JAMES SCHOENWETTER
JOHN W. HOHMANN

Landuse Reconstruction at the Founding Settlement of Las Vegas, Nevada

ABSTRACT

Integration of artifactual, architectural, historical, geoarchaeological, faunal, macrobotanical, and palynological evidence provides the grounds for a model of the landuse history of Las Vegas, Nevada, from the second quarter of the 19th century until 1905. The integrated model reinforces and elaborates upon landuse changes noted in the historic record, but adds details to support a processual, explanatory, analysis that is not well-evidenced by available documentation. From this perspective, the landuse history of Las Vegas appears always to have been more significantly influenced by socioeconomic factors than ecological conditions—a reality that continues to the present day.

Introduction

In this article, our goal is to identify and interpret the interrelationships of a number of landuse indicators recovered from the Old Mormon Fort site at Old Las Vegas Mormon Fort State Historic Park. Though structured by the landuse history documented for the site, our analysis uses an integrative approach (Luff and Rowley-Conwy 1994) in which no single information source fully supports our landuse reconstruction independently. Our results serve to illustrate the value of integrating types of information which are often ignored in historic archaeology. More importantly, we have sought to apply principles of processual analysis to explain the interrelationships of relevant historical, archaeological, biological, and geological information. We believe the outcome is sensitive to both the particulars of Las Vegas Creek's paleoecology and the broad outlines of a half-century of Western American socioeconomic history.

We realize that our reconstruction of landuse history is directly evidenced by a relatively small fraction of the site's artifactual and nonartifactual records and a narrow array of historically documented information. Thus, it is more appropriate to speak of it as a testable model than a finding. We are also very much aware of two factors that strongly influence the character of this paper. First, we recognize that this paper is an inappropriate place to present the details of historical, archaeological, geological, faunal, macrobotanical, and palynological data. So those details must remain unstated even though the information is only available in a source (Hohmann 1996) that is not widely circulated. Second, this is not an appropriate place to review the distinctive theory (Schoenwetter 1996:259–261) and method (Schoenwetter 1990) we have employed to interpret palynological records from the site. We are thus sensitive to the fact that scholars without access to our earlier work may hold that the lines of reasoning that underlie our model are vague, and they will find it difficult to assess either the model or the conclusions we have drawn from it. We have attempted, therefore, to design the paper less as an argument in support of our model of landuse history than as an illustration of the ways information has been integrated to achieve it. Following a brief review of the project's history, we shall present the view of landuse changes between 1830 and 1905 that is supported by documentary evidence. We then explore the contributions that other forms of information have made to our reconstruction, and follow this with our integrated model. The subsequent section presents our processual explanation of events, and we end the paper with a summary statement that places the sequence of landuse changes in cultural context.

Today, the landscape of Las Vegas is wholly inconsistent with the English translation of its Spanish name, "The (Wet) Meadows." Whether illuminated and carefully engineered to appeal to gamblers and tourists, or manicured to suit the sensibilities of its large resident population, or reduced to widely-spaced shrubs and herbs hardy enough to survive half a year of oppressive heat and aridity, Las Vegas looks as if it could never have supported the sorts of rich bosque and

Historical Archaeology, 1997, 31(4):41–58.

grassland its name implies. Since the landuse changes identified by our model were responsible for conversion of a lush desert oasis to the overgrazed desert habitat that existed at the Las Vegas townsite when development began in 1905, one imagines that the meadowland must have been subject to ecological changes produced through groundwater depletion, the ravages of terrible livestock mismanagement, or both. Viewed in processual perspective, however, from the vantage of information only integration of biological, archaeological, and historical research can provide, we find that a more complex explanation is appropriate.

Project History

In 1991, Nevada Division of State Parks (NSP) acquired a 3.1-acre parcel upon which the first historic settlement at Las Vegas, a fort constructed by Mormon missionaries, was located. Working in conjunction with a large number of local, statewide, and national organizations, NSP established a small park complex within this parcel for the protection and interpretation of the architectural remains of that, and subsequent, occupations. Following a number of more specialized studies (Elston and McLane 1993; Hatzenbuehler and Lowe 1993; Hohmann and Irish 1994; Hohmann et al. 1994; Hohmann et al. 1995), NSP contracted an expanded program of historic documentation research and a corresponding program of archaeological subsurface testing (Hohmann and Ryden 1994; Hohmann 1994, 1995, 1996). Ultimately, hundreds of historic documents ranging from Mormon journals and diaries to property inventories were studied in detail (Hohmann, Hatzenbuehler, et al. 1996). The archaeological test revealed a wide range of architecture foundations and other features (Hohmann 1996:161–197) and produced numerous prehistoric (Seymour 1996; Irwin 1996) and historic artifacts for study. Analysis of the latter (Hohmann, Davis, et al. 1996) allowed definition of specific space and time parameters for the architectural features and stratigraphic components of the site complex. It also provided temporal control for the faunal, macrobotanical, and palynological studies of changes in resource use and ecosystem conditions related to successive occupations of the locale (Lawrence 1996; Bohrer 1996; Schoenwetter 1996).

While this paper has evolved from the work contracted by NSP, it is distinct from it in both spirit and execution. The work and conclusions of Hohmann (1996) were meant to meet the informational and managerial needs necessary for development of the Old Las Vegas Mormon Fort Historic Park. Here, work is focused on scholarly appreciation of landuse change events and their cultural implications.

The Site's Documented Landuse History

Between 1830 and 1831, New Mexico traders George C. Young and William Wolfskill established the all-season trade route linking Santa Fe and Spanish California that would become known as the "Old Spanish Trail." It passed by the Old Mormon Fort locale where a spring-fed creek provided the only water for a stretch of over 53 mi. along the trail. Euroamerican frontierspeople knew of the Las Vegas valley as early as the 1840s. John C. Frémont's (1845) record of a stop at Las Vegas in his 1843–1844 journals notes his surprise that the Spanish place-name suggested a wetter environment than he observed.

About 1847 the "Mormon Road" connecting Salt Lake City to California and Santa Fe was joined to the trail near the site. Acquired by the United States in 1848 following the War with Mexico, southern Nevada became a corridor for immigrants and gold seekers on their way to California. In 1851, Amasa Lyman stopped to explore the area while leading the original group of 500 mormon settlers to San Bernadino. His journal noted the potential of "The Vegus" to support a mill and an agricultural settlement of "at least 50 inhabitants." In June 1855, a party of 32 Mormon missionaries began construction of an adobe fort on the north bank of Las Vegas Creek.

The missionaries were charged with (1) developing the site's agricultural potential, (2) working with and teaching the Native Americans about Christ, (3) serving as a way station linking Mormon settlements between southern Utah and southern California, and (4) protecting and keeping open the trails which allowed year-round travel and trade. An 1855 sketch map (Figure 1) shows the fort was planned to face the northern edge of a 2.5-mi. long, 0.5-mi. wide, expanse of grass south of the creek, watered by channels which branched to the south. Near the creek's southeastern branch was a small area of "Tooly" (tule) grass, identifying that part of the meadow as, at least seasonally, marshy ground.

