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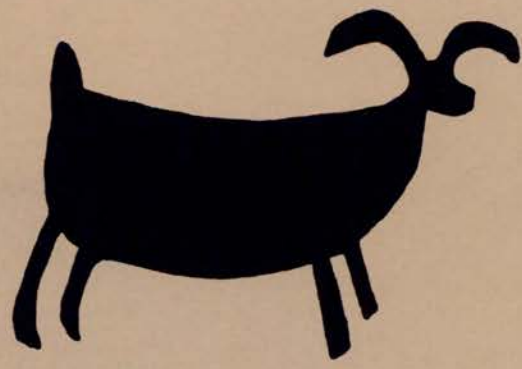

A Cultural Resource Management Plan for the Fossil Falls/Little Lake Locality

by

Alan P. Garfinkel

cultural resources publications

archaeology

The cover figure depicts a petroglyph in the shape of a bighorn sheep (*Ovis canadensis*). This rock art style is typical of the Coso Range, fifteen miles north of Fossil Falls.

A Cultural Resource Management Plan for the Fossil Falls/Little Lake Locality

by:

Alan P. Garfinkel
August, 1976

Bakersfield District Office
Bureau of Land Management
Bakersfield, California

Reprinted 1980

FOREWARD

The research conducted at the Fossil Falls/Little Lake locality by Alan P. Garfinkel in 1976 represents an intensive three month investigation of a unique geological area containing some of the few subsurface occupational remains of the "Pinto" or "Little Lake" period, dating from at least 3000 B.C. Additional cultural material found in stratigraphic context in this area may date to as early as 8000 B.C., suggesting affiliation with the "Lake Mojave" complex.

Projectile point forms recovered from both surface and subsurface contexts represent the entire Great Basin temporal series, dating from 8000 B.C. to at least A.D. 1200. The location of these archaeological sites near one of the few freshwater lakes in the Mojave Desert, their proximity to a known source of high quality obsidian, and their association with Pleistocene river channels contribute to their unique characteristics which distinguish them from other archaeological sites in the Mojave Desert. The unique qualities of the Fossil Falls/Little Lake locality resulted in its listing on the National Register of Historic Places in July of 1980 as the "Fossil Falls Archaeological District." In addition, most of the management recommendations in this report were successfully implemented in 1978 and 1979, providing protection to critical resources while also enabling the public to enjoy them.

The Bureau of Land Management, Bakersfield District, is pleased to reprint this 1976 monograph as one of the reports in the California "Cultural Resources Publications" series.

Eric Montizambert,
District Archaeologist

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Acknowledgements

I would like to thank the following people for their assistance and cooperation during the course of this study. A special thanks is due the community of Little Lake for allowing me to pick their brains and generally make a nuisance of myself during a month long excursion into the history and prehistory of the area.

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Introduction

This study was completed for the Bureau of Land Management as an internship program while the author was engaged in graduate studies at the University of California, Davis. The report represents the culmination of a three month effort to characterize the cultural resources of the Fossil Falls/Little Lake archaeological locality.

The areal focus for this study was concentrated on the National Resource Lands adjacent to the geological site known as Fossil Falls (Plate 1). However, it was found by this researcher, the prehistory of the area would best be served by a more general examination. Since the action of the pluvial Owens River and the relative fluctuations of the spring fed basin known as Little Lake are so intimately tied together, the actual study area incorporated these features as a unit.

The area of concern is located in the southernmost section of Owens Valley, the area known as Rose Valley. It is flanked on the western edge by the Sierra Nevada Mountains and on the east by the volcanics of the Coso Range. The northern edge of the study area is arbitrarily set as the prominent cinder cone known as Red Hill, and the southern boundary is the point of greatest constriction between the Coso Range and the Sierra Nevadas (Map 1).

The intent of this study is to provide information pertinent to the management of cultural resources. The author will supply background information on the environmental setting in order to acquaint the reader with the general physiography of the area. Subsequently available historical, ethnological and archaeological data will be discussed. Lastly, management recommendations (based on a general survey of visitor preference and local informant interviews) will be set forth. A further objective is to synthesize previously unrelated information on the area and to point out opportunities for further research.

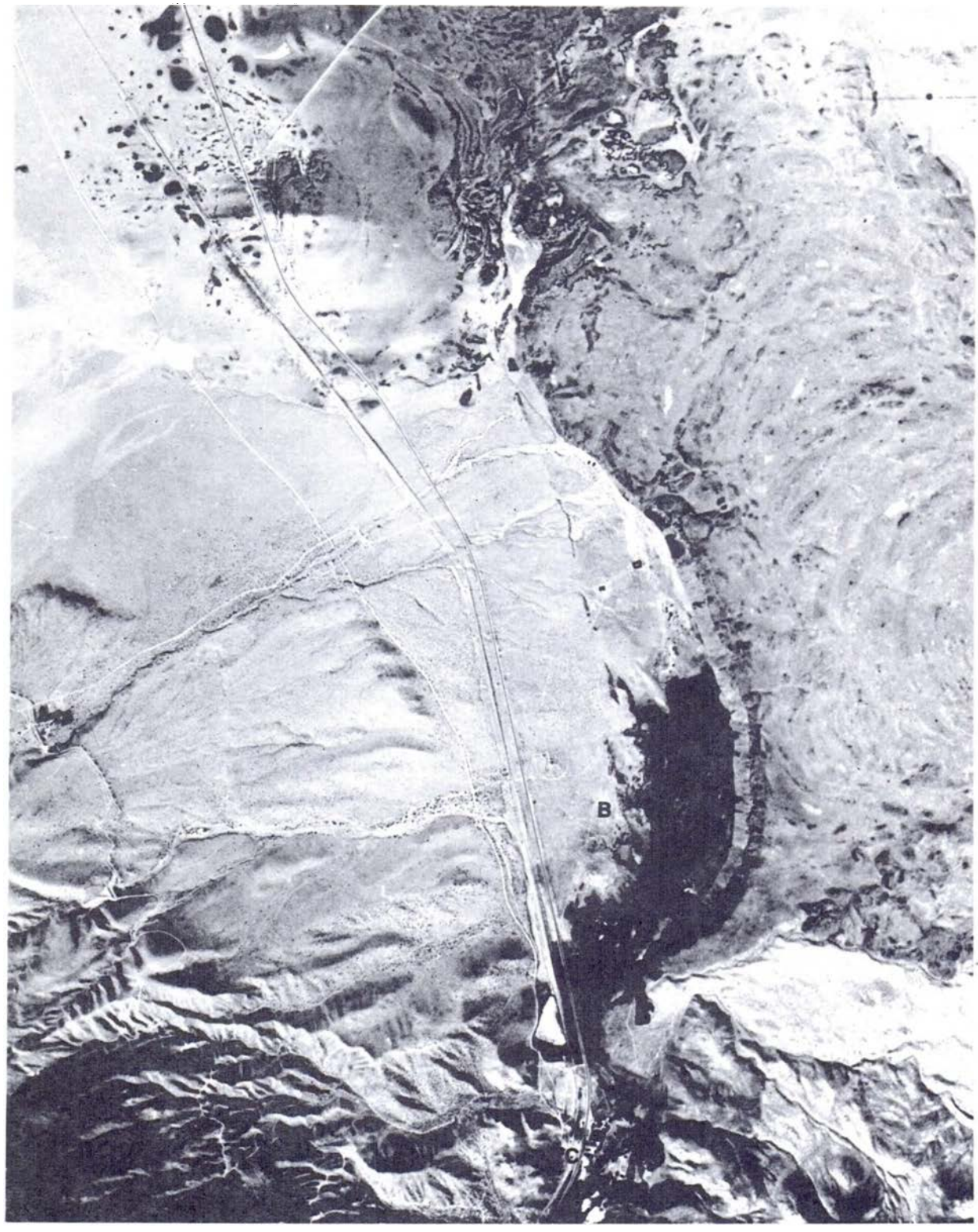
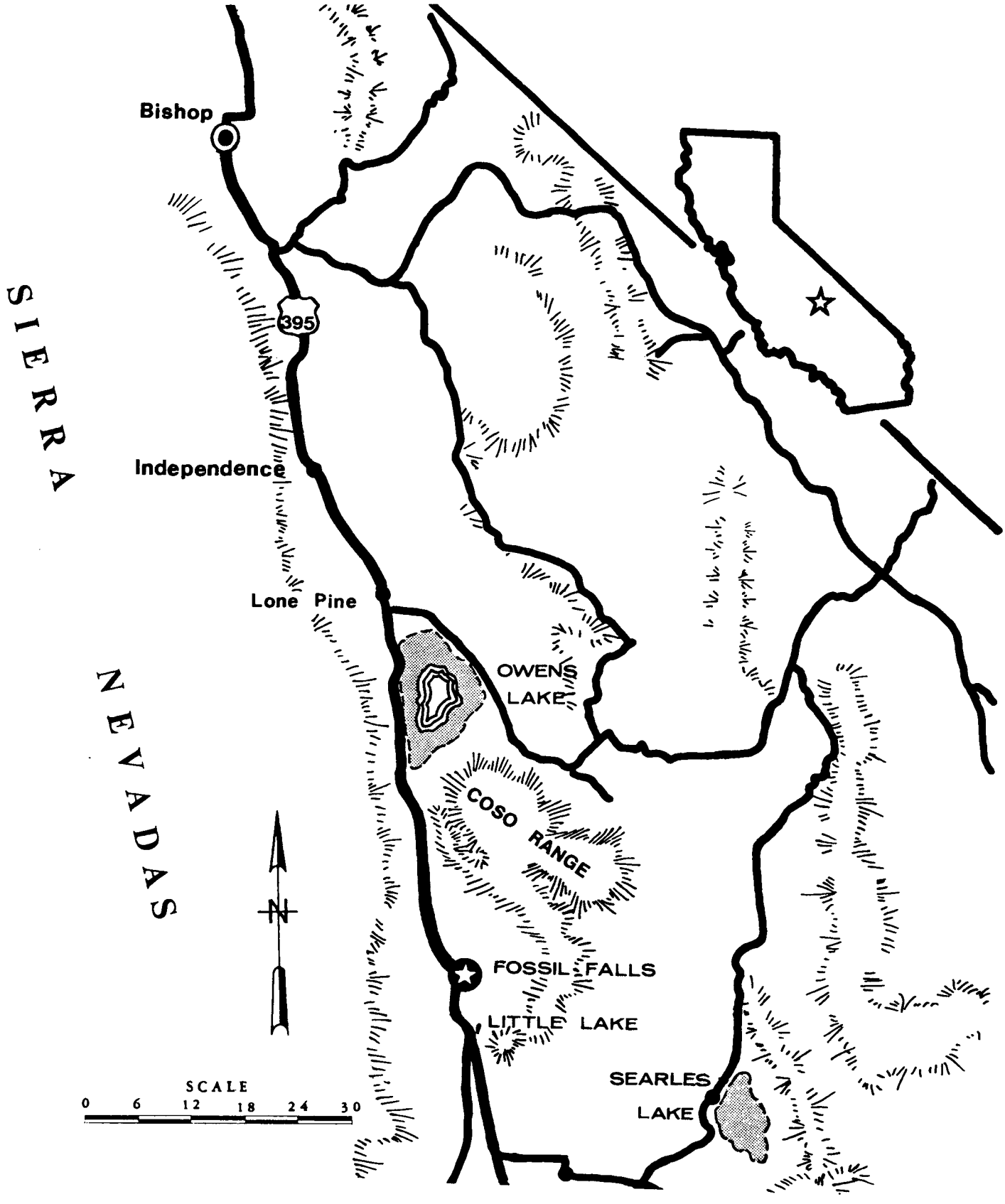


Plate 1. Aerial view of Fossil Falls/Little Lake Locality, looking north. Lava flow east of lake, pleistocene river channel at north end. A, Fossil Falls; B, Little Lake; C, the town of Little Lake.



Map 1

Location of Fossil Falls/Little Lake Area

Definitions

Since some of the terms used in this report will not be familiar to the reader or are subject to various interpretations, they will be defined here for clarification.

Anthropology: A social science, having as its general objective the explanation of human behavior, i.e. why we think, perceive, evolve and change as we do.

Archaeology: The study of the behavior of human groups that have become extinct or of the past behavior of living groups through the systematic interpretation of material remains.

B. P.: "Before the Present." Conventionally, years B.P. are calculated from a standard "present" of A.D. 1950, but for general shorthand purposes the "present" is conceived of as A.D. 2000.

C-14 or Radiocarbon: An isotope of carbon which disintegrates at a more or less fixed and measureable rate of speed. The relative amount of C-14 remaining in a piece of organic material is, within limits, a function of the material's age. The C-14 or radiocarbon method is the technical means of approximate age determination through the measurement of C-14 content.

Culture: Broadly, the system of behavior, beliefs, institutions and objects that human groups use to cope with their environment.

Culture History: The synthesis of archaeological data with the intent of determining an historical sequence for an area. The culture historian seeks to reconstruct the sequence of cultures or of cultural changes that occured in his area of study.

Cultural Resources: Any property including sites, structures, buildings, etc., whose study can provide useful information about history or prehistory, or in which the public has some sort of actual or potential cultural interest.

Ethnography: The study and description of living human groups or of groups that have lived recently enough that living people retain transmittable memories of them. Ethnography is a method of anthropology.

Endogamy: Marriage within a social unit. If one may only marry a member of one's own group, the society is said to be endogamous.

Historic: Historic sites are those sites which reflect human activities that occurred after the advent of written records in the area up until, roughly, the present.

Holocene: The period since the end of the Pleistocene, roughly the last 10,000 years.

Mano: The hand-sized, loaf-shaped stone used to grind seeds on a metate.

Metate: A flat stone slab upon which hard seeds were ground. They are called bedrock metates or grinding slicks when ground directly into bedrock.

Midden: Decomposed refuse or other discarded materials that (usually) have darkened or otherwise discolored soil, often containing bone fragments and/or cultural debris. Midden is a common element of prehistoric sites.

Negative Marriage Rule: A cultural rule stating who one may not marry. (This is usually one or several categories of persons.)

Mortar: A stone bowl used for grinding softer, pulpier plant or animal materials than are readily processable with a metate and mano. In the California Desert, mortars often are ground directly into bedrock slabs and are called bedrock mortars.

Pestle: The elongate cobble used to grind things in a mortar; It is usually simply a long cobble with signs of battering and wear on one or more ends.

Pleistocene: The glacial era or "ice age," when the northern part of the continent and many mountain ranges were glaciated.

Pluvial: Pertaining to a period of moister climate.

Point or Projectile Point: A point is the flaked stone tip of a projectile - spear, dart, or arrow.

Pothunter: One who digs up or otherwise damages an archeological site in order to get objects (for sale or for oneself) or in order to find out about the site without the archeological training to do so properly.

Prehistoric: Pertaining to a period before written history.

Shelter or Rockshelter: Many archaeological sites at Fossil Falls are in rockshelters in the natural lava. Overhanging rocks were used as shelter from the elements.

Vandalism: The destruction of archaeological sites. Pothunting is a form of vandalism. Defacement of rock art is another.

