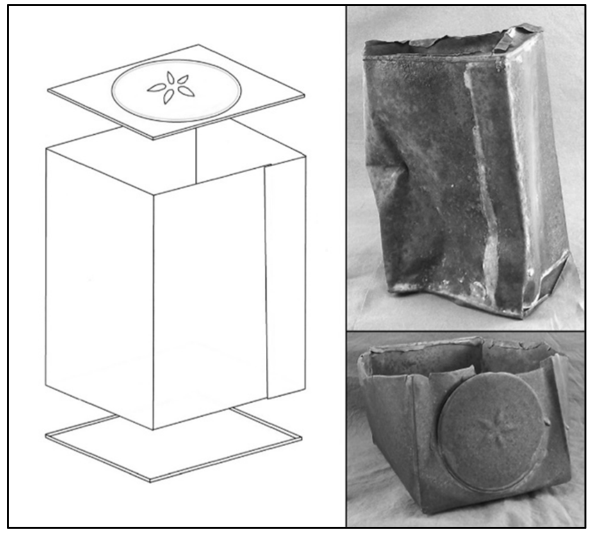

Figure 7. Example of rectangular Chinese cans with stamped cap. Illustration at left shows how the can is constructed.

both can types are unknown.

A fifth possible type of Chinese can identified at Cortez is a small cylindrical can with a slip cover lid (Figure 8). Appearing ordinary at first glance, the prevalence of these cans at Chinese sites warranted further study. The cans look like baking powder or spice cans, but have no embossing to indicate contents or brand. The cans are 2 4/16 in. diameter and 3 in. tall (about 25 ounces by volume). The base is an internal and inverted/inset flange that the body wraps around, and the side seam is a simple lap joint. Identical cans have been found in association with a Chinese site in Oregon (Mead 1996:7-2–7-3). It is possible the cans originally held a specific product imported from China, a domestic product desired by the Chinese. or their size and utility made them attractive for reuse. The contents of the can are unknown, but possible suggestions have included tea and mustard powder.

CONCLUSIONS

The large sample of artifacts collected from the Cortez Hills Expansion Project contained and overwhelming amount of redundant types of cans, yet a few with subtle differences in manufacturing techniques provided a broader understanding of the mining district's supply networks and a more intimate knowledge of its occupants' consumption patterns. Most of the unusual cans from Cortez were from sites dating from the mid-1870s to the late 1890s, a peak period of production and population in the mining district. Many of these cans are not described in research references and can easily be overlooked during investigations. A general awareness that these can types exist will hopefully lead to more accurate documentation.

Figure 8. Example of small slip cover lid cans associated with Chinese sites.

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They Have Graded One Mile Of Road To Reach The Mine: Evolving Transportation Systems In Nevada's Mining Districts

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MULE TRAINS AND PACK TRAILS

Pack trains were the modus operandi for nineteenth-century travelers with any amount of semi-portable (non-freighted) goods. In the mountainous west, pack trains were comprised of mules as opposed to donkeys or horses because of their large size, sure-footedness, and their hardiness. Pack mules generally came from Mexican stock; American mules were bred for agriculture and were not able to carry as much or travel as far, and needed more food and water than the Mexican mules (AMM 2014). A typical pack train was comprised of 40 to 50 mules, each carrying up to 350 pounds. A train of this size could travel 25 to 35 miles per day. The lead mule was called a "bell" because it wore a bell that the other mules could hear and follow even if they were out of sight (Hutchings 1856).

Mule packing is a technical skill and apprenticeship was necessary to learn the trade. A packer/teamster needed to learn caring for mules, equipment maintenance, knowledge of securing loads, and familiarity with the frontier environment. Some of the success of the Mexican mule packers stemmed from their use of the aparejo—a type of pack frame specifically designed for use with mules (Figure 1). In the eastern U.S., pack animals were equipped with the sawbuck or cross-tree pack, but these packs were better suited for short distances, lighter loads, and fair terrain. The Mexican aparejo was used in the West because it distributed weight more evenly, causing less strain on the animal (Essin 1970). The pad in the aparejo is stuffed with grass that is wetted so that it molds to the mule's back as it dries, contributing to the ability of the mule to carry the pack longer distances (Jefferson 1978).

The main difference between the sawbuck and the aparejo is that the aparejo has no breast strap or rump rigging, except for a crupper, allowing more freedom of movement (Essin 1970). Another version of the aparejo shows a breeching strap perhaps used in steep terrain where more stability was needed than a crupper could provide (Jefferson 1978).

Archival Evidence of Mule Trails

When Cortez was discovered in 1863 it was aptly described as remote; there were no other mining districts within 40 miles, and subsequently there were no established roads or trails. One of the earliest accounts of travel to Cortez is from Austin's Reese River Reveille (RRR). Writing just two months after the district's discovery, a reporter for the Reveille noted that to get to the district a traveler would "take horse, there being as yet no good wagon way" (Reese River Reveille [RRR] 08 July 1863) The reporter jumped from ranch to ranch and noted water locations along the way. A trail skirting the playa in Grass Valley just south of Cortez is described as "so soft in spots that an animal sinks half-knee deep in passing over it." The reporter finally reaches Mill Canyon, taking four days to get there.