The mission's highest priority was to establish agricultural fields, lay in a crop, and harvest it before winter. To this end, they immediately began excavation of an irrigation ditch that diverted water from Las Vegas Creek near what would become the southeast corner of the fort. Primary and secondary irrigation ditches watered garden plots of one-quarter acre per person east of the fort and five-acre farm plots (2.5 acres per person) on the valley floor. While agriculture was always the primary industry of the Las Vegas mission, the discovery of lead ore in the Potosi mountains in April 1856 led President Brigham Young to dispatch additional missionaries to mine and smelt this strategic resource. Social and political conflicts between those committed to the mission's original and its subsequent objectives led to the fort's total abandonment by December 1857.

In February of 1858, Amasa Lyman, responding to Brigham Young's call to return to Utah to defend the Church against a possible threat from the U.S. Army, led the last Mormon missionaries out of San Bernardino. Lyman stopped at the fort, rebuilt its small furnace, and began mining and smelting lead. These operations were not maintained, however, as the fort was aban-

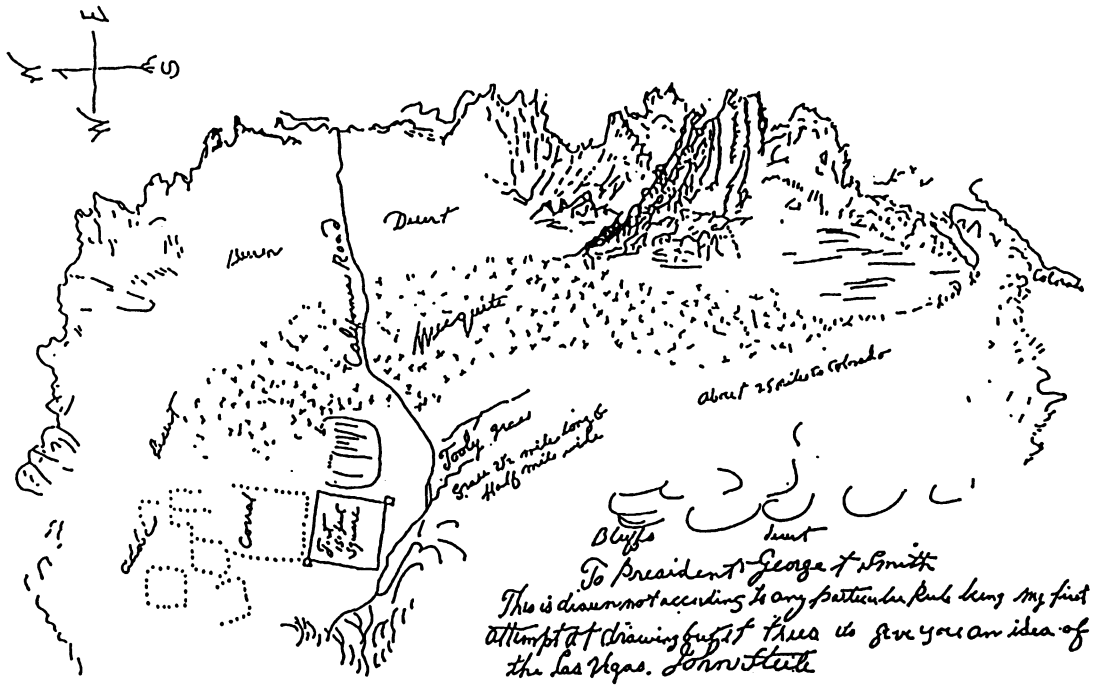


FIGURE 1. John Steele's 1855 sketch map of the planned layout of the Las Vegas Fort and Mormon Mission.

doned by the time T. S. Kenderdine passed along the Mormon Trail in the spring of that year. In June of 1858, Brother Benjamin Hulse and a small group of Mormon farmers managed to plant over 40 acres of corn and wheat in the old Mormon fields. Loss and theft of the vast majority of the harvest by "hostile mountain Indians" resulted in abandonment of their temporary encampment at the fort on 26 September 1858.

Throughout 1859, numerous travelers and wagon trains on the Spanish Trail used the shelter and water available at the ruins of the fort. In August of 1860, a California prospecting party found silver deposits worth mining at the old Potosi Lode. This group reopened the mine in early December, attracting other prospectors to the area. The population increase created demands for fresh vegetables, fruit, and grains that prompted a resumption of farming along Las Vegas Creek. Albert Knapp, an original Mormon settler, returned to the fort early in 1860 to begin ranching and farming. Surplus produce and meat was sold to the miners.

The Potosi silver boom began to subside substantially by late 1861. Correspondingly, most small farms established in the valley during the spring of 1861 failed by early 1862. One marked exception was Albert Knapp's Las Vegas Fort ranch and farm. The reduced market for the 1862 crop caused Albert to move to California, however, leaving his brother William in charge. William Knapp had opened a dry goods store across the creek from the fort by the time he inherited the ranch from his brother late in 1864. Shortly thereafter, Octavius Decatur Gass came to Las Vegas from California to reconnoiter the area's possibilities.

O. D. Gass bought William Knapp's ranch in 1865 and began extensive cattle operations while he continued farming and maintaining the general store. His store served passing wagon trains and stage lines and his ranch provided supplies of meat, grain, vegetables, and fruit to nearby mining communities and military posts. During his occupation of the site (1865–1881), Gass became the principal landowner in the Las Vegas valley, and he ultimately owned all of the springs contributing to Las Vegas Creek. In August 1879, Gass borrowed $5,000 in gold from a fellow rancher, Archibald Stewart, of Bristol, Nevada. The one-year promissory note was secured by a mortgage on the 640-acre Las Vegas Ranch and the adjacent 140-acre Spring Ranch. Gass failed to repay the loan within the year, and on 2 August 1880 Archibald Stewart acquired those properties, although Gass and his family did not leave the site until early June of 1881.

Stewart sold a third interest in the Las Vegas Ranch to H. G. (George) Haggerty in 1881. Within a month, Haggerty had moved to the ranch and begun upgrading its buildings. He reopened the store across the creek and that year harvested over 600 gallons of wine and "about a ton of raisins" from the grapevines planted by its Mormon settlers. For reasons which remain unclear, Haggerty sold his interest in the ranch back to Stewart in early 1882. By April 1882, Stewart, his wife Helen, and their three children had moved onto Las Vegas Ranch.

The ranch continued to grow as both a farm and cattle spread. In the summer of 1884, however, Archibald Stewart was killed in a gunfight at neighboring Kiel Ranch. Helen Stewart put the ranch up for sale but could find no buyers and remained to work the property she had inherited. From 1886 through 1902, Mrs. Stewart and her family maintained the ranch, a store, and a bar. Documents from the mid- to late1880s identify the Stewart Ranch as a stopover for local pioneers and regional travelers who wanted "a taste of the finer things in life." In 1893, the U.S. Postal Service reopened a branch at the ranch (spelled "Los Vegas"; it was 1903 before the name was changed to "Las Vegas"). By April 1901, Mrs. Stewart's holdings included a large cattle herd, 557 peach trees, 114 apple trees, over 1,560 grapevines, 40 acres of redtop hay, over 6.5 acres of wheat, and 2.5 acres of sweet potatoes. Las Vegas Ranch had become

one of the economic cornerstones of southern Nevada and, indeed, the entire state.