ENVIRONMENTAL HISTORY

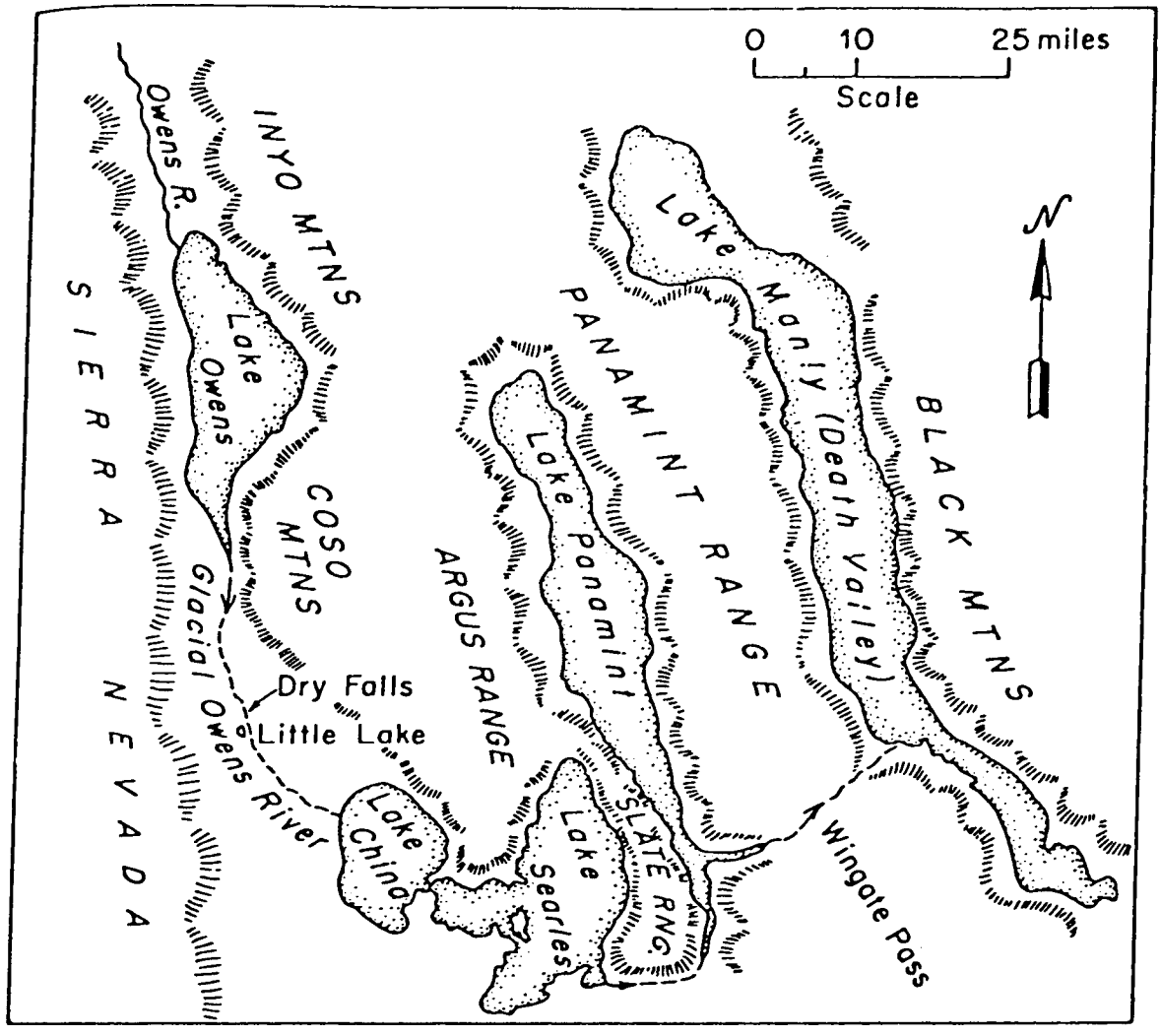
Hydrology

On the basis of hydrological studies it has been determined that the Little Lake area is part of a larger drainage system which was at its greatest extent during the latter half of the Wisconsin glaciation until about 10,000 years ago (Blanc and Cleveland 1961:2-5). This continuous internal drainage system initiated with the development of a series of large lakes in four basins in Eastern California (see Map 2). The first of these, Owens Lake, accumulated from water in the Owens Valley Basin and fed into Indian Wells and Salt Wells Valleys in a series of successive overflows, forming China Lake and Searles Lake. Searles Lake overflowed to form Panamint Lake which in turn was filled and formed Manly Lake, the final lake in this internal drainage system.

The overflow from Owens Lake created a pluvial river. This river created the geological site known as Fossil Falls (Plate 2). The Falls consist of a dry waterfall with deep pot holes and stream polished surfaces. The drop itself is approximately 40 feet. The rock surfaces are notable since they have been scoured, smoothed, and fluted by the fast flowing waters of the pluvial Owens River. The potholes were cut into the lava by fixed vortices within the stream. It has been suggested that the features one now observes were formed probably as recently as 10-15,000 years ago (Sharp 1972:130-134).

Little Lake is located a mile south of the falls, within the channel of the Pluvial Owens River. The lake was formed by resistant granitic rocks, covered in part and protected from erosion by basalts which flowed into the valley (Mehringer and Sheppard ND:4). The lake is nourished by several seepage springs, and is dammed at its southern end by alluvium from both sides of the canyon.

Recent studies by Mehringer and Sheppard (ND) have demonstrated that the Little Lake basin was occupied by a shallow lake or marsh for at least the past 5000 years. Dated sediments and fossil pollen have been interpreted as representing a salt grass meadow and marsh deposit from 5,000 to 3,000 years B.P. Since 3000 B.P. a shallow lake has existed which is inferred to have been no fresher nor deeper than during the past few years.



Map 2

Map of pluvial lakes fed by Sierra Nevada runoff.

after Sharp 1972:57

Plate 2. Looking up towards the head of Fossil Falls. Foreground rock surfaces were scoured, polished and potholed by the fast flowing waters of the Pluvial Owens River.

Geology

The sites of Little Lake and Fossil Falls are situated within an area where active vulcanism ceased only several thousand years ago. Numerous cinder cones and lava flows are found within the study area. The cinder cones are basaltic or rhyolitic in composition and are associated with the lava flows that form the Coso Range (Chesterman 1956:62-67).

Recent work by Duffield and Bacon (1976) has illuminated the local geology of the area. Specifically a mapping program, undertaken by the United States Geological Survey, has established the relative ages for the various periods of vulcanism and the composition of the cindercones and flows. Red Hill cindercone, dominating the skyline to the north, has been identified as an asymetrical cone composed of vesicular basalt (Plate 3). It dates to the late Pleistocene - early Holocene period and postdates the contiguous flow of basalt of the upper Little Lake Ranch. These two geological units meet, and are cut by Fossil Falls gorge. The basalt of Red Hill actually follows the Pleistocene Owen's River channel and can be noted at least 15 km. downstream.

The most recent period of vulcanism was noted as that associated with Volcano Peak 5 miles to the east. Duffield (1976) has suggested that its well-preserved flows and channels may be associated with a date as recent as 10,000 years B.P. or later.

Carl Austin (1971), research geologist for the China Lake Naval Weapon's Center, has suggested that the entire area from Little Lake to Coso Peak and from Wildhorse Mesa to Cactus Flats represents a collapsed caldera, the product of extensive faulting and a process called magmatic stopping. Magmatic stopping is a process of igneous intrusion in which molten rock gradually eats its way upwards, breaking off blocks of the native rock and causing them to sink downward. This geological feature has been called the Coso Ring Fracture and is the site of active heat cells and potential geothermal energy.

The Coso Range, itself, is composed of a central core of granitic and metamorphic rocks which is overlain in sequence by 1) alluvial gravels 2) tuffs and lake beds and 3) andesitic and basaltic flows. Pumice deposits within the tuffs are exposed on the north, west, and south flanks of the range. The basaltic lava flows range from 50 to 100 feet in thickness. Postdating the basaltic flows, andesitic and rhyolitic intrusions occured. In some spots these later flows are covered with a shallow mantle of ash and volcanic tuff (Fraser et. al. 1943).

Rock overhangs and caves found within the basaltic lava flows were created by the collapse of lava tubes and the deflation of lava blisters. These were subsequently important as occupation sites for the prehistoric inhabitants of the area. Another geological resource important to aboriginal inhabitants was the local occurrence of obsidian. Six miles to the northeast of Fossil Falls is located a prominent dome-shaped mountain with a hummocked appearance (Plate 4). Sugarloaf mountain,

Plate 3. Red Hill Cinder Cone in center. Little Lake in foreground. Upper Little Lake Ranch basalt flow wraps around lake on the right hand side of the photo.

Plate 4. Hummocked dome of Sugarloaf Mountain. Black scar in the center of the dome is part of a mile long exposure of obsidian.

termed a perlitic dome, is the locus for an extensive high quality source of obsidian. Here, obsidian was quarried along the length of a mile long exposure.

The geological resources of the area are still found to be economically useful. Pumice deposits and cindercones have been mined. Notably, Red Hill Cindercone has been actively mined since 1948 primarily as an aggregate for concrete. Other uses include decorative rock for planter mixture, and for use on road beds. Examination for potential uranium sources has recently been carried on at Red Hill playa, and the potential for geothermal energy is currently being evaluated by the Federal government.

Present Climate

The Mojave Desert, including that portion constituting the Little Lake area, is typical of an arid desert environment. The region receives less than five inches of mean annual precipitation in its lower valleys, such as Rose Valley. Most moisture comes in the form of winter rainstorms swept in from the Gulf Coast or over the crest of the Sierra Nevadas from the Pacific Ocean. Also, during the months of April through October, small amounts of rain may occur in the form of thundershowers or flashfloods. Strong westerly winds usually occur during the spring. Normal temperatures range from highs in excess of 100°F in the summer to below freezing temperatures in the winter.

Vegetation

The present vegetation of Fossil Falls is characterized by a dominant creosote bush community with a saltbush understory. North towards Red Hill Cindercone saltbush becomes dominant, and on the north side of Red Hill Joshua trees can be noted.

The Fossil Falls area exhibits quite spectacular annual wild flower displays. The author accompanied Mary Ann Henry, plant taxononist, on two visits to the study area during this period of wildflower display. The plant lists resulting from these two visits are included as Appendix 3.

Environmental Change

The desert environment has formed a dynamic backdrop for the inhabitants of the Little Lake area. Changes in temperature and climate would have had dramatic effects on plants and animals which served as basic subsistence resources for the hunting and gathering peoples of the region. Studies of playa lakes, relict plant communities, and woodrat middens have provided some basis for projecting the gross changes in the California desert during the past 30,000 years.

There is substantial lack of agreement on detail for the climatic sequence of the Great Basin (see King 1975). But, there does seem to be some consensus on the gross events that transpired. Beginning in the 1920's Antevs (various) described a sequence of general trends in climatic fluctuation in Neothermal or post-Pleistocene times. Antevs tripartite scheme is divided into the Anathermal, dating from 8000-5000 B.C. and characterized by a wetter and cooler condition than prevails currently; the Altithermal, from 5000 to 2500 B.C., a period of extreme dessication, far drier than currently; and the Medithermal, from 2500 B.C. to the present, where conditions generally became milder and the climate more like that found currently. Summarizing the work of Blackwelder and Ellsworth (1936), Martin (1964), Wells and Jorgensen (1964), Wells and Berger (1967), Ore and Warren (1971) and his own research in the Lucerne Valley, T. J. King (in Mortland 1974, and with revisions as cited in T. F. King 1975:17) suggests the following periods:

Period 1: Cool, moist climate ca. 30,000 to 28,000 B.P.

Period 2: Arid, warm climate ca. 28,500 B.P.

Period 3: Cool, moist climate ca. 28,500 to 16,500 B.P.

Period 4: Warm, dry climate 16,500 to 14,500 B.P.

Period 5: Cool, moist climate 14,500 to 7,500 B.P., turning warmer and drier toward end of period.

Period 6: Hot, arid climate 7,500 to 5,500 B.P.

Period 7: Warm, moist climate 5,500 to 3,000 B.P. (uncertain)

Period 8: Warm, dry climate 3,000 to 1,000 B.P. (uncertain).

Period 9: Hot, arid climate 1,000 B.P. to the present.

(After T. J. King 1975:17)

The sequence by and large follows Antev's general scheme.

Period 5 closely corresponds to the Anathermal, Period 6, the Altilhermal and Periods 7-9 the Medithermal. Period 7 represents what climatologists have termed the little Pluvial. Conditions prevailed which were wetter

than currently, but not as moist as during the Anathermal period. It is during this period, Harrington (1957) suggests, that the archaeological materials dating to the Pinto period at Little Lake and Fossil Falls occured.

Given that there were periods in the past where today's weather patterns did not exist or were relatively different, what could we expect in terms of changes in the local hydrology and vegetation?

During the Anathermal we have evidence that a pluvial river existed and its traces are left in the old river courses and dry falls in the Fossil Falls area. Dry lake beds and ephemeral playas are found to the north and east which were most probably filled during this period. During the "little" Pluvial we have evidence that Little Lake became deeper (Mehringer and Sheppard ND:15) and a major change from marsh to lake deposition occured.

Moister conditions would result in rather different distributions of economically important plants. Specifically, it might be suggested that a larger pinyon - juniper woodland community and a more extensive riparian community would exist.

Environmental change is an important variable in the study of arid lands prehistory. Even though our current understanding of these changes may be simple minded, it would be naive to overlook such an important factor in prehistoric man-land relationships.

HISTORY AND ETHNOLOGY

History of the Little Lake Area: 1863 - Present

Acknowledgements

Most of the information for this historical narrative comes from the comprehensive manuscript of Jane Thomann. Mrs. Thomann has worked ten years to compile extensive information on the local history of Little Lake and Indian Wells Valley. I would like to acknowledge her large contribution to my efforts at developing an historical background for my work at Little Lake.

Negotiations have now been initiated with the Eastern California Museum in Independence for the publication of her manuscript. Hopefully, in the near future, we will all be able to profit from the work of this dedicated local historian.

Little Lake has served as a natural oasis for travelers in route to points both north and south. For those journeying north to the Owens Valley it is a natural watering hole between Mojave and Bishop (Plate 5).

The Midland Trail or Three Flags Trail, as it is alternatively known, passed by Little Lake, where there was a stage station from 1863 to 1875 (Plate 6). In 1863 three Visalian proprietors, James C. White, Charles Rice and Charles M. Schleigh began operating the Owens River Stage Line and Express, connecting Visalia, in the Central Valley, with Independence. The stage line was prompted by the necessity of bringing gold bullion from Cerro Gordo Mine in the Owens Valley to Southern California for eventual shipment to San Francisco for refinement. The two hundred mile road went through Little Lake past a rock walled outpost originally designated as Little Owens Lake. Mexican miners passing the outpost named the place "Lagunita". The English translation, Little Lake, was the name used after the 1860's (Robertson 1965:10).

During its short period as a stage station Little Lake was robbed only once. This is exceptional since the notorious gang of bandits led by Cleovara Chavez, having in its company the likes of Tuburcio Vasquez, were creating quite a bit of havoc in the locale. It is said that the reason for Little Lake's undisturbed peace was that the owner of the stage line had once saved Vasquez's life and was receiving repayment. This streak of good luck ended for the stage station just seven days after Vasquez was hung, when the Lieutenant Cleovara Chavez robbed the Little Lake stage station.

The event was described in the Inyo Independent three days later as follows:

Chavez Again on the Road

> On Thursday morning last, as the stage from Indian Wells came up to the Little Lake station, the passengers (one of whom, Mr. I. N. Choynski, to whom we are indebted for the information) were astonished to learn that on the evening previous Chavez and four of his banditti had gagged the proprietor of the station, together with three of his men, and after helping himself to all that he considered valuable, loaded four of the stage horses and went his way. The stage passengers were detained some time owing to the scarcity of horses, but finally went on their journey with some misgivings as to their fate, and their was a hasty concealment of watches, jewelry, and coin, but Chavez and his gang did not put in an appearance, though they met several persons who came from Passmare's who testified, with much feeling, that they had been robbed by the highwaymen. (Inyo Independent, Saturday, March 27, 1875)

Nadeau (1948) adds a bit more to our description of the events that transpired. He states that after procuring fresh horses the bandits "jogged nonchalantly up the road" and camped near the lake that night, heading north at 10 a.m. the next morning.

The stage line ran weekly from Los Angeles to the Owens Valley. Two stage lines competed for passengers to Cerro Gordo itself. After April of 1875, in order to include Darwin, the main stage line avoided Little Lake, and went through Indian Wells. Whether some other sort of service was set up for Little Lake after this time is unclear.

In October of 1898 Charles W. Whittock filed a deed for his homestead at Little Lake. He had a ranch house, small post office (not officially established by the U.S. Government), store, and cafe. Chalfant (1922) mentions that the merchants Hobart and Reed established the store at Little Lake. Whether this occured in conjunction with the homestead or at a later date is uncertain. In any case, Whittock's original adobe was expanded sometime during the period from 1898-1900 and the Little Lake Hotel was started.