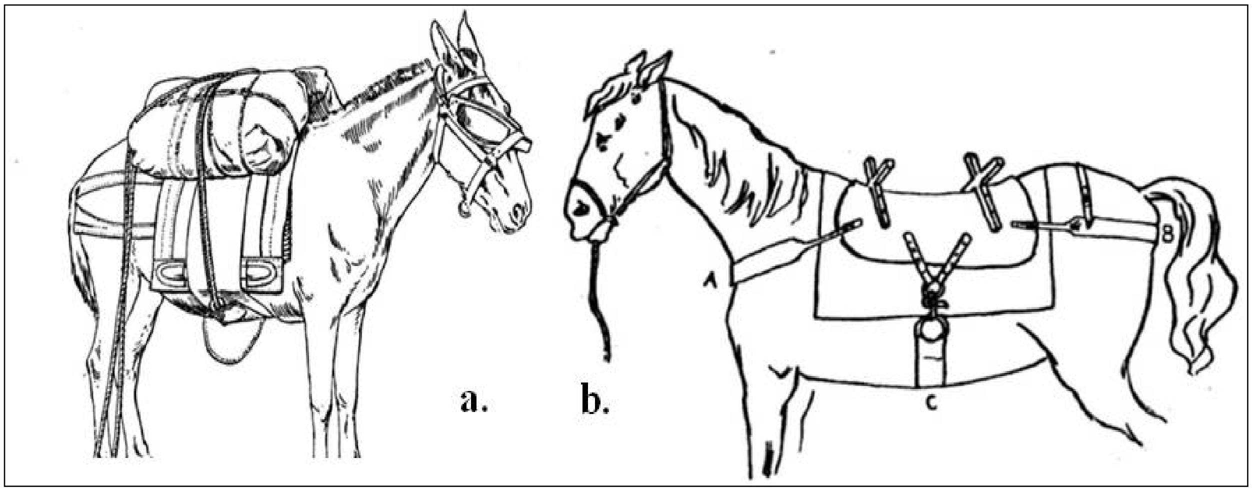

Figure 1. Aparejo (a) and sawbuck (b) type packs (from Daly 1910; Shields 1890).

An account one month later notes that the small team of men at Cortez (maybe 10 men total) "have graded one mile of road to reach the mines…" (RRR 08 July 1863). The road was cut in Mill Canyon, in preparation of receiving milling equipment that had been ordered from California. The valley outside of Mill Canyon was already presumably evolving from rugged trails to wagon roads, the result of the 'mining rush' and heavy use. From 1863 onwards the route between Austin and Cortez steadily improved (see Wagon Roads, below). By April 1864 access to Cortez was "reached easily by heavily freighted teams" (RRR 07 April 1864) Winter, however, remained the exception and would create problems into the automobile era.

Within the district itself, more and more trails were being created, connecting the mines, prospects, and camps to one another. The trails generally developed through repetition. Myron Angel describes a trail connecting two mine locations as "a very good trail…cut into the hillside leading to it, that enables it to be reached with ease, and facilitates the packing of ore on mules to the valley below" (RRR 05 May 1864). One route receiving special attention was a trail connecting mines on the south face of Mt. Tenabo with Mill Canyon on the north side of the mountain. That trail, which went up and over steep, rugged Mt. Tenabo, received abundant traffic, especially after the mill was completed in Mill Canyon (Emmons 1910:101; Whitehill 1875:47). Ore from the south-side mines was carried by mule over to the mill, with charcoal, wood, and water carried on the return trip. An 1864 account describes the trail as "...zigzagging up the mountain. Although the trail is well graded it is a severe climb to reach the St. Louis ledge" (RRR 03 May 1864; 05 May 1864).

The first mill at Cortez was not a complete success and had high inefficiencies. Fearing significant financial losses, the Cortez Company opted to ship its highest grade ores to Austin for treatment. Bancroft notes that Simeon Wenban, one of the district's principal mine owners, "engaged a mule-train owned by Mexicans" early in the formation of the Cortez District (Bancroft 1892:250). The Reese River Reveille mentions Mexican J. A. Alvarez in association with mule trains bringing ore from Cortez during the winter of 1867 (RRR 09 February 1867; 05 March 1867). Historic photos of pack mules in the Cortez District show the mules with packs resembling the Mexican aparejo. The packs have large metal hooks presumably for carrying sacks of charcoal, the breeching strap, and the absence of a breast strap.

Oral histories recall Mexicans dominating packing at Cortez, which census data supports. The 1870 census includes four Mexican mule packers, and the 1900 census has three Mexican wood choppers. The latter likely also had teamster skills and used mules to pack the wood products out of the mountains.