In the early summer of 1902, Helen J. Stewart sold 1,836 acres of her ranch to the San Pedro, Los Angeles, and Salt Lake (SP, LA, & SL) Railroad, under the supervision of Montana's Senator William A. Clark. A complete inventory of all springs and water rights, acreage, stock, crops, ranch buildings, ranch equipment, and nonpersonal ranch property was prepared as a condition of the $55,000 sale. According to the inventory, Helen Stewart's holdings included over 2,000 fenced acres of irrigated crops, of which 450 acres were held by deed.

Walter Bracken, the railroad's representative, lived and worked at the ranch while a substantial portion of the property south of the ranch was surveyed, subdivided, and subsequently sold at auction as townsite lots on 15 May 1905. That auction is today considered the "official" founding of the City of Las Vegas. Subsequent to its use as housing for railroad employees, in 1905, Harry R. Beale began conversion of the Stewart Ranch house and immediately surrounding property to a restaurant and resort for residents of the valley. For the next 50 years this would be its principal use.

Other Relevant Information

Other relevant information includes geology, architecture, artifacts, and faunal, macrobotanical, and palynological data. These are considered in greater detail below.

Geology and Stratigraphy

Las Vegas Creek valley is a large, broad basin surrounded by the Spring, Pintwater, Desert, Sheep, Las Vegas (Sunrise), River, and McCollough mountain ranges. The sediments of the basin floor are principally clay and silt deposits produced through vigorous Late Wisconsin spring discharge episodes (Quade and Pratt 1989; Quade et al. 1995). The artesian springs that support the permanent flow of Las Vegas Creek are located some 2.5 mi. west of the site (Figure 2). Along Las Vegas Creek, the escarpment of the terrace that supports the spring once lay roughly 150 m to the west of the escarpment of the terrace upon which the site is located. The primary irrigation ditch excavated by Mormon settlers carried water from Las Vegas Creek north along the escarpment of the site terrace to fields cleared from a mesquite bosque on the valley floor.

Sometime before human occupation began, Las Vegas Creek incised a channel into the clays and silts of the site terrace. The channel was infilled by a silt which also forms an overbank deposit extending roughly 10 m north of the south wall of the fort. The organically rich, thick, A horizon of the Paradise Silt Loam soil (Speck 1985), which formed on the surface of the overbank deposit, extended north from Las Vegas Creek to

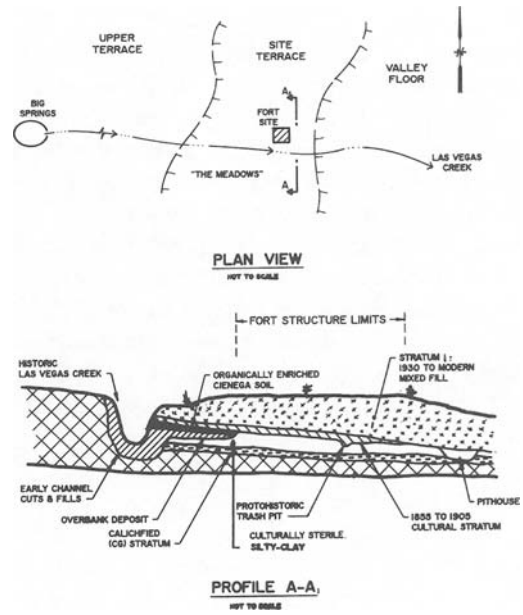


FIGURE 2. *Top*, schematic plan of the course of the upper reaches of Las Vegas Creek; *bottom*, generalized stratigraphic profile at Old Las Vegas Mormon Fort State Historic Park.

the vicinity of the south wall of the Old Mormon Fort. It demarcates the extent of direct influence of the stream on local vegetation at the time of Mormon occupation.

During the years of Mormon- and Ranching-period occupations, excavations were made through these soils, and cultural features and occupation debris—archaeological trash deposits—were placed upon their surfaces. Superimposed upon these natural and cultural deposits are two others, designated Stratum 1 and Site Stratum I. Stratum 1 is a dark, grayish-brown silt loam that appears to be the product of several grading or leveling episodes. It includes cultural materials dating between 1930 and 1950, and a mixture of the site's older natural and cultural deposits. Site Stratum I, which overlies all the others, is a modern cultural deposit of mechanically deposited exotic backfill.

Architectural Remains

Excavations revealed portions of most of the architectural elements of the Old Mormon Fort, as expected. They also identified a probable protohistoric Native American habitation structure and a group of Native American trash-filled pits that flotation studies (Bohrer 1996) identify as products of Mormon missionizing efforts. Exposure of other architectural features produced evidence of the blacksmith shop, reuse of the fort's northwest bastion during Gass's occupation, and the remodeling of Gass's L-shaped residence to the T-shaped structure that subsequently served as headquarters for the Stewart Ranch.

Material Culture

Excavations yielded a collection of 9,309 historic artifacts incorporating items of glass, metal—mostly nails and cartridges—pottery, and shell, glass, celluloid, and plastic buttons. Their analysis was primarily geared towards identifying potential chronological markers to assist calendric dating of associated architectural features, stratigraphic units, and biological samples. In combination, historic documents analysis and the artifact assemblage analysis defined eight principal historic periods represented at the site. These are (1) a Pre-Mormon period, (2) the Mormon period (1855–1857), (3) the 1858 to 1865 period, (4) the Gass Ranch period (1865–1881), (5) the Early Stewart Ranch period (1881–1884), (6) the Middle Stewart Ranch period (1884–1900), (7) the Late Stewart Ranch period (1900–1902), and (8) the Railroad period.

Faunal Remains

Lawrence's (1996) faunal analysis was directed towards other research questions, so we have reorganized her raw data to identify differences in faunal exploitation that might evidence landuse activities. Table 1 records the percentage of bone specimens of each taxon associated with datable features and/or artifact assemblages. Since the minimum number of individuals (MNI) recovered from any given feature or excavation unit was not established in Lawrence's study, the tabulated values only provide a rough index of the faunas of each horizon. Also, since the majority of specimens from most horizons were identified only as "mammal," much of the data potentially relevant to landuse assessment has been obscured.

We suspect that though other animals are undoubtedly represented, the "small mammal" remains category mainly reflects the presence of dogs, while larger mammal remains mostly represent cattle, both cow and calf. Significantly higher frequencies for these taxa are associated with evidence of the Gass Ranch occupation. The most unusual record, however, is presented by the fauna associated with archaeological evidence of the Stewart Ranch occupation. This is the only fauna that includes rabbit remains, and it incorporates about twice as many taxa as are represented in the faunas of the other horizons. Mrs. Stewart employed local Native Americans of both sexes at her ranch; the distinctive char-

TABLE 1

FAUNAL REMAINS FROM THE OLD MORMON FORT SITE

Fauna	Period			
	Stewart Ranch (1881–1902)	Gass Ranch (1865–1881)	Mormon	Pre-Mormon
Gopher	0.4	1.9	0.4	---
Rodentia	3.5	---	---	0.6
Small Mammal	1.4	3.8	1.3	0.6
Medium Mammal	4.6	---	---	1.9
Med–Large Mammal	4.6	21.2	1.6	3.9
Large Mammal	5.3	1.9	2.5	0.6
Mammal	33.3	61.5	84.9	79.8
Cattle	---	---	1.3	---
Pig	0.4	---	---	---
Lagomorph	0.4	---	---	---
Cottontail	3.5	---	---	---
Eggshell	20.0	---	0.4	---
Small Bird	7.3	---	1.3	1.3
Bird	1.4	3.8	5.0	8.4
Large Bird	---	1.9	---	---
Chicken	3.2	3.8	0.8	1.3
Turkey	0.4	---	---	---
Duck	0.4	---	0.4	---
Unknown	9.8	---	---	0.6
Total	285	52	238	154

acter of the faunal record of this occupation may be a function of their dietary practices.