Several years later, in 1908, an easement was sold to the Nevada - California Railroad and a depot established. In order to lay the rails across the tule swamps of Little Lake, a trestle was built, the remains of which can still be seen just west of present highway 395.

The first official postal service for the Little Lake area was initiated in the summer of 1909. The official station, run by postmaster Charles R. Richards, was located just south of Little Lake at a place called Narka.

Just a year later Whittock sold his property to a man named Shuttock. It was during Shuttock's ownership that the post office was officially moved to the Little Lake Hotel, where it currently remains. After

Plate 5. Little Lake as it appeared ca. 1919. Old highway 395 runs north-south in the foreground. The Midland trail essentially followed this same route.

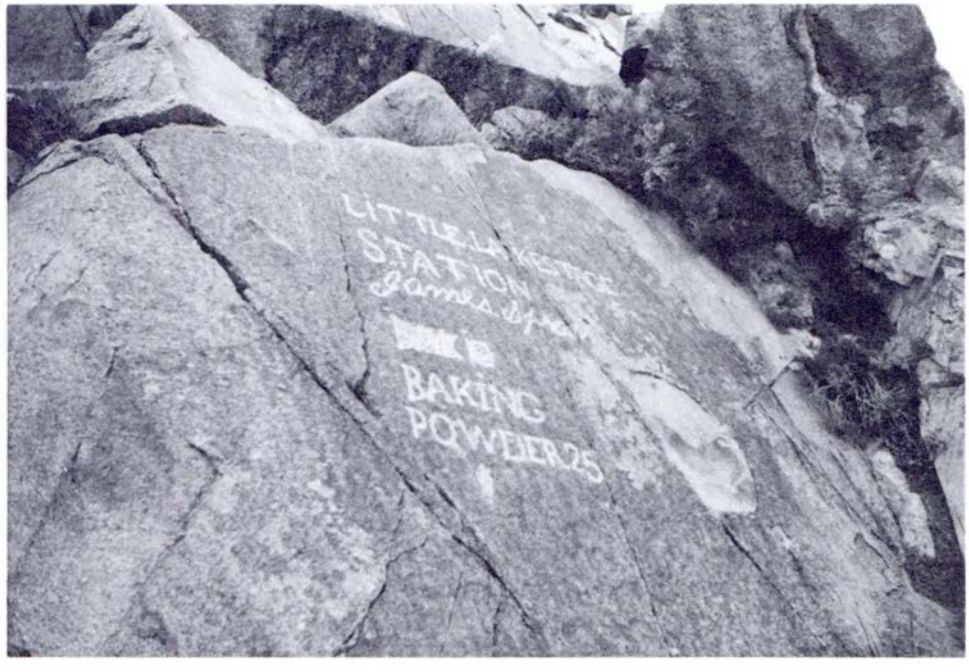


Plate 6. Patinated granite boulder on the cliff face above site of old stage station.

owning the property for only a few years, Shuttock sold it to William W. Bramlette. The Bramlette family owned and operated the lake, hotel, store and gas station for many years.

After Bramlette had the hotel for several years, he decided a new structure should be built. Construction of the present hotel was started in 1919 and completed in 1923 (Plates 7 and 8). Along with other changes the Bramlettes decided to turn Little Lake into a real lake instead of the tule marsh which had existed. They dammed the lake and imported muskrats from Colorado. After the muskrats ate all the tules, they ate each other and eventually died off.

After the new hotel was completed, it was decided there was no need for an old hotel and the structure was burned down one night. Another innovation by the Bramlettes was the sponsorship of a duck club on the lake. This has continued and today two duck clubs exist, one at the upper, the other at the lower portion of the lake. When Bramlette finally sold his property some time ago, it was divided among several owners. Currently the Lower Little Lake, Upper Little Lake and hotel are all owned separately.

It is local knowledge that the hotel at times has served as a house of prostitution, especially when it was initially sold to some Hindu Indians after the Bramlettes owned it. There have been not less than two killings and several shootings at the Little Lake Bar and another colorful chapter in its history is still being made every Friday or Saturday night. The owner of the Lower Little Lake Ranch, Jack Morhart, is negotiating with the Fish and Wildlife Department in order to make that area a game refuge or wildlife conservation district. Currently much work has been put into stocking the lakes (several smaller ponds have been built) with crappie and bass. The lake is now home for many types of waterfowl especially ducks, grebes, and coots. Planting has been done in the area in conjunction with the Soil Conservation Service to test the viability of several types of economic plants in the desert area, given the availability of fresh water.

Interest in the area continues. The prospect for geothermal energy in the vicinity has attracted geologists and supporting specialists. Loggers, truckers, and travelers still stay at the hotel, and the community at Little Lake is still a viable economic entity.

Plate 7. The new hotel under construction. The first hotel and original structure is in the center of the photo. Photo ca. 1919.

Plate 8. New hotel completed. ca. 1923.

Ethnographic Sketch

The available ethnographic information on the Little Lake region comes from Kroeber (1925) and Steward (1938).

The Little Lake region is part of the Shoshone district of Kuhwiji made up of four loosely interelated villages. The district comprises the Little Lake area, Rose Valley and the southern shores of Owens Lake centering in the Coso Mountains, and totals about 1,000 square miles.

The Little Lake village was thought by Steward's informant to contain from 50 to 60 persons in 1870. Steward indicates (Fig. 7) that 10 single families resided around Little Lake. The other three villages in the district were located at Olancha, near Darwin, and at Coso Hot Springs. As is typical in the Great Basin, these villages were occupied largely during the winter.

The seasonal round followed was not routinized. Variable procurement strategies were afforded by the resources surrounding this area. Steward was able to give us a sketch of seasonal activities from the view of his informants at the Coso Hot Springs village. This sketch is probably applicable to the groups at Little Lake (Figure 1).

During the winter subsistence was mainly based on stored foodstuffs - particularily seeds. These were supplemented with meat from rabbits. In April some families moved to Haiwee Springs to gather greens, and in June these families usually went to Cold Spring (south of Darwin), and sometimes wintered there, hunting rabbits.

In April, or sometimes later, a communal antelope hunt was organized. Antelope were most abundant in Indian Wells Valley about ten miles south of Little Lake and families would travel to this area to participate in the hunt. Antelope could also be procured just south of Owens Lake and at the northern end of Saline Valley.

In midsummer families might go to either Saline or Death Valley to gather mesquite. In July through September families gathered plant foods in the Coso Mountains, but remained as near to their winter villages as possible, in order that their trips to cache seeds would not be overly long. However, if certain seeds were especially abundant they would travel several days distance from their base camps.

In September or October, pine nuts were gathered in the Coso Mountains, with people aggregated under the auspices of a village chief. Depending on the year's harvest some families might go instead to the Panamint Mountains to collect.

In the fall, some families went to Owens Lake in order to hunt ducks. Rabbit drives most often occurred at this time as well. Families who happened to be in the area would cooperate in large drives. The main drives occured at Little Lake, Rose Valley, Darwin Wash, Olancha, and near Cold Springs.

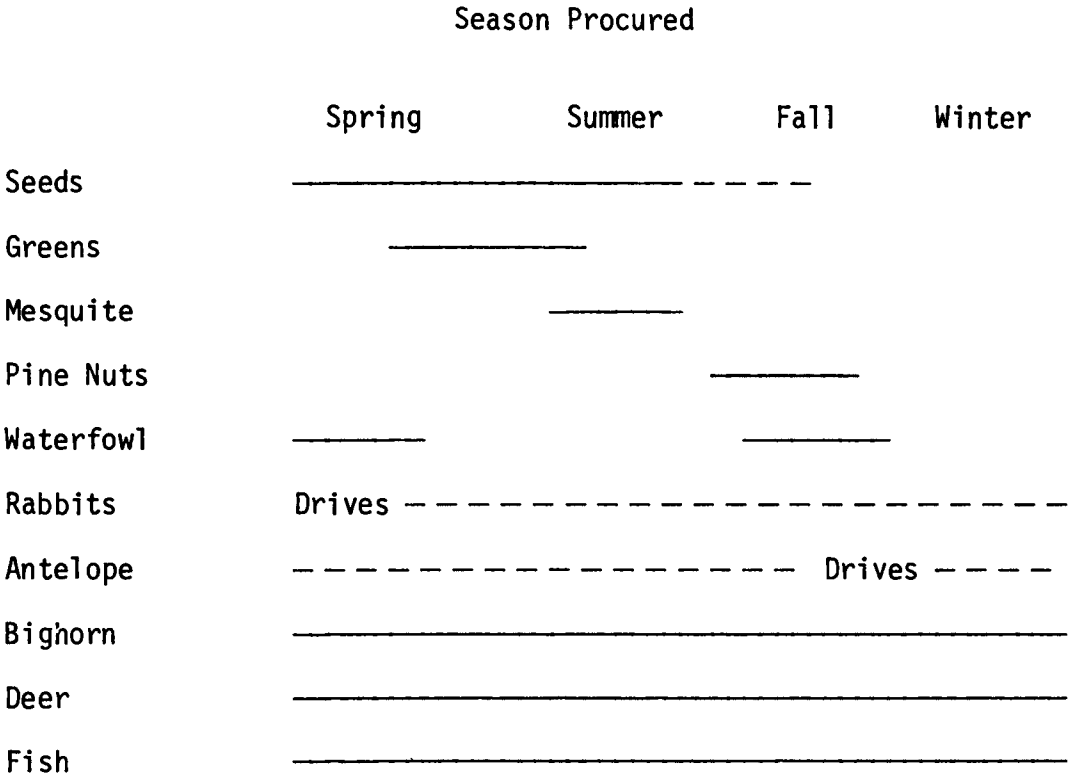


Figure 1. Major subsistence resources and their procurement periods.

Additional food procurement practices included the hunting of mountain sheep in the Cosos and/or Sierra Nevadas and of deer in the Sierra Nevadas, and fishing in Rose Valley or Little Lake.

Vegetal foods appear much more important than meat to the diet of the Little Lake Shoshone. Indeed, this is characteristic of most hunter-gatherers for which we have ethnographic information. Food stuffs which supplemented their diet were larvae procured in Owens Lake and caterpillars gathered from the grounds around Coso Springs, Little Lake, and other areas. Other minor food sources were bears, badgers, chuckwallas, gophers, mice, woodrats, doves, eagles, hawks, crows, snakes, bobcats, and mountain lions. Further, acorns were sometimes procured from the eastern skirt of the Sierras.

Social Organization

Social organization for the Great Basin groups in general, and as exemplified at Little Lake specifically, focused at two levels, the nuclear family and the village. The nuclear family performed almost as a self-sufficient economic unit; food production was nearly autonomous, as were decisions regarding settlement locations. The village served as a cooperative unit. Headmen, sort of village chiefs, were the only permanent leaders. Their positions were inherited from male relatives and they directed all communal activities, i.e. antelope drives and rabbit hunts.

Marriage practices seem to be somewhat unstructured. A negative marriage rule existed whereby an individual could not marry anyone who was related to him in any manner within several generations. Village endogamy was not prohibited, if the couple were unrelated. Since residence was so flexible, villages would usually consist of families who were unrelated. Parents arranged for the marriage of their children and associated with this practice was a form of reciprocal exchange. The male's parents would present shell money and the girl's parents would return the gift with buckskins and food. Intertribal marriages occured and were noted with Anglo-Americans, Tubatulabal, Kawaiisu and Owens Valley Paiute.

Post-marital residence followed a developmental cycle. Residence would be matrilocal until the birth of the couple's first child. Subsequently, the couple might set up a household of its own (neolocal) or (preferably) they would move to the husband's home territory.

Hunting and Gathering

As discussed above, the movements of the Little Lake Shoshone were a response to the differential ripening of the major vegetal resources within their area. Hunting was a secondary, albeit important adjunct, to vegetal procurement.

Gathering

The most important staple plant food for the Little Lake Shoshone was the pinon pine nut (Pinus monophylla). Pinon pine occurs in areas between 6,000 and 8,000 feet, on the upper slopes of the Coso Mountains. These nuts were harvested in early autumn and formed the basis for the winter diet (Steward 1938:82). Dutcher (1893:377-380) has described the process by which these nuts were collected by the Shoshone in the Panamint Valley. The pine nut camps were located within the pinon groves and consisted of several brush and wood windbreaks. The nuts were collected by women, who knocked the cones from the tree by means of a long pole with a hook at one end. The cones were collected and transported to the camp in large conical baskets. At the base camp the cones were placed on a large slow-burning brush fire which dried the pitch from the cones and released the seeds by forcing the cone scales to open.

The second most important plant food was bunch grass seeds, also known as Indian rice grass (Oryzopsis hymenoides). This important seed was gathered in late spring or early summer for storage (Steward 1938:26). The grass grew on the alluvial fans, valley bottoms, and in flat areas, with some soil development, in the Cosos. The harvest period for these seeds was limited to an average of ten days during which a particular stand would ripen and fall. The sucessful collection of these crops then depended on knowledge of local conditions and proper scheduling of vegetal procurement. The seeds were usually collected by women using seed beaters and collecting trays. In order to remove the chaff, seeds were subsequently winnowed and sifted through wicker - work sieves. Before cooking the seeds were ground and again winnowed. (Steward 1933:239; Coville 1892:353).

Other plants listed by Steward (1938:21-30) which his Little Lake informants identified as useful were:

Anisocoma acaulis - greens covered with hot rocks in small hole and cooked all day.

Calochortus gunnisonii - abundant in the Coso Mountains

Chrysothamnus - rabbit brush

Ephedra spp. - used for tea

Hookera sp. - abundant in the Coso Mountains - may be Broadiaea capitata

Lycium andersonii - a small red berry

Mentyelia dispersa - no further information

Poa nevadensis - bluegrass

Prosopis sp. - mesquite

Quercus sp. - oaks

Salvia columbariae - chia, seeds eaten

Sitanion hystrix - seeds eaten

Hunting

Antelope and Jackrabbit. It was a common practice for both of these animals to be taken by communal drives.

Antelope (Antilocapra americana), because of their exceptional speed and keen eyesight could not be effectively hunted by individuals or small groups of hunters but because of their herding tendency and excessive curiosity they could be lured into corrals. Hunters would usually chase the antelope into a box canyon, where a corral trap had already been constructed. The barrier was constructed of brush and logs of moderate height which impounded the animals because of their poor jumping ability.

Jackrabbits (Lepus californicus), live in forbs above the ground. They were hunted in large numbers by beating the brush and so scaring the animals into a U-shaped enclosure which was formed by a net set in the ground by means of poles. The net could be anywhere from 100 to 200 feet long. The rabbits would become tangled in the net or run in a circle and either be clubbed, or shot with an arrow.

Deer and Sheep. Deer (Odocoileus hemionus) probably did not occur in large numbers within the territory of the Little Lake Shoshone. They could be taken by a lone hunter or small stalking party either in the Coso Mountains or the Sierra Nevadas.

Bighorn sheep (Ovis canadensis) were probably of more dietary importance and were also more ceremonially significant (Grant et al. 1968) than mule deer. Weighting up to 300 pounds, the bighorn sheep of the Coso Mountains probably provided a sizeable meat source prehistorically. If the quantity of rock art depicting them is any indication of their importance, the bighorn sheep must have been very central to the hunters of the Coso Mountains. Grant has suggested that the hunters may have been responsible for the disappearance of the bighorn population from the Coso Mountains. He proposes that excessive hunting by means of ambush and possibly drive techniques led to overkill and eventual abandonment of the area by the bighorn sheep.

Cottontails and Small Rodents. Cottontails (Syvilagus spp.) and other small rodents occur in many areas around Little Lake, principally in brushy areas and rocky slopes. They are most easily taken with traps or snares. Sometimes they are hunted with bow and arrow. These animals served as a supplementary food supply and became more important in periods of scarcity of other resources.

Fish. Little Lake, since it was part of the Pleistocene Owens River drainage, probably contained similar sorts of resources. Bettinger (1975) notes that sucker and chub may be found in large numbers in the Owens River during spring. Species were probably netted or speared throughout the year, particularly in the summer.