Other historical information reveals mule packing was not solely held by Mexicans. That same 1870 census has a J. S. Lewis from Missouri as a mule packer, and in the 1910 census F. Michado, from Portugal, as a mule packer. Store books, payroll ledgers, and other oral histories show that Italians were a dominant force in the freighting business, and mule teams were a significant component of the freight business well into the early twentieth century. This was especially true of their use in packing charcoal and cordwood out of the Cortez District's surrounding hills (Figure 2).

Archaeological Evidence of Mule Trails

Pack trains utilized pathways often labeled generically on maps as just "trail" or "mule trail"; however, these were to a lesser degree utilized by horses and oxen (although there is little archaeological evidence of oxen at Cortez), as well as pedestrian traffic.

Pack trails are, in the simplest terms, a well-worn, linear scar on the landscape. Part of their definition is that they are generally too narrow to accommodate two-way traffic or wagons. Trails tend to follow the natural landscape and contours in an effort to ease the traverse by pack animals. If a trail needs to go directly up or down a hill, it usually does it perpendicular to the slope; if the slope is extreme, switchbacks are used. Minimal to no engineering is the norm; instead, pack trails develop over time or they overlap with wildlife paths and existing Native American trails. Trails can revert back to use by wildlife and range cattle, making it difficult to discern between cultural and natural features. When engineering is present, it may include the removal of vegetation or boulders, cuts into slopes and leveling of terrain, low rock retaining walls, or simple earth berms. In mining areas like Cortez, these trails are often in rocky, steep areas and are precarious—an environment suited for mules. Pack-animal trails can be further identified through context with artifacts related to the pack trade, animal tack, and human food consumption. Some equipment associated with animal packing, including ropes, cloth, leather, and wooden pack frames, might not survive archaeologically. What may survive in the archaeological record are animal shoes, pack cinches, buckles, bells, and other metal hardware (Gamboa 1991:43, 55; Hutchins 1856:248). Common domestic waste includes food cans and liquor bottles. Barrel hoops are also common.

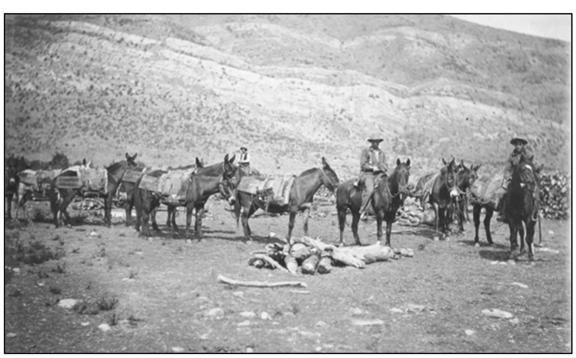

Figure 2. Mule team with unloaded wood, Cortez District, ca. 1890. Image courtesy of Estelle Shanks.

Five pack trails at Cortez provide typical examples; a sixth trail is a striking exception. One trail, near the camp of Shoshone Wells, bears west into the Toiyabe Range, terminating at a spring. Another trail bears east from the town of Cortez, toward areas of heavy woodcutting and charcoal production. A third trail on the face of Mt. Tenabo leads out of a large work camp, while two other trail segments served a small camp of charcoal burners. While serving a variety of work tasks, the trails are extremely homogeneous. They range from 0.4 to 1 m wide (1 to 3 ft) with 10 cm deep ruts. On hillsides and slopes the trails have the appearance of a narrow, leveled bench or terrace created through use. Occasionally there are small berms on the downhill side and cuts into

Figure 3. Elevated stone ramp in Arctic Canyon. The roadbed is on top of this feature that, from a distance, looks like a rock wall.

the slope of some steeper sections. Several of the recorded trails occasionally split only to rejoin farther along. The trails coming out of Shoshone Wells and Cortez received heavier and longer use, and are better defined on the landscape than the more obscure trails in the hinterlands. Even though they are better defined, they still lack any engineering. Artifacts along the trails include mule shoes, horseshoes, metal hooks from the packs, alcohol bottles, and food cans—but mule shoes are the most common. Diagnostic artifacts date to the late nineteenth century and correspond to the apex of activity in the district.

The trail through Arctic Canyon is the grand exception. This five-mile trail was developed early on (ca. 1864) to connect burgeoning mines on the south face of Mount Tenabo with the district's mill in Mill Canyon, on the north face of the mountain. Ore, miners, supplies, charcoal, water, and wood were all being carried on this trail. The problem was Arctic Canyon. Midway up the canyon it narrows to 8 m in width, and then abruptly encounters a sheer quartzite face. To overcome this obstacle, the miners cut four tight, steep switchbacks into the canyon wall. The switchbacks are supported with short retaining walls made from the quartzite. Once that ascent was made they then had to cross a massive boulder flow. This obstacle was cleared with the construction of an elevated rock causeway. The causeway was expertly constructed; it is about 2 m wide with a flat, but rocky surface, squared edges, and straight sides. The causeway is about 40 m long and 1 m high (130 by 3 ft) and curves with the hillside. To continue the ascent at a reasonable grade, the miners had to construct a second causeway (similar to a freeway's onramp), and then a stone ramp up a steep hillside (Figure 3). This was again expertly made, with a flat surface/bed, and squared sides.