Macrobotanical Remains

Nine of the 21 flotation samples that have been analyzed were associated with Native American features or cultural materials, while an additional nine samples were associated with Mormon-period features. Flotation samples associated with Native American archaeology typically contain seed concentrations reflecting significant reliance on two introduced, fig and tomato, and one native plant, ground cherry. Grape, raspberry, pickleweed, and charred saltbush seeds are also common. Fig and tomato seeds occur in fewer samples, and in lesser quantities, associated with Mormon-period artifacts; indeed, only ground cherry and charred saltbush seeds are commonly observed. The similarities suggest Native American adoption of Mormon food plants when they were camped in the vicinity, and the contrasts probably reflect food preparation and waste disposal habits more than differences in plant use.

Palynological Remains

The pollen records of the samples collected at the site have been organized by a method specifically designed to allow analysis of the ecosystem history of historic-period archaeological sites (Schoenwetter 1990). This method has the additional potential to suggest interpretations of landuse changes. Although theoretical differences also distinguish this method from those used in

traditional pollen analysis, the way palynological data is displayed is notably distinctive. Instead of the traditional pollen diagram, information is arrayed in either graphic or tabular forms that average the pollen statistics of groups, or populations, of samples of the same antiquity.

The types of palynological data used in the landuse analysis (Table 2; Figure 3) are: (1) average relative pollen frequency values (percentages) that have been calculated on pollen sums which exclude observations of two locally overrepresented taxa, chenoam (Chenopodiineae) and pellitory (*Parietaria*); (2) average values of the ratio of the overrepresented pollen types to the pollen sums; and (3) average pollen concentration per cubic centimeter of deposit.

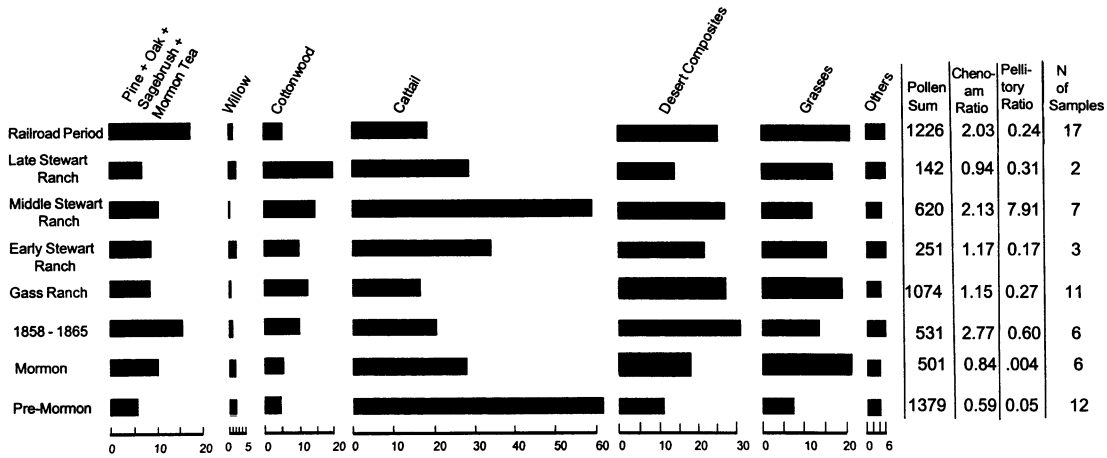
For reasons explored in detail previously (Schoenwetter 1996:264–271, 278–279), pollen frequency values for cattail (*Typha* sp.), willow (*Salix* sp.), and cottonwood (*Populus* sp.) are interpreted, respectively, as monitors of the amount of water available to support plant and animal life in the bed of Las Vegas Creek, on the creek bank, and on the creek's floodplain. The combined pollen frequency values for desert composites, Ambrosieae and Tubuliflorae, are taken as monitors of conditions favoring plants and animals adapted to the desert habitat. Changes in the relative ratio values for chenoam pollen are interpreted as indices of the intensity of local disturbance. Ratio values of pellitory pollen are taken as a monitor of water quality. Pollen of the trees and shrubs of the canyon and slope habitat—pine (*Pinus* sp.), oak (*Quercus* sp.), sagebrush (*Artemisia* sp.), and Mormon tea (*Ephedra* sp.)—was transported to the site from a relatively long distance, so the pollen concentration values for these taxa would be expected to be essentially stable throughout the half century considered here. Major fluctuations in their values are taken as monitors of factors affecting pollen production and, therefore, as indices of each taxon's vitality. Given the short periods of such fluctuations, interpretations of human impact are more probable than interpretations in terms of climatic or vegetation pattern change.

An Integrated Model of Landuse Changes

Landuse changes for each of the eight principal historic periods represented at the site are treated below.

Pre-Mormon Landuse

Construction of the south wall of the fort took place on the surface of the A horizon of the Paradise Silt Loam in the southern district of the



	Pollen Sum	Chenoam Ratio	Pellitory Ratio	N of Samples
Railroad Period	1226	2.03	0.24	17
Late Stewart Ranch	142	0.94	0.31	2
Middle Stewart Ranch	620	2.13	7.91	7
Early Stewart Ranch	251	1.17	0.17	3
Gass Ranch	1074	1.15	0.27	11
1858 - 1865	531	2.77	0.60	6
Mormon	501	0.84	.004	6
Pre-Mormon	1379	0.59	0.05	12

FIGURE 3. Average relative pollen frequencies (percentages of the pollen sum) and average ratios to the pollen sum (locally overrepresented taxa) for samples of different occupation horizons. Samples dated by direct association with datable material culture.