Waterfowl. During the spring and fall waterfowl could be found both at Little Lake and Owens Lake. Bettinger (1975) indicates that the most common of these are Canadian geese, teal, and mallard.

ARCHAEOLOGY

Previous Archaeological Investigations

The earliest reported work in the Little Lake region was conducted by M. R. Harrington of the Southwest Museum. From 1948 through 1951 extensive excavations were conducted at the Stahl Site (Harrington 1948, 1949, 1950, 1951, 1957; Simpson 1949). The results revealed a substantial stratified subsurface deposit of material attributed to the Pinto period. Of further significance was the discovery of numerous house remains (seven in total) marked by a circular or eliptical patterning of post-holes. These house remains are among the most ancient yet discovered in North America. In association with his work at the Stahl site, a cave was excavated by S. M. Wheeler (Harrington 1953). The remains identified consisted of an upper stratum associated with a late prehistoric occupation, typified by Desert Side-Notched arrow points, European trade beads of red and blue glass, and other items of recent age; and a second stratum attributed to the 'Basketmaker' culture which was in fact probably of Elko period. Pinto points were found below the second stratum as were points similar to those found at Gypsum Cave (Harrington 1933). A badly decayed burial associated with a Pinto and Silver Lake type point was also found below the second stratum.

Further excavations in the area were limited to a midden site an eighth of a mile north of Fossil Falls (Harrington 1952). The Fossil Falls Site, (Plate 8), as it was called, revealed a significant deposit four feet in depth. The site contained two strata separated by a sterile lens. Apparently the earlier deposit dates to a period when a pluvial river ran through the now-dry channel. It was suggested that this deposit may be in excess of 10,000 years in age.

Lanning (1963) has reported on work conducted at Rose Spring, approximately 15 miles north of Little Lake. Rose Springs shows evidence of consistent occupation, dating to a slightly later period than the Stahl Site. Lanning suggested habitation initiating in Early Rose Spring times (ca. 1500 B.C.) and continuing through to the late prehistoric. Farmer (1937) and Harrington (1951) have reported on the obsidian quarry associated with Sugarloaf Mountain, a perlitic dome located on the Naval Weapons Center. This high grade obsidian source, only some five miles from Fossil Falls, served as the locus for quarrying activities prior to the transport of raw material or preforms to base camps and villages.

Recently, the rock art of the region has been the focus for intensive study (Grant et. al. 1968). Research aimed at determining a relative chronology for the drawings and at functional interpretations drew close attention to the concentration of rock art in the Coso Range. Minor localities noted included those at Little Lake and would be subsumed under the peculiarly unique Coso style.

Of current significance is the work of Emma Lou Davis at China Lake (Davis 1974, 1975). Her surface survey and detailed mapping program has presented us with exemplary field techniques and timely presentation of results. Her work has included a detailed surface survey and mapping program of the archaeological remains surrounding the lakeshores of pleistocene China Lake.

As yet unpublished research has been carried on at Little Lake, aimed at obtaining geochronological controls from coring and sediment studies (Mehringer and Sheppard ND). Mostly recently, Stan Berryman, a graduate student at San Diego State University, is excavating a site in a cove near the Upper Little Lake ranch, in conjunction with Emma Lou Davis. Preliminary work suggests occupation from Pinto times to the late prehistoric period (Berryman personal communication).

EXCAVATIONS AT THE FOSSIL FALLS SITE

Plate 9. The Fossil Falls site as it appeared ca. 1950 and as it appears presently. Mark R. Harrington on back dirt mound in upper picture, archaeologist and excavator of the site. Elvis Hulsey, manager of Lower Little Lake Ranch in lower photo.

Cultural Sequence

Introduction

Recently, archaeology has undergone a period of re-examination. Some would say a theoretical revolution has occurred, causing a reorientation of our goals (Leone 1972). These changes, whether seen as an abrupt demarcation or a gradual development, have caused a transformation in our priorities from the traditional task of developing culture history to a concentration on questions of a more processual nature. Some have gone so far as to divorce the more traditional line of research from the task of developing processual explanations based on cultural similarities and differences (Binford 1962, 1964, 1965, 1968a, 1968b; Deetz 1970:115; Watson et. al. 1971). It has been argued, that in order for archaeologists to deal with questions of a processual nature, accurate historical reconstructions must be established. (Sabloff and Willey 1967; Flannery 1967; Thompson 1972). If we are to accomplish our goal of accurately explaning prehistoric human behavior, the most profitable method will be an integration of recent innovations in method and theory with established practices. It is with this orientation in mind, that the information below, which falls into the category of culture history, is presented.

This data is provided in order that further research questions may be framed in the context of an established cultural sequence. The temporal context should serve as a baseline for future work and further research possibilities.

A cultural sequence fully appropriate for the Little Lake Locality has yet to be written, but drawing on work by researchers in the Little Lake area itself (Harrington 1948a, 1948b, 1951a, 1951b, 1952, 1953, 1957; Warren and Renere 1968) and from the adjacent environs (Lanning 1963; Hillebrand 1972; Davis 1974, 1975; Bettinger 1975), one may be tentatively constructed.

Projectile points will serve as the basis for these temporal periods, since they have been shown by archaeological researchers to have value as temporal diagnostics. The projectile point styles noted are illustrated in Figures 2 and 3. The period names will largely follow Bettinger and Taylor (1974), cf. Hall and Barker 1975. Table 1 delineates the periods mentioned, and indicates their chronological placement as correlated with Antev's climatic sequence.

Fluted Point Tradition

The earliest documented evidence for human habitation at Little Lake comes in the form of several fluted points noted by Warren and Renere (1968). These artifacts are typologically similar to Clovis and Folsom points. The presumed antiquity of these finds lies in their assumed contemporaneity with points of similar style in the Southwest and Great Plain. This would place them in a period ca. 10,000 B.C. As yet this

Table 1

Fossil Falls/Little Lake Cultural Sequence

Antev's Climatic Stages		(after Bettinger and Taylor, 1975) Projectile Point Series Named Period	Lanning (1963)
Medithermal	ca 1850	Marana (Cottonwood and Desert Side-Notched)	Cottonwood
	1500		
	1000	Haiwee (Rose Spring and Eastgate)	Late Rose Spring
	AD 500		
	BC 500	Newberry (Elko and Gypsum)	Middle Rose Spring
	1000		Early Rose Spring
	1500		
	2000	Little Lake (Pinto)	Little Lake
	2500		
	3000		
Altithermal	3500		
	4000		Lake Mojave
	4500		
	5000	Lake Mojave (Lake Mojave and Silver Lake)	
	6000		Lanceolate Points
Anathermal	7000		
	8000		
	9000	Fluted Point Tradition (Clovis-like and Folsom-like)	
	10000		

Figure 2*

Lake Mojave

a - Lake Mojave, California
After Warren and Renere, 1968, Fig. 3, d.

b - Lake Mojave, California
After Warren and Renere, 1968, Fig. 3, e.

Pinto

c, d, e - Stahl Site at Little Lake; from Harrington, 1957:50.

Gypsum Cave

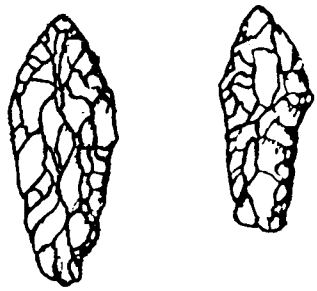
f - Gypsum Cave, Harrington, 1933:44.

Elko

g - NV CH 15, 1-17567 After Hester and Heizer 1973:21 Fig. 3, e.

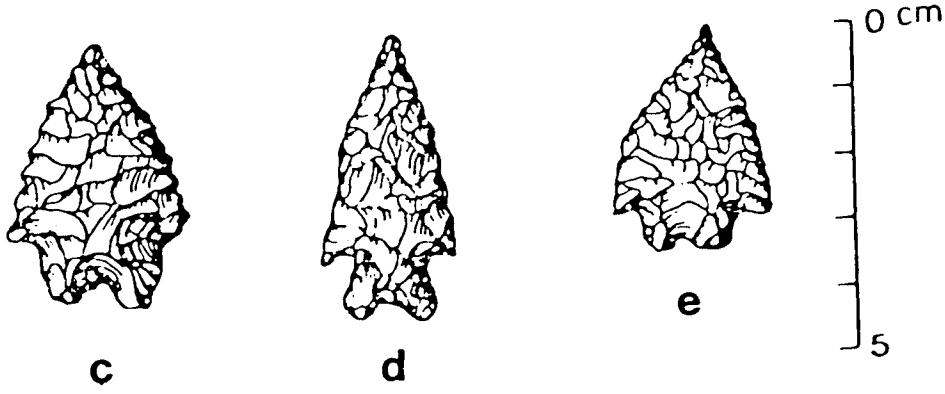
h - Field catalog S-28, NV E, 11 after Hester and Heizer 1973:21
Fig. 3, f.

*Line drawings after Hester and Heizer, 1973



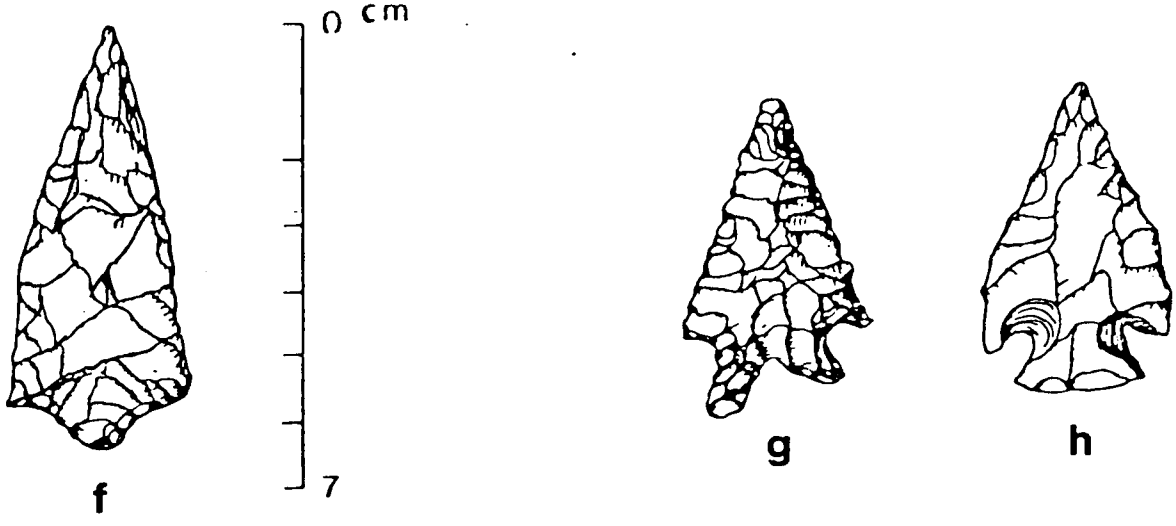
a b

0 5 cm



c d e

0 cm 5



f g h

0 cm 7

0 1 .5 cm

Figure 3*

Rose Spring

a - 1-65382; NV Ch. 15

b - 1-65606; NV Ch. 15

c - 1-18814; NV Ch. 15

a, b, and c - After Hester and Heizer 1973:23; Fig. 4, c, d, e.

Eastgate

d, e, f - After Hester and Heizer 1973:23; Fig. 4 o, p, g from site NV Ch. 15.

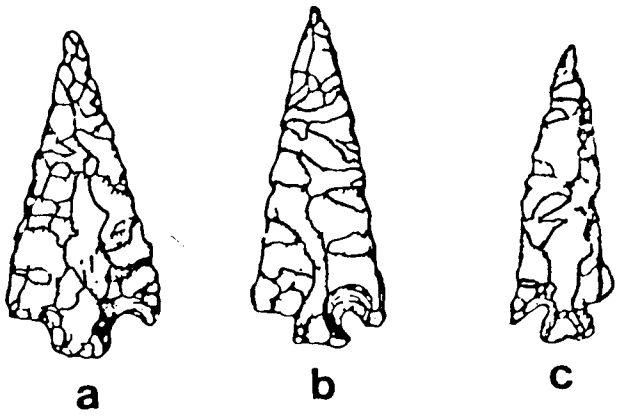
Cottonwood

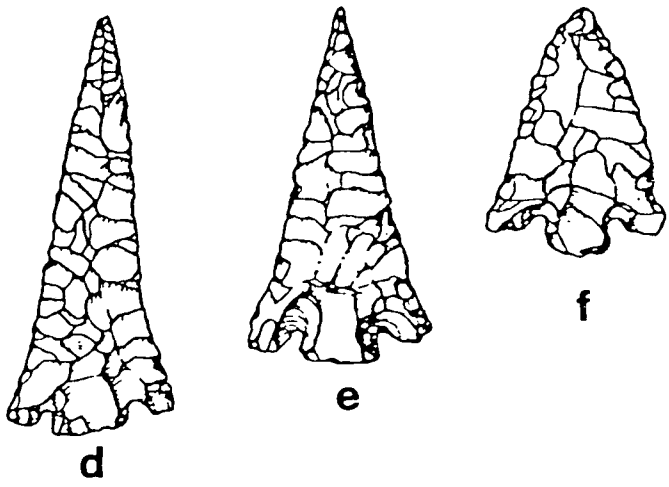
g, h, i, j - After Hester and Heizer 1973:23; Fig. 4, g, h, i, j, from site NV Ch. 15.

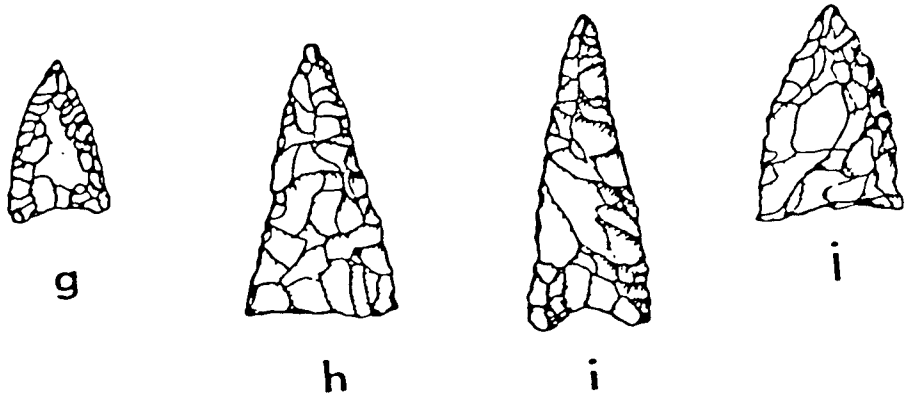
Desert Side-Notched

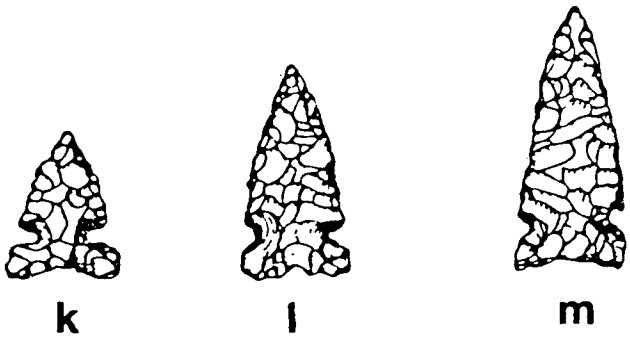
k, l, m - After Hester and Heizer 1973:25; Fig. 5, d, e, f, from site NV Ch. 15.

*Line drawings after Hester and Heizer, 1973.









0 1 5 cm

temporal placement has not been documented in the Far West and, in fact, association with later-dated material is a possibility. A further problem with the interpretation of these finds is the controversy surrounding an associated 'big-game hunting complex'. The argument revolves around whether these early point forms are actually associated with the procurement of extinct megafauna in the Great Basin, as they are in other regions. This has yet to be adequately demonstrated in a stratigraphic context, but tantalizing evidence is now being gathered on material at China Lake, 15 miles to the southeast. Davis (1974, 1975) has now suggested that, indeed, such an association may be indicated from surface finds. Both fluted points and extinct megafauna have been found on the shores of ancient China Lake, but the association has not yet been firmly established.