The ramp is extremely steep and had to have caused some anxiety for the teamsters. Artifacts found along this trail included mule shoes, bottle glass and food cans, and cordwood. The wood probably fell off the animals backs and was not retrieved. A stone building found along the trail may have served as a way station.

WAGONS, STAGES, AND THEIR ROADS

While mule teams were versatile they also had their limitations, foremost being their carrying capacity. There was some freight that the back of a mule was simply impractical. To that end wagons also played a critical role. On Nevada's wide open valleys wagons were more efficient. Wagon freighting in the West increased with mining booms during the 1860s (Clawson 1985), and was the only practical means of transporting large commodities of goods in remote, rugged locations lacking a railhead (Due 1999:222). Mules were still employed with some freighting needs, as they could cover more ground and endure hardships better than horses or oxen. Horses, however, were a much stronger animal and fewer horses could carry comparable loads. Horse teams were near exclusively employed for the shipment of large, industrial equipment like milling machinery, steam engines, and the massive timbers needed to house them. Stage companies employed either horses or mules depending on travel conditions and necessity for speed. Oral history recalls mixed horse-mule teams hauling freight to Cortez. The wagon types, hardware, harnessing, and necessary skills for freight teaming discussed below uses mules as the main example, but the equipment is consistent with horses.

A six-mule wagon could carry 3,000 lbs of cargo—a much larger load than the same number of pack mules could carry (Essin 1970:53). Wagons were easier to load and unload, could accommodate unwieldy objects, and did not need to be unpacked during overnight stays (Bethel 1998:259; Essin 1970:53). Just like mule trains, operating a wagon required organization and skill. The driver, known as the muleskinner or teamster, rode on the left hand mule called the 'nigh wheeler' closest to the wagons and held a rope called a 'jerk line' that ran the length of the team. From there he could operate the brake. If there was no water along the route, teams would carry their own water tanks or barrels behind the wagons. Hay and grain was stored at camp ahead of time or available at way stations (US Borax 2014). A loaded freight team traveled around 10 to 15 mi per day (Breckenridge 2014; Obermayr 2007:21).

The animals employed in pulling a freight wagon needed to be well-trained. Each mule had a job and needed to know its name and respond to commands. The leader animals were chosen for intelligence and, like the mule train, the 'leader mules' carried bells to alert the other animals where they were going and to let oncoming traffic know they were coming. The 'swing team' and the 'wheelers' were the strongest of the team and did not need much special training (Breckenridge 2014). Because turning a long train of animals lashed to a wagon is tricky, freight roads ideally had as few curves as possible, were graded, were at a low grade (14 percent or less), and had frequent pullouts or were wide enough for another wagon to pass (Bethel 1998:259; Obermayr 2007:10).

Most of the wagons that plied Grass Valley between Austin and Cortez were of two basic types: the farm wagon and the freight wagon. Buckboards likely existed within the Cortez District and handled smaller jobs, but they were not designed to carry heavy loads or for long hauls. Historic photographs show other specialized wagons, such as one designed to haul long timbers and logs (Figure 4). These are all 'open' wagons, in that goods are not protected from the elements while being shipped.

Freight and farm wagons are both built for sustained, heavy work. The farm wagon is the most versatile form, and the most classic looking, with a short-sided box and four wheels. Farm wagons could be flatbeds, have low sides, or have high sides, and it was common for them to be designed to switch between the forms (stake irons held or extended the sides). The seat was a simple, flat wood bench and seatback, usually with iron handles on the side. It may or may not have sat on leaf springs to make the ride less jarring. The undercarriage was a mix of standard hardwood and iron components. A small footrest would hang out the front for the driver, and he operated the brake via a long iron brake handle (Spivey 1979). In some cases, the design was closer to a freight wagon, which had no seat as the driver rode on the wheeler horse.

Freight wagons are sturdier than farm wagons. The undercarriage is built especially strong to endure heavy loads and the jarring trip. Axles were almost always steel. The most distinct difference with the farm wagon (besides overall scale) was the sides of the freight wagon, which were considerably taller than on a farm wagon. Clawson describes freight wagons in northeast Nevada being 20 ft long, 6 ft wide, with sides 7 to 8 ft tall. The wagon weighed 5,200 lbs and

Figure 4. Wagon with four-mule team hauling timbers in the Cortez District, ca. 1905. Image courtesy of Angela Johns.

could carry 10 to 12 tons of cargo (Clawson 1985:127). Heavy chains connecting the horses to the wagon carried the brunt of the stresses. A second and sometimes a third wagon would be hitched to the main wagon; these wagons were only slightly smaller than the lead vehicle.