TABLE 2

AVERAGE POLLEN CONCENTRATION VALUES FOR POLLEN GROUPS OF THE OCCUPATION HORIZONS

Period	Pollen Concentration Values													
	Pine	Oak	Sagebrush	Mormon Tea	Willow	Cottonwood	Cattail	Grass	Low Spine	High Spine	Chenoam	Pellitory	N	Total
Railroad	178	59	416	---	89	238	950	861	891	238	8,580	1,009	465	27,612
Late Stewart Ranch	174	29	29	155	193	1,179	1,904	1,063	933	553	5,653	1,739	1,388	93,891
Mid-Stewart Ranch	116	77	193	77	39	714	1,486	618	772	540	10,326	38,314	2,772	160,514
Early Stewart Ranch	131	253	262	87	297	900	3,243	1,512	1,285	787	10,969	1,600	2,508	241,136
Gass Ranch	325	142	183	244	122	1,362	3,254	2,115	1,485	1,362	12,447	2,969	1,308	159,616
1858–1865	82	82	226	50	50	314	742	428	704	245	8,722	13	1,788	56,216
Mormon	329	362	436	41	304	659	3,529	2,526	1,547	592	9,518	543	2,565	253,211
Pre-Mormon	297	157	245	26	376	372	8,122	591	769	168	4,432	9	2,353	143,848

site. The pollen samples collected from this surface, however, segregate into two pollen groups. Since one pollen group is associated with Mormon-period architecture, the other is presumably older. Both the highly organic soil (Figure 2) and the local overrepresentation of cattail pollen (Figure 3) documents the presence of standing water—probably a marsh which became a seasonally open pool—when the earlier pollen group was deposited. The protohistoric Native American structure was located near but north of the floodplain margin. If it was occupied when the Pre-Mormon-period pollen records were deposited, the camp would have had immediate access to water, and would not have been too distant from both a very productive mesquite harvesting district and hunting grounds for birds and mammals that watered at the creek and occupied the meadow. This reconstruction is consistent with ethnographic accounts (e.g., Euler 1966; Schroth 1987) of preferred Southern Paiute summer encampment areas. It is also consistent with the name given the site by Spanish-speaking traders.

By the time Frémont camped at the site in 1841, the marsh no longer existed. By 1853, Las Vegas Creek was confined to two deep but narrow channels, flanked by willow and vines on the site's terrace, with extensive meadow to the south and on the lower terrace to the southeast, and mesquite bosque where the creek flowed across the valley floor. Travelers on the Old Spanish Trail certainly took advantage of its water and grazing potential but, like the Native American residents, occupied the site only through temporary encampments.

Mormon Landuse

The reduced average cattail pollen frequency for the group of pollen samples associated with archaeological evidence of Mormon occupation suggests the volume of water in the creek had declined since the Pre-Mormon, presumably protohistoric, occupation. We strongly suspect this was the result of water diversion into the Mormon irrigation ditch. A slight increase in the chenoam ratio suggests more local disturbance of the site, but the pollen record otherwise offers no evidence of the fort's construction or the agricultural activities that the historic record documents as the prominent features of Mormon landuse. The flotation and faunal records for this period, however, illustrate the significance of agricultural production to both the Native American and the Mormon populations that occupied the site. The increases in pine, oak, sagebrush, and Mormon tea pollen concentration values in this period (Table 2) are most likely an indirect effect of increased human activity at the margins of the valley.

1858 to 1865 Landuse

Local landuse changes documented by the historic record focus on the abandonment and debilitation of the fort; its reoccupation as a residence and corral by the Knapp brothers, redevelopment of the Mormon garden, vineyard, and fields; and the establishment of a store across Las Vegas Creek from Old Mormon Fort. The archaeological record attests Knapp's blacksmith shop, where mining equipment was probably repaired as often as traveler's horses were reshod. Property ownership documents show patenting of plots of land on both sides of Las Vegas Creek upstream of Knapp's lands. Beyond the site, historic accounts allow us to recognize that mining reached its maximal intensity during this period.

Although it is a very short interval of time, pollen records of this date can be recognized by their associations with Civil War-period artifacts. On average, a further reduction in the cattail pollen frequency suggests exploitation of the waters of Las Vegas Creek was intensified, and a significant rise in the desert composites pollen frequency value indicates enhancement of that habitat. An extraordinary decline in pollen production by the trees and shrubs of the slope and canyon habitats at the valley margins (Table 2)

may index the impact of human harvests for smelter fuel or the effects of smelter smoke on pollen production in that area.

The reconstruction that emerges from integration of the archaeological, palynological, and historic information is of a time when landuse patterns were responsive to the demands of a larger, more diverse, community than had existed earlier. Basically, the Mormon objective of economic self-sufficiency gave way to one motivated by the cash profit created by satisfying the needs of populations of miners and travelers. Knapp's establishment of a blacksmith shop and store were the most obvious signs of this change, but the documentary and palynological records provide clues that the Knapp brothers were not the only ones responding to this by-product of the silver boom. By patenting plots of land along the creek, a number of individuals seem to have established rights to divert some of its flow into small-scale irrigation systems that watered desert plots. Only the Knapps seem to have been able to make a go of it, though, and most of their competitors were "out of business" when O. D. Gass and his partners purchased the fort.

Gass Ranch Landuse

Historic records document Gass's success at farming; for example he doubled the amount of harvested irrigated acreage between 1871 and 1880. He also systematically purchased the lands and water rights along Las Vegas Creek as farm failures made them available. His 1878 purchase of the 120-acre Spring Ranch finally gave him virtually sole control of all the water of Las Vegas Creek. His principal source of wealth, however, was livestock production. He herded more than 400 head of cattle, and butchered a bull or a cow twice weekly to satisfy local demand. The faunal record independently suggests ranching took precedence over farming, since the frequency of bone attributable to domestic fauna increased substantially on this horizon. As Gass prospered, however, both mining and small-scale farming in the valley declined. Gass's store continued to satisfy local needs, but the primary markets for his beeves were the soldiery stationed at Camp Eldorado, workers at the Potosi mine, and mining communities northwest of the Las Vegas valley.

Average pollen concentration values increased for the flora of the canyon and slope habitat in the group of samples dated to the Gass Ranch occupation, concurrent with a reduction in sagebrush pollen concentration. Alternatively, average frequency values for the pollen types that monitor water quantity (cattail) and desert enhancement (desert composites) both decrease in this period, while both relative frequency and pollen concentration values for grass (Poaceae) pollen increase. Increased pollen production by the floras of the valley margins seems likely to have been a response to the cessation of intensive mining and prospecting activities in those areas. The landuse reconstruction, however, must accommodate evidence of a reduction in the quantity of water in Las Vegas Creek and the evidence for enhancement of one or more ecological niches favored by grasses, during the period in which upstream agricultural production was in decline. Gass's intensification of irrigated agriculture no doubt accounts for much of the quantitative loss, but cannot explain the other features of the palynological record. We believe, however, they are linked to the reduced sagebrush pollen concentration value and suggest a landuse scenario that is not documented in the historic record.

As we reconstruct the situation, Gass was the first of the district's residents with both the initial capital and the enterprise to take advantage of more than one of the valley's resources. Those who preceded him had hoped to profit from either its agricultural potential or its mineral wealth. Gass diversified his interests, identifying secure markets his activities could serve as a hostler, a merchant, a farmer, and a rancher. In the latter capacity, we believe he recognized the extraordinary potential of the open desert range. Like Hell, all it needed was a bit of water. We believe his systematic purchase of failed farms

along Las Vegas Creek was not principally intended to provide more water for the irrigated acreage of his farming operations. The creek watered cattle, but we think Gass's real objective was control of the small-scale irrigation systems that had been abandoned during the silver boom bust of 1862. These systems could be developed into stock tanks to water cattle feeding on the open range at strategic desert locations. The banks of the canals extended floodplain habitat conditions, appropriate for invasion by grasses, into the desert.

When he was able to purchase the Spring Ranch in 1878, Gass had total control of the only water available to livestock that grazed the central part of the Las Vegas basin. Springs at the margins of the valley, however, could also water herds. We think the effect of those herds on the sagebrush habitat is reflected in the pollen record, and that by the time Gass lost the ranch to Stewart there were a number of competing ranching operations in the area.