Western Pluvial Lakes Tradition

This tradition, first defined by Bedwell (1970:231), is associated with a general adaptation towards the exploitation of Pleistocene lakeshore habitats. At Lake Mojave, near the present town of Baker, in the eastern Mojave Desert, the Campbells (1937) have defined a complex based on the presence of highly sand blasted implements and points. These sand blasted artifacts occur on the shorelines of fossil Lake Mojave and in an area essentially equivalent with the outlet channel of Silver Lake at its northern end. This complex is characterized by the absence of milling equipment, and the presence of rough percussion flaked tools, hammers, crescentic stones, unifacial and bi-facial tools, choppers, scrapers, knives, drills, blades, and the diagnostic Silver Lake and Lake Mojave points. These remains have been interpreted as representing a predominantly hunting based economy with little emphasis on seed grinding or fishing, although this has yet to be substantiated in a stratgraphic context. Although there has been much debate over the chronological placement for this complex, it is currently generally accepted at ca. 6,000-8,000 B.C. (Warren and True 1961; Wallace 1962; Warren 1967).

Silver Lake and Lake Mojave type points have been reported by Harrington (1948, 1952) for the Little Lake area. Further, the author has reviewed several local collections which contain Silver Lake and Lake Mojave type points. It is assumed that this period of occupation would date to the overflow of Pleistocene Owens Lake via Owens River and the subsequent filling of Little Lake and China Lake. Recently work has been undertaken in order to date this event and further elucidate the chronology of the archaeological sites associated with the lake (Mehringer and Sheppard, ND). As yet, the earliest date reported for the associated sites is approximately 5,000 years B.P., but work to be undertaken may push back this date.

It has been suggested (Harrington 1957:70-73) that Silver Lake and Lake Mojave points at Little Lake might date later than their counterparts at the type site of Lake Mojave. Since both these point types are found in stratigraphic association with Pinto points dating to a later period, possibly these projectile point style had a greater duration in the Little Lake locality than at its counterpart in the eastern Mojave.

Lake Mojave and Silver Lake points have been recorded as surface finds by a local collector on the west side of Red Hill Playa. This type of surface find may suggest more ancient date, contemporaneous with the overflow of Owens Lake.

The Altithermal

It has been suggested (Wallace 1962:175; Kowta 1969; Hillebrand 1972; Hester 1973) that a considerable length of time may separate the manifestations of Lake Mojave and those of the subsequent Pinto Period. Hester and Heizer (1973) noted the absence of radiocarbon determinations for the period from 6 - 4,000 B.C. This time span correlates with Antev's Altithermal climatic period. This period of hot and dry climate, distinctly more intense than that of the present, is the subject for present discussion. Under debate is the significance of this period of dessication for man. Current archaeological and chronological evidence can not substantiate whether or not this period of dessication resulted in an occupational hiatus. It is interesting to note however, that Lake Mojave and Pinto points seem to be found in stratigraphic association at the Stahl Site and that no break in the chronological sequence is inferred (Harrington 1957).

Pinto Period

The Pinto period was originally defined by Campbell and Campbell (1935) on the basis of materials recovered from a series of sites located in the Pinto Basin in Riverside County. Points similar to those found by the Campbells were recovered by Harrington at the Fossil Falls site (Harrington 1952) and at the Stahl site (Harrington 1957). It has been suggested that the points retrieved bear such striking typological similarity to the Campbell's Pinto specimens that there is no doubt that they are one and the same (Harrington 1957:49). Others (Lanning 1963: 250-251) have preferred to use the term "Little Lake" to refer to "Pinto" points at the Stahl and Rose Spring sites.

Other investigators have noted that the term "Pinto" is rather loosely applied and broadly defined (Layton 1970; O'Connel 1971). Bettinger and Taylor (1974) have suggested that there is stylistic variation between the points from Little Lake and those from Pinto Basin. The former are less massive and more finely flaked and have characteristic deep basal notch, while the latter are thick and percussion-flaked, without the deep basal notch. Hester and Heizer (1973), in contrast with other researchers, see remarkable similarities between the two series and feel that the Pinto series still appears to posess cultural-historical significance, though they do agree that the Pinto series is in need of analysis and refinement. Hester and Heizer (1973), drawing on a set of radiocarbon dates, estimate the Pinto series to extend from ca 3,000 B.C. - 700 B.C. Bettinger and Taylor (1974) note a determination of an earlier date in Nevada, and put the terminal date at an earlier period. They suggest the Pinto period begins ca. 4,000 B.C. and ends about 1,200 B.C. Both these chronological estimates would bridge the waning period of the altithermal and the initiation of the moister medithermal peiods.

Newberry

The Newberry period is characterized by two projectile point forms, Gypsum Cave and Elko. The Elko series was originally defined by Heizer and Baumhoff (1961). The Gypsum Cave form is named after its type site, excavated by M. R. Harrington (1933) in Southern Nevada. Both forms have been described for the study area (Harrington 1952, 1957). Bettinger and Taylor (1974) set dates for this period at 1200 B.C. to A.D. 600.

Besides these distinctive projectile point styles, an abrupt increase in population and the initiation or enhancement of the stone tool assemblages for plant processing characterizes the period. Milling stones become more dominant in the tool assemblages manifesting this change.

Bettinger (1975) notes another change during this period. He suggests a shift in the location of occupation sites from typically riverine localities to desert scrub zones. Pointing to the sites at Little Lake (Harrington 1957) and Rose Spring (Lanning 1963), Bettinger sees the Stahl site as representative of the early use of riparian resources near to the sites, while at the later dated Rose Spring site, the setting and assemblage appear to be more representative of the use of dry land plants. This change is said to have taken place between the Clyde phase (4500 B.C. - 1500 B.C.) and the Cowhorn phase (1500 B.C. - A.D. 600).

Haiwee

This period is set apart from previous complexes on the basis that projectile points of the Rose Spring and Eastgate series represent the introduction of the bow and arrow into the Great Basin (Lanning 1963:268). Rose Spring was named by Lanning (1963) and Eastgate by Heizer and Baumhoff (1961).

The Rose Spring site is just 13 miles north of Little Lake and numerous points of the Rose Spring type have been found and described in the study area (Harrington 1952, 1957). Eastgate points seem to have a distribution mainly restricted to central and western Nevada. Harrington (1952, 1957) notes Eastgate expanding-stem points in the Little Lake area, although he refers to these as Basketmaker.

Radiocarbon determinations from a wide variety of sites containing these two forms suggest an initial date of ca. A.D. 500 and a terminating date somewhere near A.D. 1300 (Bettinger and Taylor 1974).

With respect to subsistence patterns during this period there is no conclusive evidence that the introduction of the bow and arrow brought about any significant economic changes. However, it has been hypothesized that the bow and arrow increased the efficiency of bighorn sheep hunters in the Coso Mountains and ultimately, caused wide scale decimation of the sheep (Grant et. al. 1968:112-115). The presumed adverse effects the bow and arrow may have had on animal populations may correlate with lexicostatistical information indicating a population shift out of the northern Mojave desert, ca. A.D. 900-1000.

Bettinger (1975) has indicated that his studies of the settlement - subsistence system within the Owens Valley document the inception of pinon - collection between A.D. 600 and A.D. 1000. If this inference applies to the most southerly part of the valley, Rose Valley or the Little Lake area, we might find a similar inception within the study area. This has yet to be documented.

Marana

In the late prehistoric or Marana period we see the introduction of ceramics, Desert Side-Notched and Cottonwood projectile points, and the advent of Paiute and Shoshonean peoples. Linquistic information suggests (Lamb 1958) that ca A.D. 950 these groups distributed themselves from southeastern California (in the vicinity of Death Valley) into the Great Basin. Other linguists date this migration at A.D. 1000 (Hale 1958:107) and A.D. 1450 (Goss 1966:272). These Numic speaking peoples, it is suggested, were originally related but spoke mutually unintelligible dialects; Northern Pauite, Shoshoni-Comanche, and Ute-Southern Pauite-Comanche. Lamb suggests that the division into these dialects occurred some 2,000 years ago.

Desert Side-Notched points were originally defined by Baumhoff and Bryne (1959). The Cottonwood forms were first identified by Lanning (1963). The point styles are fully contemporaneous and are present into historic times. Radiocarbon determinations indicate that Desert Side-Notched points appear ca A.D. 1100-1200 and Cottonwood points begin ca. A.D. 1300.

Late prehistoric materials found within the study area include both projectile point series (Harrington 1952, 1957). Further Marana period time markers appearing in the study area include Owens Valley Brownware pottery, ceramics, Olivella Wall beads and European blue and red glass trade beads, identified by this author from private collections.

Economic pursuits continued much the same during this period, although Bettinger (1975) identifies a sharp decrease in hunting of large game in his study of the Owens Valley. Evidence indicates that after A.D. 1000 most hunting which required long trips and the use of temporary camps ceased. This resource-use change has yet to be documented for the study area.

Aboriginal activity in the study area continued up till the disruption of native subsistence practices ca. 1900. Steward's ethnographic work (Steward 1938) attests to the occupation of the area, as does an interesting historic cache of aboriginal artifacts dating to the 1870's found some three miles south of Little Lake (McCown 1957).

Summary

From the works of Harrington in the study area, and from data available from adjacent locales, an occupational history for man in the Little

Lake area has been tentatively developed. Man probably initiated occupation in that area ca. 10,000 B.C. although evidence attesting to his activities is scant. During the period from 10-6,000 B.C. his activities were probably largely confined to lakeshore adaptations. Either lacustrine or megafaunal food sources served as primary foci for subsistence activities.

Between 6,000 and 4,000 B.C. a period of dessication and marginal occupation has been delineated. Partial abandonment of low-lying areas in pursuit of more attractive resources at higher elevations is a possibility. By 4 - 3,000 B.C. a basic foraging adaptation had been adopted. The appearance of ground stone implements such as manos, metates, mortars and pestles attests to an increase in vegetal processing and use. The bow and arrow seem to have been introduced ca. A.D. 500 as evidenced by the appearance of smaller and lighter projectile points. An expanded development of bow and arrow technology, and the advent of pottery mark the late prehistoric period.

Archaeological Inventory

In conjunction with the preparation of a management plan for the Fossil Falls area, a systematic archaeological inventory was conducted. Forty nine (49) archaeological sites and site complexes were recorded during a month of intensive field work. Most of these sites are located within the boundaries of an area less than 160 acres in size.

This reconnaisance was conducted by means of a one-man on-the-ground survey. All sites located were recorded on the Bureau of Land Management, Bakersfield District Archaeological Site Survey Form. This type of record documents site type, size, constituents, features, and environmental associations.

Most sites recorded were on National Resource Lands. Other sites in adjacent localities which appeared significant to an overall interpretation of land use patterns and site densities were inventoried, as were sites located with the aid of local informants, regardless of their significance or land ownership.

The site record form utilized by the author is the same as that used by the Desert Plan Staff and this data will be included in the Desert Plan's computerized data-storage-and-retrieval system. Most sites were photographically documented and all have been mapped on an enlarged version of the USGS aerial photo dated September 30, 1948, flight line GS-HG 1-106. (See Appendix 4 for site records and map.)

Methodology

Surface reconnaissance and site recording initially focused on the pluvial river channels of the Owens River northwest of Fossil Falls where there is the greatest density of sites in the area. Subsequently sites were recorded above the gorge below Fossil Falls both on the east and west sides. Lastly a cursory examination of other areas including the alluvial fan east of Red Hill cinder cone, the edge of Red Hill playa, a north-south strip running across an area of discontinuous lava flows and isolated boulders (directly north of Fossil Falls to the cinder mine road), and other areas locally known to contain archaeological resources, was conducted.

This survey obviously can not be regarded as thorough or all-inclusive. A single observer can not adequately record every archaeological site in an area as large as that being considered here, but an effort has been made to give a fair representation of the relative densities of archaeological remains in the area and of the associated environmental correlates. The results, give a fairly realistic picture of the areal densities and site types found in the Fossil Falls locality.

Patterning

During my inventory several land use patterns became apparent. These are detailed here in order to assist in management decisions and in the prediction of site locations in the future.

1. The greatest density of archaeological remains occurs in the vicinity of the Pleistocene river channels northwest of Fossil Falls. These sites are among the largest in areal extent and include surface scatters, open-air midden sites, rock shelters, caves, rock rings and milling features.

2. On the flats above the gorge below Fossil Falls, within easy reach of the pluvial river below them, are found caves, rock shelters, and open-air midden sites. These do not appear in as great a profusion as those previously noted.

3. Red Hill Playa is ringed with sparse but consistently distributed surface remains including isolated stone tools, chipping circles, milling features, sparse flake scatters, and isolated finds.

4. The area of boulders and discontinuous lava flows running from immediately north of Fossil Falls, north-south to Cinder Mine Road contains ephemeral, playa-related, temporary sites, usually unimpacted and in pristine condition. These indicate temporary occupation, probably related to lacustrian vegetal use.

5. Almost anywhere in the study area one can locate isolated or sparse scatters of obsidian flakes and/or milling equipment. This indicates the use of the entire area for vegetal procurement and/or processing.

6. There is a marked tendency for use of easterly oriented lava cliff faces either for camping spots at the feet of these rock faces or in natural shelters. This extensive use may be due to two factors. First, wind, which is very frequently quite strong, can usually be broken by such rocks and, second, the easterly orientation allows the shelters to catch the morning sun's warmth.

7. Known rock art sites in the area occur, for the most part, in association with water sources or near natural hunting areas (i.e., above gorges or in steep walled canyons). Survey conducted on National Resource Lands inventoried only three small sites with a total of less than 20 elements.

   The larger rock art sites (one with 25+ elements, others with 100+ elements) occur outside of those lands supervised by the Bureau of Land Management, but within short distances of these lands, in one instance an eighth of a mile (DA 32), and in others, several miles (DA 17, 18, 19, 33, 48).

Management Recommendations

Roads and Trails

The area within the Fossil Falls locality is marked by a system of dirt roads (See Map 3). The most easily defined access and that most used by visitors is the paved road to the east of highway 395 north of Little Lake. It is prominently marked with a highway sign designated Cinder Mine Road. This form of access should be maintained and some form of prominent directional sign indicating that this is the access into Fossil Falls should be placed below the Cinder Mine Road sign for both vehicle routes along the highway.