From 1860 to 1900 stagecoaches, or "the stage," was the dominant form of passenger travel and mail delivery anywhere west of the Mississippi River (Due 1999:229). Even with the advent of the Transcontinental Railroad and numerous feeder lines, to get to most places a traveler eventually (and perhaps begrudgingly) had to transfer to a stage. Stagecoaches were designed to withstand the trials of 'quick' overland travel. Stages traveled about 5 miles per hour, and like freight wagons, stages required stops every 10 to 15 miles to give passengers and animals a break (Bethel 1998:264; Schwantes 1999:5). Stages came in three sizes built to hold six, nine, or twelve passengers (but could crowd as many as 20), plus their personal belongings, luggage, and usually mail (Matile 1998:126). The most common and iconic stagecoach design was the Concord, but the Mud Wagon-style of stage was considered basic for use in remote mountainous areas and is likely the option used to get to most of Nevada's mining camps (Schwantes 1999:13). The Mud Wagon was less flattering than the Concord but it was cheaper, lighter, boxier, and had a lower center of gravity necessary for mountain roads (Bethel 1998:265; Helmich 2008:6). The wagons were durable and there were some attempts at passenger comfort, but historical literature is filled with ghastly tales of the jarring overland travel by stage, the most famous probably being Mark Twain's account in *Roughing It* (1873).

Archival Evidence of Wagon and Stage Roads

Unlike trails, references to freight and stage traffic is much more prevalent. Mapmakers marked roads much more consistently while newspapers regaled readers with tales of appalling travel conditions. The Reese River Reveille noted terrible road conditions in the winter (including outright road closures), abundant mud in the spring, and hot, dusty, rides in the summer (Clawson 1985:133-134; Murbarger 1959:11). A springtime article noted the road between Austin and Cortez "is in a worse condition than at any previous season, and it will require labor and time to make it at all good" (RRR 28 May 1868). Another good example is this description:

> The repairs on the mill of Mount Tenabo Co. are delayed for materials from this city [Austin], which cannot be hauled at present on account of the wretched condition of the road through Grass Valley (RRR 11 March 1867).

From 1863 to 1869, two wagon roads out of the district went south to Austin. At the time Austin served as central Nevada's entrepôt, with mills, assaying facilities, and abundant sundries. The prospectors that discovered the Cortez district had set out from Austin. General Land Office (GLO) maps from 1869 show the two roads to Austin connecting with the district's main camps and the several roads and trails radiating out of Mill Canyon. Roads were being improved within the district. As mentioned, the road from Crescent Valley was improved up to the settlement in Mill Canyon. Less than a year later a second freight road was needed to connect the mines and the camp. The road was difficult to construct, as this description tells:

> A great amount of labor has been expended in making roads and trails… One of these roads is more than ordinary work. It leads from Mill Creek, up a hill as precipitous as it is possible for dirt to lie, to the mining camp. It is called Wilson's Grade, in honor of its chief engineer, a San Francisco gent and member of the company. It was constructed chiefly by Indians (RRR 05 May 1864).

After 1869 the Transcontinental Railroad redirected the movement of people, goods, and supplies from Austin north to Beowawe, a rail station 30 miles north of Cortez. Beginning in 1869 there was a fundamental, geo-cultural shift in Cortez' lines of supply and communication. Ledger books from the 1880s and 1890s show almost complete communication with the outside world now traveling through Beowawe. The railroad profoundly eased the logistics of freighting and movement of people; Cortez was no longer "remote" (Due 1999:239). Trains were able to haul greater quantities and varieties of goods, and in certain seasons, fresher produce. Wagon freighting remained essential, however, for hauling goods from the station to the district, and the trip still took two to four days to complete (McElrath 1989:13).

The importance of the railroad is evident in the Tenabo Mill and Mining Company's store ledger books. In 1900 the store manager often wrote to send supplies "by express to Beowawe" (TMMC 1900:15, 26, 134). The store manager wrote of the difficulties of traversing the wagon road during the harsh winter months:

> Minoletti is going to rig up a light outfit to haul up a load of groceries. He cannot pull his heavy wagons up on account of so much snow. We won't be able to get anything here after this trip so please send all you can (TMMC 1900:174).

The freight wagons were a welcome site to the remote camp, and supplies of every imaginable kind arrived in the district by freight wagon. Mabell (Paddock) McElrath was a young girl at Cortez from ca. 1897 to 1910. She later wrote down her memories of the place, including the impressions left by the freight teams:

> No story would be complete without credit to the 18 or 20 horse-mule teams, depending on the number of huge freight wagons being hauled uphill. These were loaded with chemical supplies for the Mill and groceries and staples for the Community, or mill…the teamster helped control the team by his own powerful voice. Sometimes one could hear him coming for almost a mile. These teams and wagons would wear out the roads until wagons sank to the hub-caps. Then a new road would have to be made alongside of the old road… (McElrath 1989:13).

The last year 'teamster' is given as a profession in the Cortez census is 1910. Teamsters were American, Portuguese, and Italian, the latter being fairly dominant in the trade. The decline of freighting, by wagon at least, coincides with the transition to automobiles and trucks, as well as a general decline in the district's population and productivity. The next real surge in activity was not until the 1920s, and by that time trucks were used to haul ore and large supplies. Animals were not completely out of the picture, however, as a newspaper clipping from 1923 shows a photograph of a large horse-mule team hauling equipment for the construction of the Consolidated Cortez Mill (Shanks).