Early Stewart Ranch Landuse

Pollen records we can attribute to the early years of Stewart Ranch operations (ca. 1881–1883) suggest much the same landuse pattern as Gass had employed. An increase in the quantity of water reaching the Old Mormon Fort site, however, suggests less was diverted to upstream stock tanks and more was used to irrigate orchard and croplands and to support grazing in the meadow in the immediate area of the ranch headquarters. The pellitory pollen ratio evidence of an increase in water quality at this time suggests that livestock production was actually decreased. The historic record supports this landuse reconstruction. Paher (1971) notes that agricultural production, especially grapes for wine and raisins, was increased in 1881 and 1882, while livestock production was decreased.

Mid-Stewart Ranch Landuse

Local range disputes and increased cattle rustling created conditions for an alternative use of the land by the mid-1880s. Historic records document intensification of both livestock and crop production at the Stewart Ranch, but photographs suggest both operations were developed close to ranch headquarters. In 1883, Mrs. Stewart purchased an additional 1,100 acres, which included roughly half the meadowland south of her Old Mormon Fort property and about one-third of the irrigated area developed from the Mormon fields to the northeast. Added to the 780 acres situated along the length of Las Vegas Creek that had been transferred by Gass, she now owned all the land directly influenced by that water. This allowed her sole use of an additional 1,500 acres of irrigated cropland and approximately 600 additional acres of meadowland. Control of all the water of Las Vegas Creek meant that no one else could irrigate cropland acreage or water cattle grazing on meadow adjacent to her property.

Mrs. Stewart, like Gass and other ranchers before and since, used more land for livestock production than she owned. Gass extended the watering potential of Las Vegas Creek into open range by diversion ditches that carried it out to desert stock tanks. Gass's strategy could not remain effective, however, if aggressive competitors challenged his unique access to that water. Following her husband's violent demise, Mrs. Stewart devised a strategy that could effectively ward off competition and support her herd closer to her ranch headquarters—and so discourage rustling, though it used both grazing and water resources more intensively and required the purchase of more property. Her purchases allowed her to restrict access to the watering potential of Las Vegas Creek, and thus reduce competition for the grazing potential of the lands adjacent to those she owned.

The pollen record expression of this situation is manifested by: (1) evidence of an increase in the quantity of water reaching the environs of the site as upstream desert stock tanks were abandoned, (2) a doubling of the chenoam ratio as local disturbance increased, and (3) increased use of the meadow habitat reflected as a decrease in grass pollen and an increase in the desert com-

posites pollen frequency values. Now that her cattle were concentrated near the ranch headquarters, however, the quality of water arriving at the fort location was drastically affected. The pellitory pollen ratio monitor of that ecosystem condition increased logarithmically at this time.

Late Stewart Ranch and Railroad Landuse

Documentary evidence suggests Mrs. Stewart continued to execute the strategy implemented earlier, but stabilized the size of her cattle herd to conserve her meadowland resource and expanded production on the irrigated land under her control. She prospered financially and socially as a result. The palynological record of this period, however, yields insight into the ecological side-effects of these activities.

The effects of wise management of the meadowland close to ranch headquarters is observable as a positive change in the pollen concentrations of grass, willow and cottonwood pollen. Though the relative frequency value for desert composites pollen was reduced, the pollen concentration value for desert composite pollen types and Mormon tea increased, suggesting an increase in pollen production and vitality of plants of the desert habitat. Taken as a whole, the pollen record suggests enrichment of the meadowland pasture Mrs. Stewart owned but coincident expansion of the desert habitat that lay beyond the southern border of her land. The principal reason seems suggested by the dramatic decline in the cattail pollen relative frequency value, which we interpret as a reduction in the quantity of water available for support of the meadow habitat. This change, like the parallel change observed between the Pre-Mormon and Early Mormon horizons, can be accounted for as a product of the diversion of water that previously supported meadow to the support of cultivated plants via development of the irrigation system.

Both the reductions in oak and sagebrush pollen concentrations and major increases in the chenoam pollen concentration value can be interpreted as indices of overgrazing on lands beyond the boundaries of Las Vegas Ranch. This interpretation explicates the ecological conditions existing at the site of the modern settlement of Las Vegas when townsite development began in 1905. Though it lay within the area mapped as meadowland in 1855, diversion of the creek's water to support episodes of intensified agricultural production, plus a 20-year history of intensive use of the meadow resource close to the Stewart Ranch headquarters for beef production, drew off water that had sustained the southern margin of the meadow prior to Mormon settlement. By the turn of the century, the townsite district had become overgrazed desert land unsuitable for rural use.

Beginning in 1900, Mrs. Stewart reduced her cattle holdings to prepare for sale of her property. Once acquired by the SP, LA, & SL Railroad, some of the Stewart property was platted as the townsite which became modern Las Vegas. In 1905, when lots were put up for sale, Montana's Senator William A. Clark, the railroad's principal shareholder, assured a water supply for both the town and the railroad by piping water from Las Vegas Creek south from its upstream source to the townsite and north from a point near the Stewart Ranch headquarters building to the railroad station site. These landuse changes are represented in the pollen record by declines in the indices of water pollution and water quantity and an increase in the chenoam pollen ratio, which monitors land disturbance.

Processual Analysis of the Landuse History Model

Landuse in the period prior to Mormon settlement reflected the sorts of ways the valley's resources could be exploited by small, mobile, groups of Native Americans or Euroamerican travelers. The stated objectives of the Mormon mission brought a wholly new perspective, as well as a new landuse ethic. The land was now to be used to support both a permanent settlement and a proselytizing effort. Food production

was essential to both. The political significance of control over the transportation routes that converged near the site was not lost upon the Mormons, of course. After all, the building they constructed was a fort. Obviously, though, the economic significance of the valley's resources were now assessed in relation to quite different social and political parameters and seen through the screen of religious motivations.

Discovery of metallic ores in the mountains marginal to the Las Vegas valley changed its strategic and economic potential in at least two ways. First, it placed new priorities on the mission's functions, which led to social conflict and abandonment of Old Mormon Fort; second, it shifted the economic focus from self-sufficient agriculture to resource exploitation for fiscal profit. Prospectors and the miners who localized at strikes and successful mines sought the quick wealth they could extract from the earth; those who controlled food production along Las Vegas Creek sought the quick wealth they could extract from the prospectors and miners.

Most farmers failed late in 1862 as the silver boom collapsed and the demand for the small surpluses they could produce on raw desert land declined. Alfred Knapp, however, commanded property with unusual advantages. Though upstream farmers reduced the amount of water he could use, he controlled sufficient cleared and arable land to generate enough surplus to exploit economies of scale. When insufficient market for the crops he produced in 1863 provoked his departure, his brother William survived through management of the store constructed south of the creek. Less than a year after inheriting them, however, he sold all holdings to O. D. Gass.