The first spur to the right, deeply marked by much vehicle use, leads to the Fossil Falls parking lot. The size of this lot seems adequate and should be maintained as is. A bright-orange-marked foot trail leads to Fossil Falls. It is recommended that this trail be improved in several ways:

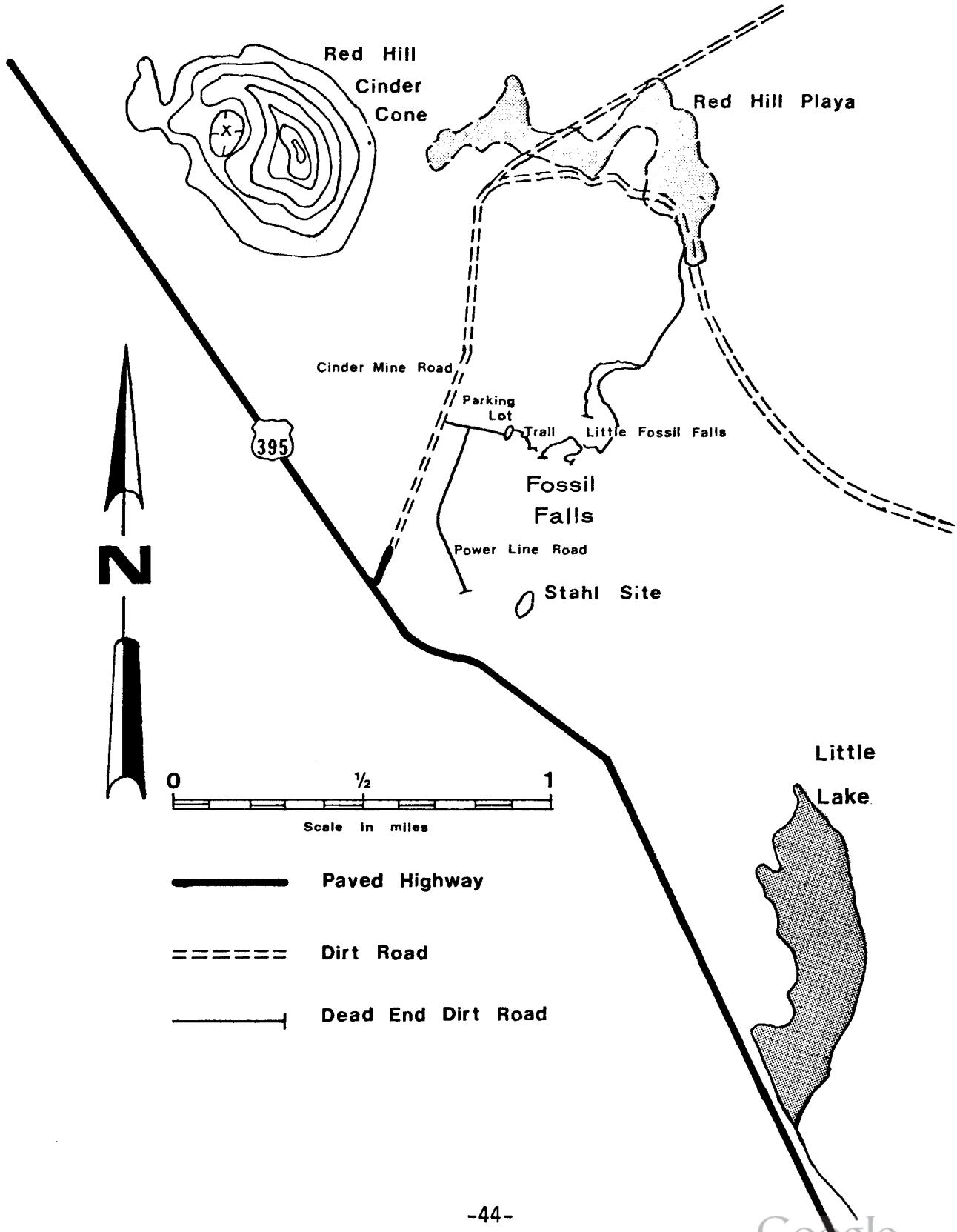
1. An appropriate name for the trail is essential for clarity. The name "Fossil Falls Trail" is recommended. This title should be embossed on a sign and placed at the initiating point of the trail.

2. A comfortable walking grade, not more than 10 percent is important for ease in travel. The trail should be made wide enough for two people to walk along side by side.

The existing trail is inadequate given these considerations. It is recommended that the trail be improved to meet these conditions.

Access to Fossil Falls can also be gained by vehicle. Vehicle access should be detered as delineated in the following section on 'Protective Barriers'. The Cinder Mine Road now permits access across Red Hill Playa to Little Fossil Falls and to Fossil Falls proper. These roads will most likely still be the general access routes for foot traffic in and around Fossil Falls.

MAP 3



MANAGEMENT RECOMMENDATIONS

Protection

Protective Barriers

There are four areas where barriers should be placed in order to protect fragile archaeological remains and to deter vehicular traffic (See Map 4).

These barriers should be made of anodized aluminum in a dark brown color, to blend with the natural dark brown-black patinated basalts of the lava cliffs. As an alternative wooden log barriers might be constructed at a lesser cost. These both would in effect, serve the same purpose. A break in the barrier to permit foot traffic should be included. Protective signing on the barrier should indicate the purpose of the barrier and the law regarding collection or disturbance of antiquities.

A suggested narrative for the protective sign to be placed on barriers in association with the yellow antiquities signs is presented here:

> This vehicle barrier has been placed here by the Bureau of Land Management in order to protect fragile archaeological resources. Vehicular travel, vandalism, and illegal collection have destroyed irreplaceable archaeological remains.

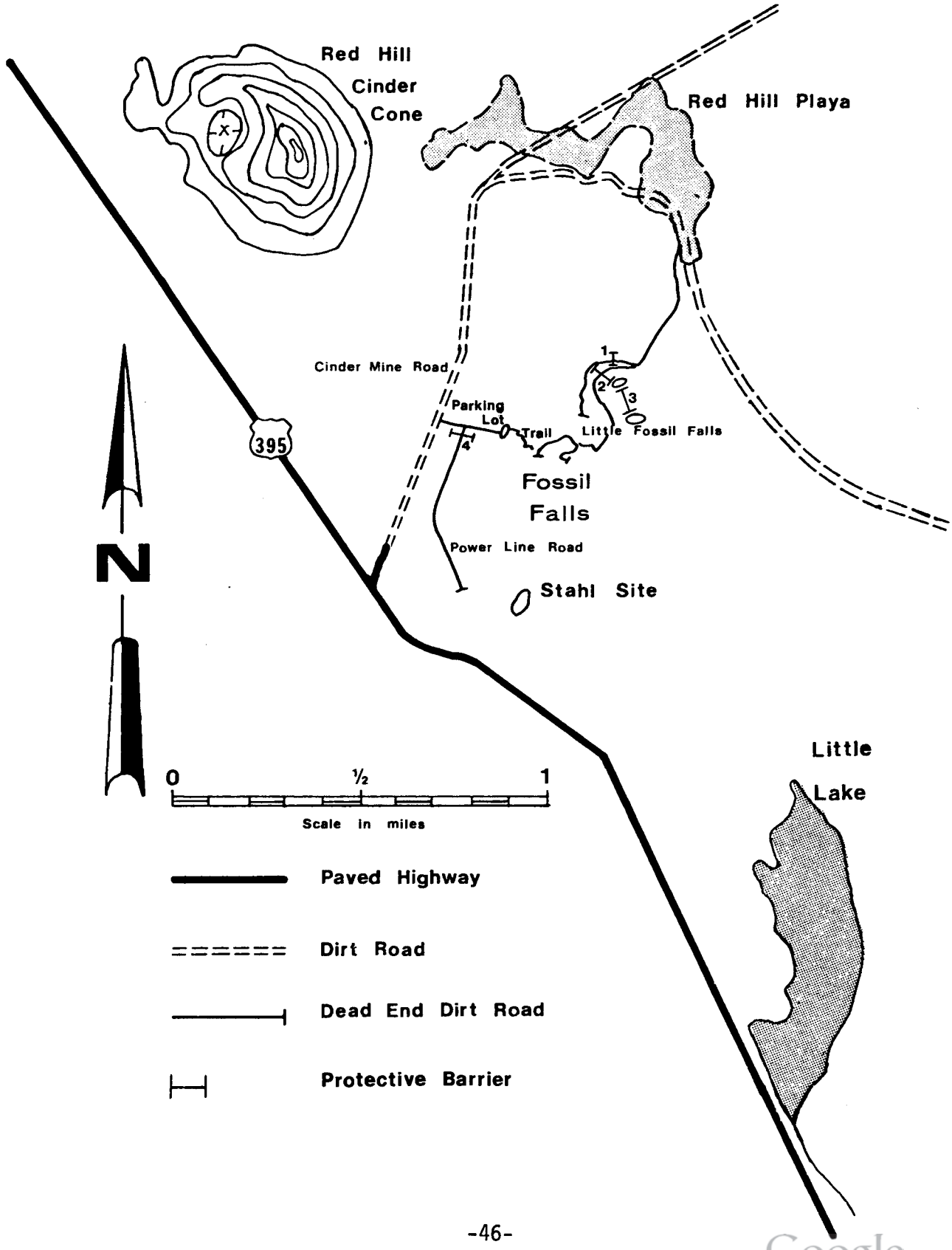
Please report any activity injurious to the resources of this property to:

> the patroling BLM ranger or,
>
> Bakersfield District
> Bureau of Land Management
> 800 Truxtun Avenue, Room 311
> Bakersfield, CA 93301
>
> (805) 861-4191

A small sign might be included or this phrase added to alert visitors to the availability of our brochure:

> Should you desire more information about Fossil Falls, an interpretive brochure explaining the archaeological and geological significance of the area is available at the Fossil Falls parking lot.

MAP 4



Barrier 1

It is recommended that Barrier 1 be placed at the mouth of the Pleistocene river channel leading to Little Fossil Falls. A dirt road follows this channel originating as the north fork of the road running off of Red Hill Playa, which starts as a spur off of Cinder Mine Road. The barrier would connect the two sides of the river channel, bounded by lava cliffs (Plate 10). This barrier would measure approximately 63 feet in length.

The barrier would deter access to Little Fossil Falls and the large sites directly adjacent to the north and south.

Barrier 2

Barrier 2 should be placed at the mouth of the river channel, which meanders to an area below Little Fossil Falls. The dirt road which follows the ancient river course is the only vehicular access directly to Fossil Falls proper. A yellow antiquities sign has already been placed at the western terminus for the proposed barrier (Plate 11). The barrier would run in an east-west diagonal, crossing the present road, and connecting to a prominent lava hill. The barrier would measure approximately 250 feet in length (Plate 12).

Barrier 3

Although a road does not presently exist in this area, the terrain is such that access could be gained to the dirt road going to Fossil Falls proper by circumventing Barrier 2 and traveling cross-country from the southern portion of Red Hill Playa across the flat area of Atriplex. In order to ensure protection against this possibility, Barrier 3 is necessitated (Plate 13). This would again block access to the main road into Fossil Falls itself, an area of great arcaheological site density. This barrier would measure approximately 150 feet in length.

Barrier 4

Access is currently being gained onto private land and national resource lands by means of travel along a powerline road. Pothunting has been very heavy at the Stahl site, near the mouth of Fossil Falls Gorge. In order to preserve this significant site and protect archaeological resources on national resource lands, a locked gate should be placed at the point where the dirt road branches off the access into the Fossil Falls parking lot (Plate 14). The dirt road is marked by a yellow sign stating "Not a Through Road." Permission would most probably have to be obtained from the power company involved and a key system instituted.

Plate 10. Barrier 1 blocking access to Little Fossil Falls.

Plate 11. Yellow Antiquities sign presently at western terminus of Barrier 2.

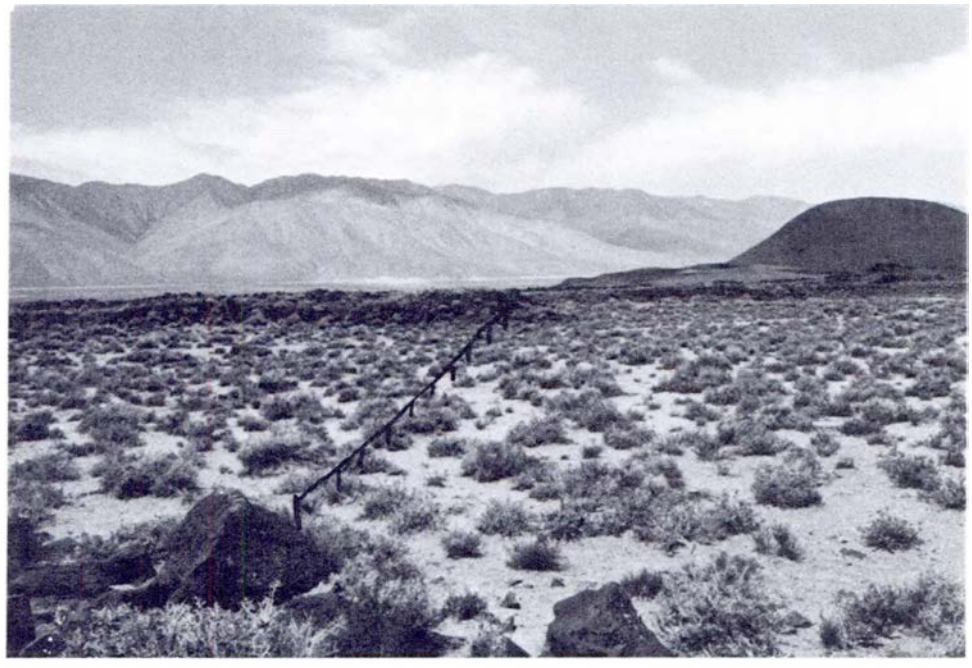


Plate 12. View west across Barrier 2.

Plate 13. Barrier 3.

Plate 14. Barrier 4.

Mitigative Excavation and Mapping Program

Fragile archaeological resources at Fossil Falls are now in the process of being destroyed. Local collectors have removed many of the temporally diagnostic artifacts from the surface i.e., projectile points and shell beads. More avid pothunters have been "mining" the area to unearth artifacts buried beneath the surface. These individuals in some cases are quite systematic. Their looting includes the excavation of large hand dug units and screening with one-eighth inch mesh hardware cloth.

In order to prevent the loss of further information some form of mitigative excavation is necessary. The information could then be retrieved through scientific methods, and subsequently curated and stored in a recognized educational institution or museum. This would make the information available for further interpretation and preserve it for future scholars.

The most heavily impacted areas in order of intensity are:

1. Little Fossil Falls South (DA 35) - This site complex contains open air sites with substantial midden accumulation (up to four feet deep), rock shelters, caves, rock rings, and surface flake and tool scatters. The complex has been severely impacted, but the degree of severity has not been determined. Future work should evaluate the extent of damage to the resource, by answering the following questions:

   How deep have the pothunters excavated?

   How much of the site area has been disturbed?

   Is there significant subsurface deposit, substantial enough to make future work profitable?

   In order to answer these questions, a systematic mapping program should be initiated, to inventory and record in detail the existing archaeological resources and the extent of damage to these areas. Associated with this test excavations should be undertaken to determine the depth, quantity, and areal extent of deposits.

2. 'Bad Potting Area' (DA 11) and Harrington's Fossil Falls Site (DA 12) -These two contiguous areas located at the base of the lava flow on the west side of the dirt road running to Fossil Falls proper, have been heavily impacted. Harrington (1952) has indicated that the Fossil Falls site contained a subsurface deposit in excess of four feet. If this is indeed the case, it is most likely that the potholes of recent vandals have not tapped the true extent of these subsurface remains. But the extent of damage since 1952 is not known with any certainty.

   It is recommended that;

a. Test excavation be initiated to determine the extent of damage to the subsurface deposit.

b. Test excavation be further oriented towards the end of determining the depth, quantity, and areal extent of subsurface remains.

3. Little Fossil Falls North (DA 28) - This site area is much less severely impacted than neighboring Little Fossil Falls South (DA 35). In order to protect fragile archaeological resources from further destruction, some form of mitigative excavation, and a mapping program is necessitated. A small scale test excavation is recommended, for the purpose of preserving a small sample of the archaeological data available. A mapping program, undertaken concurrently with the excavations, to record damaged versus pristine archaeological resources, is also deemed important.

4. Rock Ring Village (DA 3) and Fossil Falls Shelter (DA 4) - On the tablelands above Fossil Falls gorge, at the head of the falls, are preserved several rock rings, and a rock shelter.

   According to visitors to the Falls many more rock rings were visible, in the past which through the years, have been tumbled, scattered, and obliterated. It is recommended that the existing structures be completely mapped and recorded before they too are destroyed.

   Fossil Falls Shelter has also been potted, but considerable midden accumulation still remains. It is recommended that some form of mitigative excavation be initiated, and a detailed map of the site and vicinity be prepared.

5. Archaeological Resources at the Fossil Falls Locality - In total, the Fossil Falls area presents an abundance of archaeological remains, ranging from isolated finds of stone tools to extensive open-air midden accumulations. These fragile resources are in danger of destruction through collection and 'pothunting'. A systematic mapping program is recommended in order to preserve the vital contextual information so easily destroyed by casual collection.

   This mapping program would provide detailed information regarding the relationships of sites and site complexes, the degree of impact to, and the areal extent of each. This information is necessary and pertinent to further management decisions regarding the Fossil Falls archaeological locality.

Recreation

From the author's month of field work and observation and from numerous contacts at Little Lake and with visitors to Fossil Falls, visitor use in the area has been discerned to be quite variable. Substantial visitation usually begins after Easter and continues throughout the summer. Most weekends during the year see heavy visitation although, from my experience, this seems to be mostly in the nature of organized groups (i.e., geology classes, historical societies, rescue teams, rock and mineral clubs, etc.). Although weekends see the heaviest use of the area, it is quite possible on any particular weekend to find few, if any, visitors. During the week, at least one or two vehicles can be noted daily. These will usually represent lone individuals who come to the area for solitude and may stay the night to camp.