Archaeological Evidence of Wagon Roads

Most wagon roads, if they retained usefulness, were later used by motorized vehicles. Archaeological evidence helps determine if a road was also used by wagons (Obermayr 2007:36). Such evidence would include fragments of chain, leather fragments, bells, buckles, harness fragments, and other temporally diagnostic or wagon-specific artifacts that pre-date the automobile. This criteria, and historic maps, identified seven main wagon roads at Cortez. Most of these roads were also later used by automobiles, the evidence of which will be covered below.

Roughly 25 miles out from Austin, travelers

Figure 5. Freighter Dan Johns taking a break somewhere near Cortez, ca. 1910. Image courtesy of Angela Johns.

encountered a large playa in Grass Valley and had to decide between passing along its west or east margins. Both options were tried, and an early newspaper article notes that either option was feasible, as water and grass were available on both sides (RRR 27 June 1863; 27 April 1864). The western valley route eventually fell into disfavor; the eastern valley route had more leeway between it and the mountains, it could avoid wet areas more easily, and it had several ranches along its route, allowing for safer and more convenient stops.

This Austin-Cortez valley road was Cortez' primary artery from 1863 to ca.1870. The road appears on the 1869 GLO map of the area, was still in use when mapped in 1909, and for the first half of the 20th century was automobile highway State Route 21 (discussed below). This road was used for stage and mail carrying, and most of the freight. Evidence that it was one of the main routes between Cortez and Austin in the 1860s includes black bottle glass and cans with lapped side seams, which generally date to the mid-nineteenth century. Wagon-related hardware and tack include a wagon's leaf spring, leather fragments (tack), horseshoes, and mule shoes. Small dumps of food cans and bottle glass also line the route and may represent areas where people rested (Figure 5). Mabell McElrath (1989:13) recalls the teamster would simply "lay his bedroll on the ground to sleep" during the two to three-day journey.

Examining the physical trace of the wagon road matches written descriptions about travel conditions. In several places the road includes the 'main' travel lane (likely the last-used travel lane), which has light vegetation and is flanked by low earth berms indicating blading (an improvement during the automobile era), which has two and sometimes four deeply rutted and heavily eroded abandoned parallel travel lanes. One such road segment is up to 1 m (3 ft) deep and is so eroded that in some places it looks more like a ditch. The fact this road has so many abandoned alignments attests to its repeated, heavy use.

Another well-worn wagon road connected the two camps of Shoshone Wells and Cortez, situated about 1.25 miles apart from one another. Shoshone Wells was established ca. 1864, shortly after creation of the district. The camp was next to a perennial water source and near the south opening to Cortez Canyon, the only viable pass through the mountains to Crescent Valley and Mill Canyon. The town of Cortez sprang up in 1886 at the foot of Mt. Tenabo, in conjunction with construction of the Tenabo Mill (which replaced and siphoned people from Mill Canyon). Cortez quickly became the largest camp in the district, and remained so until the entire area was abandoned in the early 1940s. This roughly east-west running road received the heaviest freight traffic in the entire district: several photographs exist showing freight wagons stopped along this road (Figures 6 and 7).

The Cortez-Shoshone Wells road currently consists of five parallel alignments spaced 10 to 40 m apart. Each alignment represents a bypass to an older segment that had become so rutted or eroded that it was no longer usable.

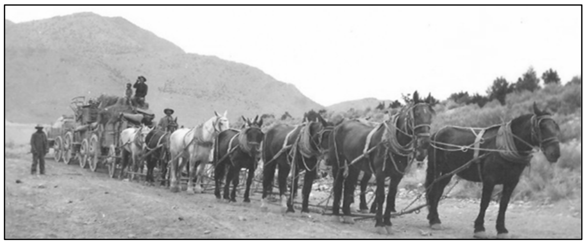

Figure 6. A freight wagon pauses on the main road to Cortez, ca. 1900. Image courtesy of Estelle Shanks.

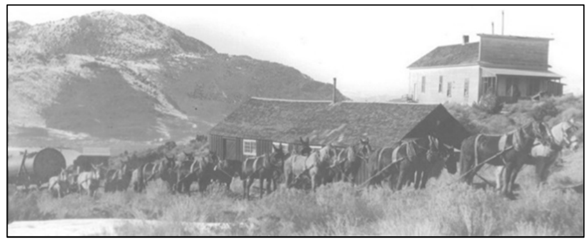

Figure 7. An 18 or 20 horse-mule team hauling a large boiler through Cortez, ca. 1900. Image courtesy of Bill Englebright.

The numerous parallel alignments attest to the continued, prolonged, and heavy traffic along this travel corridor. The road skirts a low foothill and did not require any engineering, though some of the road alignments had been bladed in an attempt to keep them open. The road lacks artifacts specific to transportation. Instead, the various alignments are lined with large piles of domestic trash that was carried out of town and dumped by the residents of Cortez. These dumps date from 1900 to ca. 1920. Several of the dumps include large, institutional-size food cans and 'Old Dutch' brand cleaning powder. The large cans indicate cooking for a crowd, so these dumps either came from the Cortez hotel, which served meals, or from another boardinghouse in the camp. The Cortez-Shoshone Wells road continued to be the main access route to Cortez until 2009, when new mining operations finally severed the road.