Gass's economic behavior was also motivated by fiscal profit, but he introduced a new strategy. He deliberately organized the work and production of his farming, livestock, blacksmithing, and merchandizing operations to satisfy three specific, secure markets: mining communities, military outposts, and travelers along the wagon roads that passed through his holdings. This strategy was effective, but we believe Gass recognized the long-term profit to be made by developing his herd, and that his systematic accumulation of water rights along Las Vegas Creek as they became available was intended to fulfill that objective. By 1878, when he purchased the Spring Ranch, he controlled all of the only source of water in the central Las Vegas valley. The water he could divert to stock tanks allowed his cattle access to much of the desert vegetation beyond Las Vegas Creek's floodplain and meadowland.

Gass's strategy was unable to withstand competitive pressure, however. As other entrepreneurs enlarged their herds, his lowland stock tanks became natural focal points for rustling and conflict. We were originally surprised that Gass had defaulted on so small a loan secured by the entirety of his holdings. Given his age, and the character of the rough and ready socioeconomic context of ranching in his day, we now view his action as a strategic retreat. Archibald Stewart, apparently, believed the continued success of Gass's strategy required only ambition, threats, and belligerence. His death by gunshot on the porch of a neighboring ranch was never satisfactorily investigated. As Paher (1971:57) writes, "Not much sympathy was expressed for Stewart, and many believed he was an overbearing man who got his just desserts."

Mrs. Stewart, as inheritor of Las Vegas Ranch, was unable to sell it off and realized she required an economic strategy that minimized competitive relations with other ranchers, yet offered opportunity for expansion of her assets. By relinquishing the open desert range north and south of Las Vegas Creek, confining her cattle to her own property and adjacent meadowlands south of her ranch headquarters, she maintained her herd within defensible borders—albeit at the cost of more intensive landuse. She simultaneously developed and expanded her irrigable cropland and played the role of gracious hostess to travelers and locals using the Mormon Road and Old Spanish Trail.

Sale of Mrs. Stewart's holdings to the railroad ushered in an era of economic changes and

changes in landuse practice. As the foci of local economic activity became the townsite established a mile south of the Old Mormon Fort site—on now-overgrazed desert land—and the site of the railroad terminal, the bulk of the artesian springs water that fed Las Vegas Creek was diverted to those locations.

Summary

The landuse history of the founding settlement of Las Vegas mirrors the economic history of Western America. In both prehistoric and protohistoric times, landuse was regular though intermittent. The exceptional character of locally available resources was appreciated and exploited, but the priorities of visitor populations were focused on conditions and opportunities that existed elsewhere. Prior to the area's historic uses, Native Americans oriented their seasonal movements to the rhythm of the pinyon and oak harvests at higher elevations, when surpluses allowed larger gatherings and broader social intercourse. Early historic traders and travelers were oriented towards further destinations. As a result, the oasis at Las Vegas was culturally marginalized. It was simply a convenient and relatively comfortable place to halt a journey that began and ended elsewhere.

Landuse during the Mormon Mission period, short-lived as it was, exemplified the same motives and cultural ideals that brought contemporary pioneers to Oregon, southern California, and the Arizona Territory: their intention was creation of self-sufficient frontier communities with potential to "civilize" the wild landscape and its wild inhabitants. Those willing to labor to enact these ideals, however, could not effectively coexist with those who flooded the West with the landuse ethic consistent with prospecting and mining. The new ethic sought exploitation of those qualities of a landscape which promised rapid achievement of wealth and power. In many places, it was ore deposits; at Las Vegas, it was the travelers and miners who needed the meat and produce that development of Las Vegas Creek's waters could provide. As elsewhere in the American West, some individuals found ways to survive the bust that followed the boom.

For the 20 years that followed the Civil War, O. D. Gass prospered as a result of an economic strategy that centered on personal control of the only water supply adequate for large-scale meat and produce production and personal control of secure markets for those commodities. As competitors—who were prepared to back their demands through bravado, brute strength, and lawless action—came to claim shares of both, however, that strategy proved ineffective. Archibald Stewart's violent death was sufficient proof that a new set of socioeconomic conditions existed. It was those conditions Stewart's widow had to adapt to in order to succeed.

Her solution was to explore both a new ethic and a new strategy. Her objective was neither wealth nor power, but survival and elevation of social position. Carefully planned investment allowed her to concentrate the entirety of the supply of her principle resource, water, within the bounds of properties she owned outright or could protect from intrusion. She used less land more intensively than Gass, but was thus able to distance herself from competition with her neighbors and avoid even opportunity for conflict. She was probably fully aware that her strategy also exploited contemporary cultural expectations for a widow responsible for her children's upbringing.

By the end of the 19th century, then, at least in this little corner of the whole, the ideals of those who sought to civilize the Western frontier 50 and 60 years before had finally begun to be fulfilled. Not as they had expected, of course. One doubts travelers of the 1840s would credit a prophesy that neither Native Americans, antelope, nor buffalo would exist along the Old Spanish Trail 50 years hence. Or that changes in the ways the landscape at the Las Vegas Oasis would be utilized over the course of that 50 years would mirror a broader sequence of changing socioeconomic conditions as the history of the American West evolved.

Though we are aware of the perspective exemplified in the work edited by Crumley (1995), our archaeological training and prior experience originally led us to expect that a processual analysis of landuse changes at the Old Mormon Fort site and environs would find them to have been adaptations to changes in the ecology of the local district. Adaptations, for example, to changes in the water table or adaptations to ways in which the open range and meadowlands were affected by introduced livestock. We believe, however, this expectation has not been fulfilled. Rather, in the words of M. Van Buren (1996:338), landuse changes at the Old Mormon Fort locale are "better understood as strategic decisions in the context of contemporary socioeconomic conditions, not ecological adaptations rooted in cultural tradition." At various times, strategic decisions prioritized religiously and idealistically motivated interests; they exploited the opportunities for quick riches offered by boomtown settlements; they shrewdly identified the profit in supplying the demands of specific markets; and they successfully identified a secure means of withdrawing from the competitive pressures of the early days of business ranching. Sometimes they were reactions to the demands of population growth, and sometimes they were proactions based on accurate predictions of a foreseeable future. Las Vegas was not ineptly named, nor is the present state of its landscape simply a product of mismanagement or exploitation by greedy and uncaring developers. The ways the land is used today are effectively controlled by the same factors that controlled its use even into the prehistoric past. Landuse at Las Vegas has always been a matter of strategic response to the prioritized interests of its occupants and the character of socioeconomic conditions existing within, but created beyond, the margins of the Las Vegas valley.

ACKNOWLEDGMENTS

We wish to express our appreciation to Phares Woods and Laura Eissmann of Nevada Division of State Parks for supporting these investigations and their comments and suggestions regarding earlier research results. Also, we thank Vorsilla Bohrer, Donald Hardesty, Lonnie Pippin, and an anonymous reviewer for comments and suggestions made on an earlier version of this article. We take responsibility for any misinterpretations of their ideas and comments, and for the character of errors we have made.

REFERENCES

BOHRER, VORSILA L.
1996 The Plant Remains from the Old Las Vegas Mormon Fort State Historic Park, Clark County, Nevada. In The Old Las Vegas Mormon Fort: The Founding of a Desert Community in Clark County, Nevada, edited by John W. Hohmann. *Studies in Western Archaeology* 4:H1–H18. Louis Berger & Associates, Phoenix, AZ.