In discussing various options with locals and visitors to the area, it was generally agreed that the area should "stay like it is" or have as minimal an amount of change as possible. I tend to agree with this general preference and suggest only those changes necessary for a low level of management.

Recommendations

1. A minimal day use facility should be established in a location where the most minimal alteration possible to the natural features of the landscape need occur. Day visitation should be encouraged; overnight camping facilities should not be established. However, overnight camping should not be prohibited.

2. Graffiti in the form of spray-painted designs in the parking lot area should be eradicated, either with paint of the same color as the natural rock or through sandblasting.

3. Ranger patrol or an on-site ranger station (trailer ?) should be instituted during weekends and peak visitor-use periods. One of the duties of rangers should be to lead guided tours of the area. Rangers should be acquainted with pertinent archaeological, ethnological, historical, and environmental information about the area.

4. Subsequent to the implementation of recommendation number three, several trash containers, picnic tables and rest room facilities. in the form of portable toilets should be imported to the area.

Lands

It is recommended that the Bureau of Land Management acquire the 80 acre parcel below Fossil Falls (T. 23 S., R. 38 E., E½ NE¼ Section.6, MDM.

This privately owned parcel contains significant cultural resources including the Stahl site and cave (DA 19). This site dates to as early as 3-5,000 years B.P. and contains some of the earliest recorded house remains in North America. The archaeological resources located in this parcel are directly related to those noted above the dry falls. This parcel should be acquired for continuity in management actions.

The original owner of the parcel containing the Stahl site, Jack Mohrhart, has indicated that the current owners would most probably be amenable to some sort of agreement with the Bureau of Land Management. If purchase or exchange is infeasible, possibly some sort of compromise could be arranged, in which the Bureau could manage the noteworthy resources of the property. Management might include protection and/or interpretation of the significant cultural resources found within the parcel.

The current owner of the lot is:

D. O. P. Investment Company
923 Bay Blvd.
Newport, Oregon, 97365

Interpretation

Three forms of interpretation are recommended to enhance the cultural resources found at Fossil Falls and to increase their educational values. They are:

1. A brochure will be prepared dealing with the natural history of the area and pointing out significant features of the landscape, including those pertaining to archaeology, vegetation, wildlife, and relict hydrology.

2. A free standing interpretive display (Kiosk) will be placed within the parking lot area at Fossil Falls. The display will include a map of the general area delineating points of interest and existing trails.

3. Rangers will serve as guides for interpretive walks within the confines of the Fossil Falls archaeological district.

   Talks might focus on such topics as:

   a. The prehistory of the Fossil Falls/Little Lake area.

   b. The preculiarly unique rock art style of the Coso Range - pointing out the Fossil Falls/Little Lake area as a peripheral one within the major complex. (visual aid Five Bighorn Rock Shelter)

   c. Relict hydrological features in the Fossil Falls area.

   d. Past periods of active vulcanism at Fossil Falls.

   e. The fauna and flora at Fossil Falls.

Brochure

The brochure should be made available at the Fossil Falls parking lot, at the entrance to the trail leading to Fossil Falls. A metal dispenser could be placed in association with the free-standing interpretive display.

Other literature could be made available as well including the "Grave Robbers" pamphlet and possibly the notice entitled "Public - No. 209".

The following narrative has been developed and is suggested for use in the interpretive brochure.

Fossil Falls

The Fossil Falls geological site is a spectacular dry waterfall formed some 10,000 years ago by the fast moving waters of the glacial Owens River. The former river cut through a lava flow and formed a gorge which drops approximately 45 feet. At the head of the falls one can see deep pot holes and stream polished rock surfaces. Some fluted forms go completely through the lava boulders to form hollow tubes.

Name

Fossil Falls was named by archaeologist Mark Raymond Harrington while doing fieldwork for the Southwest Museum in the early 1950's.

The significance of the site became apparent when he discovered substantial remains of prehistoric man along the old river courses above the Falls and at the area below near Little Lake.

Vulcanism

The rugged and primitive features of Fossil Falls are the product of volcanic activity. This area has seen an intense and recent period of active 'vulcanism'. Lava flows have erupted from fissures within the earth and volcanoes have poured forth molten rock and rock foam. The black rock you see is basalt formed slowly from liquid rock turned solid. The prominent red hill dominating the skyline to the north was formed more violently. The structure is known by geologists as a cinder cone. It is created when gases are trapped in rock and collect. Eventually this gas blows outward from the vent and turns into rock foam which settles to form the cone. The red porous rock is called scoria. The cone has been mined since 1948 for cinders and 'light weight aggregate'. The material is used as an additive for cement, as decorative rock, as building blocks, and for many other commercial purposes. Another volcanic feature is the dome shaped mountain to the northwest (known locally as Sugarloaf Mountain). Geologists call this a perlitic dome, it has a characteristic hummocked appearance. Associated with the mineral perlite is the volcanic glass obsidian. The black scar you see in the center of the dome is part of a mile long seam of obsidian.

Obsidian was used by the native inhabitants of the area to chip their stone tools and implements. Many 'flakes' of this material can be seen on the surface of the ground in the vicinity of Fossil Falls.

Prehistory

Indians began living in the vicinity of Fossil Falls more than 10,000 years ago. At that time the dry lakes and river courses one now sees were filled with water, and the vegetation and climate were somewhat different.

A system of inland water-ways existed and large lakes filled China Basin as well as Panamint, Searles and Death Valleys. Man adapted to the use of animals and plants associated with these lakeshore environments.

Glacial changes caused the climate to change and there was a period of aridity, drier than the present from 6 - 4,000 B.C. Since this period the climate has been similar to that which now exists.

The native inhabitants of the area have been called 'Koso', an Indian word meaning fire. The Koso were characterized by a hunting and gathering way of life which continued throughout the entire span of time that the Fossil Falls area was occupied.

Small but significant changes took place in the culture of the Koso during this time. When lakeshore environments were no longer available, subsistence persuits changed to an emphasis on desert plants and animals. A heavier emphasis on plants increased the use of milling tools to process this food. Earlier, large dart points were affixed to spears. Later, about 500 A. D., the bow and arrow was introduced and small light weight arrow points began to be used. Recent research suggests that about this same time a new plant resource, the pinon (pine) nut, began to be systematically collected. In the late prehistoric period, pottery began to be used and the variety of storage containers increased.

Foraging

Hunting and gathering served as the basis for the economy of the native inhabitants of this area for over 10,000 years. The habits of these Indians were largely determined by the seasonal availability of wild plant foods. Village locations and movement tended to coincide with the ripening of different economic plants. The recent native inhabitants of the area, the Shoshone, maintained a winter village at Little Lake. During the spring, women would gather greens and seeds while men hunted rabbits and sometimes large game. A communal antelope hunt was undertaken at this time, usually in the area of Brown (ten miles to the south). In the summer, most families gathered seeds in the Coso Mountains. Some families might go to either Death Valley or Saline Valley and gather mesquite beans at this time. During the fall, pine nuts would be collected and stored for winter use.

'Rabbit drives' were also held during this season. The drives were held in places where rabbits were numerous and several families cooperated in the hunt. Nets were used, each about two feet high and perhaps 100 feet long. Individuals would beat the brush, scaring the rabbits and driving them towards the nets, where they would be ensnared and shot with bow and arrow or clubbed.

Bighorn sheep and mule deer were also hunted.

Also eaten was smaller game including most rodents, many insects and several types of lizards and snakes.

Archaeological Features

Numerous remains from the lengthy perhistoric occupation of Fossil Falls may be noted in many places within the archaeological district.

Types of sites one may see include:

Flakes Scatters: Areas where one may see bits of obsidian and other stone material chipped by the native inhabitants to make their tools and stone arrow and dart points.

Milling stations: Indications of places where plant processing was conducted. One may see an isolated round fist sized cobble used as a hand stone called a 'mano' or a flat hard rock slab where the material to be ground was placed. These are called 'metates'.

Concave depressions of lighter color found on flat surfaces of the darker volcanic bedrock are also 'metates'. These are sometimes called 'grinding slicks'.

Utilized shelters and caves: Sheltered from the wind, natural rock openings and overhangs were used by the Koso for occupation areas. Many of these may be seen within the lava flows and at their bases. Sometimes rock walls were added to help break the wind.

Rock rings: Circles of lava boulders used as the bases for brush superstructures can be seen in many places within the archaeological district. Some have well-defined entrances, usually facing to the east. This eastern orientation could have served to warm the house by catching the morning rays of the sun.

'Midden' areas: Sites where intensive camping activities took place are marked by a discoloration in the local soils. This darkened soil is what archaeologists call 'midden'. It is the product of an addition of organic remains, the decaying product of refuse, to the soil.

Petroglyphs: Designs and pictures pecked, etched, or incised into the volcanic rocks are called 'petroglyphs'. The surface of these volcanic rocks are shiny and dark with desert varnish. Pecking through this weathered surface reveals the lighter colored rock beneath and allows the production of rock pictures.

Wildlife

A suprising number of animals live within the Fossil Falls area. Notably a great number of lizards may be seen. These include the Desert Horned Lizard, Collard Lizard, Western Whiptail, Zebra-tailed Lizard, Side-Blotched Lizard, Desert Spiny Lizard, Desert Iguana, and Chuckwalla. Most unusual perhaps is the Chuckwalla (Sauromalus obesus). It is California's largest native lizard and full-grown individuals may reach a length of eighteen inches and have a body four inches wide. They may be noted mainly on sunny days during the spring and summer basking on rocks sillohuetted against the sky. In the winter they hibernate.

Other animals which can be seen include the jack rabbit (Lepus californicus) cottontail (Syvilagus audabonii), woodrat (Neotoma lepida), and antelope ground squirrel (Ammospermophilus leucurus).

Plants

The desert is not as devoid of vegetation as one might think. Here at Fossil Falls a great number of plants may be seen. The most common shrub is saltbush (Atriplex sp.). Saltbushes inhabit alkaline soils throughout the Mojave Desert and are often tolerant of very dry soils. The creosote bush (Larrea divaricata) is also a common form. It is probably the most dominant and widespread shrub in the Mojave Desert. Its root system spreads out to some distance close to the surface in order to absorb whatever moisture is available after rains. Another interesting shrub is Anderson's thornbush (Lycium andersonii). During the spring it produces small red berries, that resemble miniature tomatoes. The plant is in the same family as the tomatoe, Solanaceae. Indians would pick these berries in great numbers and eat them.

If winter rains are adequate a good display of wildflowers can be seen in the spring. Flowers which can be noted include Mojave aster (Machaesanthera tortifolia), Desert Mallow (Sphaeralcea ambigua), and Thistle Sage (Salvia carduacea).

Preservation and Protection

All objects within the district including Indian artifacts, rocks, wildflowers, and animals - must be left in place undisturbed so that others may enjoy them. This protection is a matter of law, it also conserves resources and shows consideration for others. The Bureau of Land Management is working to control the destruction of archaeological remains, as well as prevent new disturbances from taking place. Barriers have been constructed within the Fossil Falls area to prevent vehicle access which would further damage fragile archaeological remains.

If you see anyone engaged in activity which you feel is injurious to the natural resources of this property or is engaged in any illegal activity - including collection or excavation of Indian remains, please report this to:

Bakersfield District
800 Truxtun Avenue, Room 311
Bakersfield, CA 93301
(805) 861-4191

or the patroling BLM ranger.

Your cooperation in preventing further destruction of our national resources is urgently needed.

Administration

Fossil Falls is administered by the Bakersfield District, Bureau of Land Management, U. S. Department of the Interior. This agency is responsible for the multiple-use management of the 450 million acres of national resource lands, encompassing such renewable resources as timber, forage, and wildlife and such non-renewable resources as archaeological sites and minerals. BLM manages some 16 million acres in California, of which 12 million are in the California Desert.

For additional information contact:

State Director
Bureau of Land Management
2800 Cottage Way, Room E-2841
Sacramento, CA 95825
(916) 484-4724

Interpretive Display

In this section specific recommendations and suggested narrative for an interpretive kiosk will be detailed.

1. First, a map should be provided orienting visitors to the location of Fossil Falls within the general area of the Northern Mojave Desert in California. This map might also illustrate an example of the Pleistocene lake system, like that shown in Map 1 in the body of this report.

   Narrative:

   Fossil Falls is located in the southernmost section of Owens Valley, in the area known as Rose Valley. The valley is flanked on the western edge by the Sierra Nevada Mountains and by the volcanics of the Coso Range on the east. Fossil Falls lies within the channel of glacial Owens River, which was formed when Owens Lake overflowed during the Pleistocene age, over 10,000 years ago. Other lakes (now dry) which were filled during this period include Searles Lake, China Lake, Panamint Lake and Manly Lake.

2. An enlarged aerial photograph for the area translated into map form should be keyed to points of interest. Each point of interest should be illustrated with an appropriate photograph in order to give the reader some idea of what to look for. Points of interests suggested for highlighting and descriptive narrative follow:

   A. Fossil Falls - Some 10 to 15,000 years ago the fast moving waters of the glacial Owens River cut through a lava flow forming this spectacular now - dry waterfall, which drops approximately 45 feet.

   B. Little Fossil Falls - Lava boulders have been potholed and eroded into fascinating shapes and forms in this smaller (15 foot) drop of the same glacial river.

   C. Red Hill Playa - Within the ancient channel of the Owens River, this now dry lake was full during the Pleistocene age, over 10,000 years ago.

   D. Red Hill Cindercone - An extinct volcano whose violent formation resulted when gases collecting in liquid rock finally blew the rock outward turning it into rock foam. The foam settled forming the cone. Its red color is due to the presence of iron in the rocks.

   E. Old River Channels - The channels of the glacial Owens River cut through the lava flows in the vicinity of Fossil Falls. Numerous archaeological sites can be noted on the banks between which the river once flowed.

F. Five Bighorn Rockshelter - One of the few 'petroglyph' sites in the immediate vicinity, this Indian rock drawing depicts five bighorn sheep and a 'medicine bag' motif. These designs are of the Coso Rock Art style. Major concentrations of rock art of this style lie within the confines of the China Lake Naval Weapons Center.

G. Fossil Falls Archaeological Site - Mark R. Harrington, archaeologist at the Southwest Museum, excavated this site in the late 1940's. Evidence that occupation of this site dates to a period about 10,000 years ago was found. Later periods of occupation are also noted at this site.

3. Archaeological features will be included as another subject for display. Five by seven inch photographs should depict first an ethnographic example of the function of the feature described. A second photo, should depict a local example of the archaeological feature described.

Descriptive narrative and photo suggestions for each feature follows:

A. Flake Scatters - The initial photo could show a native Californian either manufacturing a projectile point or using percussion on a large cobble. Second photo would show a flake scatter or 'chipping circle'.

Narrative: Flake scatters are the material remains of stone tool manufacture. Bits of obsidian and other stone were fashioned into tools. A flake scatter represents the waste products of stone tool manufacture.

B. House Features - Three photos could be used here.

The first would show an excavated house site at the Stahl site (Harrington 1957). This photo would depict the post hole pattern left beneath the ground for archaeologists. I would suggest using Figure 26, page 33 from Harrington's manuscript.

A second photo showing one of the 'house rings' at Fossil Falls would do well for comparative purposes.

A third photo showing an ethnogrpahic example of this feature would put the sequence in perspective. One such photo is found in the Journal of California Anthropology, summer 1975, page 52, figure 14.

Narrative: The remains of house structures can be seen on the surface of the ground, as represented by rock rings (Photo 2), or beneath the ground as represented by a circular patterning of post holes (Photo 1). House structures at Fossil Falls may have resembled that shown in Photo 3.

C. Bedrock 'Metates' - Two photos the first showing a woman using a grinding slab, the second depicting a grinding slick can be used.

Narrative: Concave depressions on flat surfaces of the volcanic bedrock were used to grind hard seeds. Vegetal foods processed in this manner included pinon pine nuts, Indian rice grass seeds, and chia seeds. Portable grinding slabs were also used, as seen in the first photo.