AUTOMOBILE ROADS

Marketable automobiles began appearing in the late nineteenth century, but they were expensive and impractical for a mass audience. Early automobiles were mostly ridden for amusement by the upper class. It wasn't until 1913, when Henry Ford perfected the assembly line, that an affordable car was available to the middle class in the form of the iconic Model T. The automobile had a profound effect on American society by increasing freedom of movement, creating the ability to live away from railway lines, and narrowing the gap between rural and urban life (Brancheau et al. 2014; Riddle and Dickey 2015). The early 20th century saw a proliferation of automobile companies offering bewildering options and models of cars and trucks.

For the mining districts, trucks replaced wagons faster than automobiles replaced horses. Early trucks did not have the carrying capacity of multi-hitched freight wagons, but that loss was offset by speed and other economies. With good roads, trucks could make a freight run in half the time, or better. Trips to Cortez that used to take two or three days by wagon were 'easily' completed in less than one day with a truck. The economy of a truck was multiple. Trucks required considerably less maintenance, especially when they were idle. Horses or mules required tending even after hours, including stockpiles of hay and other fodder, a large stockade, and a stable. A truck on the other hand could be parked anywhere, and forgotten about until the next time it was needed.

Archival Evidence of Automobile Roads

The arrival of the first automobile in Cortez is unknown. Like all places with a reasonable amount of access to the outside world, in the early twentieth century the Cortez Mining District transitioned from wagons to automobiles. Wagon freighters as an essential transportation method were reduced when automobiles, and more specifically trucks, became widely utilized in the 1920s in Nevada (Clawson 1985:122). A report by Tom Parker in ca. 1913 illustrates this dichotomy by writing "the mines are reached by a good wagon road from Beowawe" but later says "At present ore and supplies are hauled to and from the railroad by a five-ton auto truck" (Parker 1913). The mention of a 5-ton auto truck this early indicates a quick acceptance of the new

Figure 8. Early truck used to haul ore, photographed in Grass Valley near Cortez. Image courtesy of Estelle Shanks.

transport method. A series of photographs taken in the 1920s show a 1910s vintage truck being used to haul ore to Beowawe (Figure 8).

During the transition from wagon to automobile, mine engineers ran calculations determining the most cost effective method of hauling ore. An article from 1913 estimated that a mule team doing the same work as a truck would cost 40 to 50 percent more than the truck (Los Angeles Mining Review 1913). The means of transportation was not the only topic discussed among mining investors; road conditions were also important. Leonard Arnold provides an assessment: "the first thirty miles of wagon road are through valley and alkali flats, last five miles up an easy grade to the camp of Cortez. Auto trucks easily make the round trip in one day" (Arnold 1913:1). Locker describes the road from the property to the railroad as "easy going" (Locker 1912:1). No roads in the Cortez District were ever paved, though several were formally or informally maintained to various degrees.

The transition from wagon to auto/truck use can be found elsewhere, too. A 1912-1913 ledger entry in the store accounts is the first order for 20 cases of Red Crown gasoline from the Standard Oil Company in Sacramento. However, they also ordered wagon wheels, wagon tongues, buggy whips, and leaf springs (TMMC 1912-1913:12-13). The ledger shows the slow encroachment of the combustion engine into the daily routines and work of the miners at Cortez.

In the 1910s and 1920s most of the 'mining' in the Cortez District was by lessees engaged in reworking existing mill tailings from the Tenabo Mill (Emmons 1910:101; Naramore and Yale 1909:469). In 1915 the mill burned down and was not rebuilt. Until a new mill was constructed the lessees shipped their ore by truck to Beowawe, where the material was sent by rail to Utah for processing. The transportation costs dictated that only the highest grade material be shipped. Ironically, the lessees were mirroring Wenban's decision in the early 1860s, when he was forced to ship the high grade material to Austin on the backs of mules. Completion of the Consolidated Cortez mill in 1922 again allowed profitable treatment and shipping of lower grade ores (Kaeding 1923:2).

The mining boom in the 1920s encouraged the next significant change in the Cortez region's transportation network. The newly created Nevada Highway Department designated State Route 21 in Grass and Crescent Valleys. This road was a north-south connector, beginning at Dunphy on Nevada State Route 1 (later U.S. 40), going south to the Beowawe railway station, onto Cortez, and finally reaching Austin (on Nevada State Route 2, later U.S. 50). Consistent with Nevada's highway program at the time, State Route 21 was created from existing and already well-traveled wagon roads. The route's incorporation into the state highway system meant, in theory, higher standards of safety for faster automobiles and scheduled maintenance. This included state-funded repairs and maintenance, snow removal, shoulder improvements, and the erection of standardized directional signage (State of Nevada 1929:48). The route, however, was a "State Highway not on Federal Aid System," meaning funding for the road was essentially non-existent. In 1935 State Route 21 was described by mine operator Cecil Hanselman as "a good desert road which was graded last fall and only needs to be graveled to be put into first-class shape" (Hanselman 1935). He was probably describing the segment from Cortez north to Beowawe or Dunphy.