CRUMLEY, CAROLE L. (EDITOR)
1995 *Historical Ecology: Cultural Knowledge and Changing Landscapes.* School of American Research Press, Santa Fe, NM.

ELSTON, ROBERT G., AND ALVIN R. MCLANE
1993 *Old Las Vegas Mormon Fort: Historical and Archaeological Perspectives.* Manuscript on file, Intermountain Research, Silver City, NM.

EULER, ROBERT C.
1966 Southern Paiute Ethnohistory. *University of Utah Anthropological Papers* 78. Salt Lake City, UT.

FRÉMONT, JOHN C.
1845 *Report of the Exploring Expedition to the Rocky Mountains in the Year 1842, and to Oregon and North California in the Years 1845–44.* 28th Congress, second session, House of Representatives Document 166. Blair and Rives, Washington, DC.

HATZENBUEHLER, LYNN E., AND JAMES C. LOWE
1993 Monitoring Report for Overburden Removal, Old Las Vegas Mormon Fort, Las Vegas Nevada. Report submitted to State of Nevada Parks Department, Las Vegas.

HOHMANN, JOHN W.
1994 A Research Design and Scope of Work for Phase II Archaeological Testing at the Old Las Vegas Mormon Fort State Historic Park, Las Vegas, Clark County, Nevada. *Cultural Resource Group Research Report* 23. Louis Berger & Associates, Las Vegas, NV.
1995 The Founding of Las Vegas Nevada: Phase II Archaeological Investigations at the Old Las Vegas Mormon Fort State Historic Park, Clark County, Nevada. *Cultural Resource Group Research Report* 24. Louis Berger & Associates, Las Vegas, NV.

HOHMANN, JOHN W. (EDITOR)
1996 The Old Las Vegas Mormon Fort: The Founding of a Desert Community in Clark County, Nevada. *Studies in Western Archaeology* 4. Louis Berger & Associates, Phoenix, AZ.

HOHMANN, JOHN W., MARGARET "PEG" DAVIS, DONALD C. IRWIN, JAMES C. LOWE, AND MICHAEL REID
1996 Historic Materials Analysis. In The Old Las Vegas Mormon Fort: The Founding of a Desert Community in Clark County, Nevada, edited by John W. Hohmann. *Studies in Western Archaeology* 4:221–257. Louis Berger & Associates, Phoenix, AZ.

HOHMANN, JOHN W., MARGARET "PEG" DAVIS, AND JOEL D. IRISH
1995 The Reliability of Three Remote Sensing Techniques Used at the Old Las Vegas Mormon Fort State Historic Park. Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis, MN.

HOHMANN, JOHN W., LYNN HATZENBUEHLER, AND PHARES WOODS
1996 A History of the Old Las Vegas Mormon Fort and Its Surrounding Environments. In The Old Las Vegas Mormon Fort: The Founding of a Desert Community in Clark County, Nevada, edited by John W. Hohmann. *Studies in Western Archaeology* 4:17–96. Louis Berger & Associates, Phoenix, AZ.

HOHMANN, JOHN W., AND JOEL D. IRISH
1994 Additional Remote Sensing Studies Conducted at the Old Las Vegas Mormon Fort State Historic Park, Las Vegas, Clark County, Nevada. *Cultural Resource Group Research Report* 18. Las Vegas, NV.

HOHMANN, JOHN W., JOEL D. IRISH, AND MARGARET "PEG" DAVIS
1994 Recent Investigations at the Old Las Vegas Mormon Fort, Nevada. Paper presented at the 67th Annual Pecos Conference, Mesa Verde National Park, CO.

HOHMANN, JOHN W., AND DON W. RYDEN
1994 A Proposal to Conduct Historic Research and Phase II Archaeological Testing at the Old Las Vegas Mormon Fort State Historic Park, Clark County, Nevada. Joint *Berger/Ryden Technical Report* 5. Las Vegas, NV.

IRWIN, DONALD C.
1996 Lithic Analysis. In The Old Las Vegas Mormon Fort: The Founding of a Desert Community in Clark County, Nevada, edited by John W. Hohmann. *Studies in Western Archaeology* 4:17–96. Louis Berger & Associates, Phoenix, AZ.

LAWRENCE, PAMELA
1996 Faunal Analysis. In The Old Las Vegas Mormon Fort: The Founding of a Desert Community in Clark County, Nevada, edited by John W. Hohmann. *Studies in Western Archaeology* 4:247–257. Louis Berger & Associates, Phoenix, AZ.

LUFF, ROSEMARY, AND P. ROWLEY-CONWY (EDITORS)
1994 *Whither Environmental Archaeology?* Oxbow, Oxford, UK.

PAHER, STANLEY W.
1971 *Las Vegas, As It Began—As It Grew.* Nevada Publications, Las Vegas, NV.

QUADE, JAY, MARTIN D. MIFFLIN, WILLIAM L. PRATT, WILLIAM MCCOY, AND LLOYD BURKLE
1995 Fossil Spring Deposits in the Southern Great Basin and Their Implications for Changes in Water Table Levels Near Yucca Mountain, Nevada, During Quaternary Time. *Geological Society of America Bulletin* 107(2):213–230.

QUADE, JAY, AND WILLIAM L. PRATT
1989 Late Wisconsin Groundwater Discharge Environments of the Southern Indian Springs Valley, Southern Nevada. *Quaternary Research* 31:351–370.

SCHOENWETTER, JAMES
1990 A Method for the Application of Pollen Analysis in Landscape Archaeology. In *Earth Patterns: Essays in Landscape Archaeology*, edited by William M. Kelso and Rachel Most, pp. 277–296. Charlottesville University Press, Charlottesville, VA.
1996 Archaeological Palynology at the Old Las Vegas Mormon Fort State Park: The Pilot Study. In The Old Las Vegas Mormon Fort: The Founding of a Desert Community in Clark County, Nevada, edited by John W. Hohmann. *Studies in Western Archaeology* 4:247–257. Louis Berger & Associates, Phoenix, AZ.

SCHROTH, ADELLA
1987 The Use of Mesquite in the Great Basin. In Papers on the Archaeology of the Mohave Desert, edited by Mark Q. Sutton. *Coyote Press Archives of California Prehistory* 10:53–78. Salinas, CA.

SEYMOUR, GREGORY R.
1996 Native American Ceramics from the Old Las Vegas Fort. In The Old Las Vegas Mormon Fort: The Founding of a Desert Community in Clark County, Nevada, edited by John W. Hohmann. *Studies in Western Archaeology* 4:247–257. Louis Berger & Associates, Phoenix, AZ.

SPECK, ROBERT L.
1985 *Soil Survey of the Las Vegas Valley Area Part of Clark County, Nevada.* United States Department of Agriculture Soil Conservation Service., Washington, DC.

VAN BUREN, M.
1996 Rethinking the Vertical Archipelago. *American Anthropologist* 98(2):338–351.

JAMES SCHOENWETTER
DEPARTMENT OF ANTHROPOLOGY
ARIZONA STATE UNIVERSITY
TEMPE, AZ 85287

JOHN W. HOHMANN
CULTURAL RESOURCE GROUP
LOUIS BERGER & ASSOCIATES, INC.
LAS VEGAS, NV 89119