On 1937 highway maps for Eureka and Lander counties, State Route 21 is an "unimproved" road in Grass Valley (where it received less traffic), defined as a roadway made from the natural ground that is only maintained to barest minimum. The Crescent Valley portion included segments that were "metal surfaced" (gravel) from Cortez Canyon to the Dean Ranch (used in earlier years by wagons as a rest stop) and the town of Tenabo on the west side of Crescent Valley. The road returns to "unimproved" north of Tenabo the rest of the way to Beowawe (State of Nevada 1937). The "metal surfaced" road is the leg attempting to cross from one side of the valley to the other, passing through lowlands that are near playa-like. This part of the road turns to a slurry every spring and after every rainfall. Hanselman's report about 'good roads' mentioned above differs from Estelle Shanks, a local who said (ca. 1937) "the old roads we had out there then, from Cortez to Beowawe was terrible! It was dusty and it was rutty and it was a terrible road from there" (McCracken 1993:1202). Hanselman was trying to convince people to invest in the mines and may have conveniently forgotten some details, whereas Ms. Shanks probably has more accurate recollections of day to day conditions.

The timing of the construction of State Route 21 was too late to be of much use to the residents of Cortez or its mining operations. The decline at Cortez after the 1930s reduced the importance of State Route 21 and the state highway designation disappears sometime in the 1940s, retiring the road to county status. Today the road receives a fair amount of traffic (due largely to active open operations, but also ranch-related use) and is maintained by the county as an improved dirt road.

Archaeological Evidence of Automobile Roads

Archaeological evidence indicating a road's historic use by automobile includes motor oil cans and automobile parts that date to the early and mid-twentieth century. This evidence, along with historic maps and occasionally photographs, is used to determine a road's use into the automobile era. Cortez has eight roads dating to the automobile period. Seven of these roads transitioned from wagon roads.

State Route 21 was designated with the intent of use by automobiles and trucks. Automobile-related artifacts include quart-size motor oil cans, an automobile wheel bearing cap, a decorative rear wheel well cover (ca. 1940s or 1950s vintage), a rubber tire, and steel belting from an automobile tire. In most respects SR 21 looks similar to a wagon road. In some places there are three parallel alignments of this road, as drivers had to bypass impassable segments.

We found no automobile-related artifacts along the short but heavily used Shoshone Wells-Cortez road. As mentioned earlier, the road has abundant trash along it, including trash dating into the automobile era. There are historic photographs of cars in Cortez that would have gotten to town via this road or the less used south road.

Similarly, the south road out of Cortez has no automobile-related artifacts, though it clearly dates into the automobile era. Several resource roads, leading to springs on the west side of Grass Valley, also lack artifacts dating to this period. The lack of materials along these roads is testament to their relatively light use, and the fact that automobiles have become increasingly reliable. Automobiles also allow people to travel further and faster, removing the opportunity to leave trash behind.

CONCLUSIONS

Like the dirt roads of Estelle's memory, Nevada's road network was fluid. Early state maps show a spider web of lines going every imaginable direction. At the local and regional level, it is easier to decipher its development and evolution from trail to automobile. At any mining region the transportation system dates to the district's founding. For Cortez, the evolution started with the development of pack trails in 1863, the construction of wagon roads beginning in 1864, and the arrival of the Transcontinental Railroad in 1869, which moved the supply route from Austin in the south to Beowawe in the north, and finally the incorporation of the district's main north-south route into the state highway system in 1928. Wagons and automobiles shared the roads in the Cortez Mining District beginning in 1912 into the 1920s. By 1930 automobiles and trucks became the dominant form of transportation and remain so today.

Continued research in the Cortez Mining District includes examining the several roads and trails that comprise the district's historic transportation system—pack trails in the uplands and wagon roads in the valleys and populated places. Archival material, especially historic maps and newspaper accounts, in conjunction with archaeological evidence, identified and defined these routes. By Nevada standards Cortez was a moderate-size mining district, and this is reflected in its travel corridors. Formal planning or design was largely ignored. Exceptions are the road connecting the main settlement with the outside world, the camp with its mines, and a mule trail making a precipitous passage through the mountains. However, these roads still only show only nominal engineering. Most routes at Cortez contain little evidence of grading beyond simple cut-and-fill along hillsides. Roads that became impassable from washouts or heavy wear were bypassed rather than repaired or improved to avoid the same calamity. Even state-sponsored SR 21 had little maintenance done to it; the Nevada Highway Department only required that the road remain "passable." These roads left an indelible mark on the landscape, one that was shaped by past perceptions of need and use, and continues to impose themselves and affect our own sense of place (Riddle and Dickey 2015:65).

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