D. Rock shelters and Caves - Two photos, one showing a typical example of a rock shelter, another showing a cave could be used.

Narrative - Rock shelters and caves provided protection from the elements for the prehistoric inhabitants of Fossil Falls. Many such shelters have an easterly orientation providing protection from the strong westerly gales and allowing the rays of the morning sun to warm the shelter.

4. A general statement set in bold-face lettering should be highlighted on the kiosk. This statement would serve as an overview of the area's resources.

Narrative:

The history of the geological site known as 'Fossil Falls' is a story of the struggle between molten rock and fast moving river waters.

A major river carrying water southward from Owens Lake has intermittently flowed through a narrow trough between the Sierra Nevadas and the Coso Range. Molten rock from volcanic eruptions has invaded the area several times as recently as 20,000 years ago. This lava intermittently clogged the river channel and erosion has carved the channels one can now see. The dry falls you see display the characteristic features of this erosion, including potholes formed through the scouring effects of sand and boulders churning and grinding away at the rock.

Prehistoric man found the banks of the river courses pleasant places to live. The physical remains of 10,000 years of occupation are manifested in the many different types of archaeological sites one can see at Fossil Falls.

Enjoy your visit to Fossil Falls and remember to protect the resources of the area. All objects including Indian artifacts, rocks, plants, and animals must be left in place undisturbed so that others may enjoy them.

Research Opportunities

Up to this date, a very limited amount of archaeological research has been conducted within the study area. As yet we know only the general outlines of the prehistory for this area. Given this general outline perhaps we can focus on those questions most pertinent in terms of future research opportunities.

Since the Fossil Falls locality has been occupied for at least 10,000 years, many interesting changes have undoubtedly taken place over the span of occupation. We know that a considerable amount of environmental change has taken place during this period. The occurance of several technological breakthroughs over the time span (i.e, the use of milling tools, the replacement of the spear and atlatl with the bow and arrow, and the inception of pinon nut gathering) is evidenced. It is believed that substantial population shifts have occured, most recently that indicated by the dispersal of peoples related to the Shoshonean language family. This general information suggests certain processual questions as bases for research.

Specifically, in the study area, we have a cultural manifestation termed the Pinto or Little Lake complex. How different this expression is from that found at the type site at Pinto Basin has yet to be detailed. Further, researchers have not yet firmly established the temporal placement for this complex at Little Lake. Obsidian hydration research as yet unpublished by Jon Ericson accomplished in conjunction with his dissertation research at the Universtiy of California, Los Angeles, could provide the key to absolute chronological controls for the area. Since the Coso obisdian quarry is such a short distance from the Little Lake area it is quite likely most of the obsidian used can be related to this source. Once sourcing is accomplished, a hydration rate can be established, if indeed one has not already been detailed through Ericson's efforts. The Little Lake remains could then be dated by using the method of obsidian hydration.

Further clarification of the Pinto complex would entail the development of operational criteria for identification of specimens belonging to the Pinto projectile point series (See Thomas, 1970). As stated previously (see cultural sequence section) this particular series is especially in need of refinement. Such refinement might be gained by the use of statistical tests based on polythetic criteria evaluating the validity of this type concept. Correlative with this study would be an evaluaton based on similarities and differences in specimens, with stratigraphic controls. Such a study could most easily be carried out using the substantial subsurface deposits found at Fossil Falls and Little Lake, or if possible by a detailed reworking of Harrington's material.

In another vein, the Fossil Falls archaeological locality might be used in a test of Campbell Grant's model of bighorn sheep decimation by the Coso hunters as suggested by his study of rock art. Grant has stated:

> In the Early Period, the Coso hunters armed with the relatively inefficient atlatl, used rock pictures as an important psychological or hunting-magic aid. The evidence of early Spanish explorers shows that the numbers of bighorn in the Great Basin and in the Southwest were enormous and well able to withstand such hunting pressure as the Coso atlatl hunters could bring to bear. With the introduction of the bow, a great step forward was taken in the art of killing game. With the bow as prime weapon and the development of large communal hunts, the kill rate must have gone up sharply. . .
>
> The use of dogs, beaters, and dummy hunters along the cliffs, and especially ambushing on the migration routes through canyons, helped make a large harvest of sheep possible . . .
>
> A point of maximum killing, we believe, was reached in the Late Period and brought on the development of a sheep cult, a period when the rock pictures suggest the animal was revered as an object of worship and veneration. It is probable that with the improved hunting techniques, hunting magic was no longer the main motivation for the pictures. Somewhere along the line however, the point of overkill and insupportable harassment of the bighorn was reached, causing them to abandon the area.
>
> (Grant, et. al. 1968:41-42)

The study area lies within the stylistic boundaries of Coso Range rock art style, and during the author's brief reconnaisance of the area it was noted that all three periods of rock art style are well-represented. Given the time depth apparent in the study area, investigation of subsistence change through time and the effects of the bow on prehistoric populations could be most advantageously studied. Further investigation would seem to dictate close attention should be paid to the reconstruction of faunal assemblages for the periods under examination.

Other studies, of course, could be detailed, and these suggestions are not meant to limit the range of possibilities. The author has intended simply to mention a few plausible and interesting possibilities for future research.

Conclusion

This report has been an attempt to succinctly characterize the cultural resources of the Fossil Falls/Little Lake locality. The author has endeavored to describe completed work in the area and to provide relevant contextual information in order to understand its significance. This is the first step in the development of a protective plan for the Fossil Falls area. The series of recommendations made should be operationalized by a practical plan of step by step implementation. It is with the hope of protecting these resources that the author submits this report, laying the ground work for such developments.

Appendix I

Collections

A number of private collections pertinent to the study area have come to light during this investigation. The owners of these collections are listed here for future reference purposes.

These collections have not been adequately photographed and a detailed inventory of each has not been made.

1. Elvis and Pat Hulsey
   Managers Lower Little Lake Ranch
   P. O. Box 22
   Little Lake, CA 93542

   Collection from Little Lake area: Approximately 125 specimens

   Three Pinto projectile points - 1 obsidian, 1 basalt, 1 silicified medisediment (?).

   One Elko projectile point - obsidian

   Five plus Rose Spring projectile points - all obsidian.

   Several Desert Side-Notched - all obsidian.

   Several Cottonwood Triangular - all obsidian.

   One large white Chalcedony Biface. Several soapstone beads, and Olivella wall beads

2. Verna Evans
   P. O. Box 12
   Little Lake, CA 93542

   Collection for Little Lake area and adjoining vicinity.

   Number of specimens - unknown.

   One specimen is a large drill with a characteristic Pinto base, material obsidian.

3. Ed and Jane Thomann
   Box 503
   Lone Pine, CA 93542

   Ed and Jane currently live in a trailer at Lake Diaz. Ed works for the Department of Parks and Recreation.

Their collection numbers in the thousands of specimens. It includes Silver Lake, Lake Mojave, Pinto, Elko, Eastgate, Rose Spring, Desert Side-Notched, and Cottonwood series projectile points. These were all collected during the period when Ed managed the Lower Little Lake Ranch. Other items include Olivella shell beads, European red and blue glass trade beads, large obsidian bifaces and T-shaped drills.

4. Jackie Bramlette
Old Benton, CA

Jackie runs the Benton Hot Springs general store and post office. While a child she lived at Little Lake with her parents who originally owned much of the property in the area. Their collection, numbering hundreds of specimens, is housed at the store in a glass case. The prospect for either photographing or inventorying this collection is slim. Jackie will not cooperate with any such study.

Appendix 2

Wildlife

This report was submitted to me by Bruce Bowen, Wildlife Bioligist on the Inyokern Resource Area staff. The list was compiled during a day's excursion around Fossil Falls and vicintity on May 28, 1976.

The following is a list of species frequently observed near Little Lake, California in the Fossil Falls archaeological locality. Observation time was brief and this list is therefore incomplete.

Mammals

A. Fully-protected species - non-observed

B. Game Species

1. Black-tailed jackrabbit (Lepus californicus)
2. Cottontail rabbit (Sylvilagus audobonii)
3. Bob cat (Lynx rufus ssp.)

C. Other Species

1. Coyote (Canis latrans ssp.)
2. Antelope Ground Squirrel (Ammos permophilus leucurus)

Birds

A. Fully-protected by California State Law

1. Great horned owl (Bubo virginianus ssp.)
2. Red-tailed hawk (Buteo jaimacensis)
3. Common raven (Corvus corax)

B. Game Species

1. Western Mourning dove (Zenaida macroura marginella)
2. Chuckar Partridge (Alectoris graeca)

C. Other Species:

1. Rock wren (Salpinetes obsoletus)
2. White throated swift (Aeronautes saxatalis)
3. Horned lark (Eremophila alpestris)

Reptiles

A. Fully-protected - non-observed

B. Game Species

1. Desert Horned lizard (Phrynosoma platyrhinos)
2. Chuckwalla (Sauromalus obesus)
3. Collard lizard (Crotaphytus collaris)

C. Other Species:

1. Western Whiptail (Cnemidophorus tigris)
2. Zebra tailed lizard (Callisaurus draconoides)
3. Side-blotched lizard (Uta stansburiana)
4. Desert Spiny lizard (Sceloporus magister)
5. Desert iguana (Diptosauros dorsalis)
6. Side-winder rattlesnake (Crotalus cerastes)

Invertebrates

A. Crustaceans

1. Tadpole shrimp (Order Notostraca)

B. Insects

1. Monarch Butterfly (Danaus plexippus)
2. Red Dragonfly (Family Libellulidae)
3. Sand Wasp (Family Shecidae)

Comments

Fossil Falls has an unusually high density of the above mentioned lizards. It is recommended that in conjunction with archaeological interpretative displays, that reptile displays also be considered. If visitor use becomes high, it may be necessary to close the area to hunting and shooting for visitor protection and to maintain populations of observable wildlife.

Appendix 3

Plants noted at Fossil Falls, Inyo County California
May 1, 1976: by Mary Ann Henry

Ephedra Family	
Ephedra nevadensis	Mormon Tea
Amaryllis Family	
Dichelostemma pulchella var. *pauciflora* (*Brodiaea capitata* var. *pauciflora*)	Desert Hyacinth
Buckwheat Family	
Eroigonum pusillum	Yellow Turbans
E. inflatum	Desert Trumpet
E. gracillimum	Slender Stemmed Buckwheat
E. nidularium	Whisk Broom
E. fasciculatum polifolium	Rosemary Eriogonum
Chorizanthe brevicornu	Brittle Spine Flower
Pterostegia drymarioides	Pterostegia
Pigweed Family	
Atriplex canescens	Four Winged Saltbush
A. polycarpa	Cattle Spinach
Eurotia lanata	Winter Fat
Grayia spinosa	Spiny Hop-Sage
Four O'Clock Family	
Mirabilis bigelovii retrorsa	Wishbone Bush
Crowfoot Family	
Delphinium parishii	Parish Larkspur
Poppy Family	
Eschscholzia minutiflora var. *darwinensis*	Little Gold Poppy
Mustard Family	
Caulanthus cooperi	Cooper Caulanthus
Descurania pinnata	Tansy Mustard
Lepidium flavum	Yellow Pepper Grass
Lepidium fremontii	Desert Alyssum
Streptanthella longirostris	Twist Flower

Pea Family	
Astragalus lentiginosus	Locoweed
Dalea fremontii	Fremont Dalea
Lotus tomentellus	Hairy Lotus
Lupinus odoratus	Royal Desert Lupine
Geranium Family	
Erodium cicutarium	Red Stem Filaree
Spurge Family	
Euphorbia polycarpa	Sand-Mat
Caltrop	
Larrea divaricata	Creosote Bush
Mallow Family	
Malvastrum exile	White Mallow
Sphaeralcea ambigua	Apricot Mallow
Loasa Family	
Mentzelia affinis	Yellow Comet
M. nitens	Venus Blazing Star
Cactus Family	
Opuntia basilaris	Beavertail cactus
Opuntia ssp.	Cholla
Evening Primrose Family	
Camissonia boothii condensata	Woody Bottle Washer
C. campestris	Tooth-leaved primrose
C. claviformis	Brown-eyed primrose
Oenothera primiveris bufonis	Large Yellow Desert Primrose
O. micrantha exfoliata	Spencer Primrose
Parsley Family	
Lomatium mohavense	Mohave Parsley
Morning Glory Family	
Cuscuta californica	Dodder

Phlox Family

Gilia latiflora	Davy Gilia
Linanthus Parryae	Parry Gilia

Watherleaf Family

Phacelia distans	Wild Heliotrope
P. fremontii	Fremont Phacelia
Phacelia rotundifolia	Round Leafed Phacelia
Pholistoma membranaceum	Fiesta Flower
Nama demissum	Purple Mat
Eucrypta chrysanthemifolia bipinnatifida	Torrey Eucrypta

Mint Family

Salvia carduacea	Thistle Sage
Salvia columbariae	Chia
Salazaria mexicana	Paper Bag Bush

Compositae

Stephanomera pauciflora	

Borage Family

Amsinckia tessellata	Checker Fiddleneck
Cryptantha circumscissa	Western Forgetmenot
C. intermedia	Scented Forgetmenot
C. pterocarya	Wing-nut Forgetmenot
Plagiobothrys arizonicus	Pop-corn Flower

Potatoe Family

Lycium andersonii	Anderson Thornbush
Lycium cooperi	Cooper's Thornbush

Figwort Family

Orthocarpus purpurascens ornatus	Mojave Owl Clover

Sunflower Family

Brickellia arguta	Spear Leaved Brickellia
B. desertorum	Desert Brickellia
Haplopappus cooperi	Cooper's Goldenburh
Acamptopappus sphaerocephalus	Goldenhead
Chrysothamnus teretifolius	Terete-leaved Rabbit Brush
C. nauseosus	Mojave Rabbitbush
Machaeranthera tortifolia	Mojave Aster

Ambrosia dumosa	Burrobush
Hymenoclea salsola	Cheese Bush
Coreopsis bigelovii	Bigelow Coreopsis
Eriophyllum Wallacei	Wallace Eriophyllum
Eriophyllum ambiguum	Yellow Frocks
Ohaenactis stevioides var. brachypappa	Pincushion
Tetradymia stenolepsis	Felt Thorn
Rafinesquia neo-mexicana	Desert Chicory
Stephanomeria ssp.	Desert Straw
Malacothrix coulteri	Snake's Head
Malacothrix glabrata	Desert Dandelion
Glyptopleura setulosa	Keysia
Monoptilon bellidiforme	Desert Star

Grass Family

Bromus tectorum	Desert Stipa
Stipa speciosa	Indian Rice Grass
Bromus rubens	Foxtail Brome
Schismus arabicus	Arabian Schismus

Crustose Lichens

Caloplaca ssp.	Reddish-brown, rust color
Acaraspora ssp.	Yellow-green color
Lecanora ssp.	Blue-gray color
? ? ? ? ? ?	Black lichens

Puff-ball

Tylostoma ssp.	Puff-ball

Plants noted at area NE of Red Cinder Cone;
3400' elevation, May 26, 1976
by Mary Ann Henry

Ephedra Family	
Ephedra nevadensis	Mormon Tea
Agave Family	
Yucca brevifolia	Joshua Tree
Buckwheat Family	
Eriogonum nidularium	
Eriogonum gracillimum	Slender-stem Buckwheat
E. pusillum	
E. inflatum	
E. maculatum	
Chorizanthe brevicornu	Spine Flower
C. perfoliata	Punctured Bract
C. rigida	Spiny chorizanthe
Pigweed Family	
Atriplex confertifolia	Shadscale
Grayia spinosa	Spiny Hop Sage
Erotia lanata	Winter Fat
Four O'Clock Family	
Abronia pogonantha	Sand Verbena
Mirabilis bigelovii	Wish Bone Bush
Poppy Family	
Eschscholtzia minutiflora	Little Gold Poppy
Mustard Family	
Dithyrea californica	Spectacle Pod
Lepidium flavum	Yellow Pepper Grass
Pea Family	
Dalea fremontii	Fremont Dalea
Lupinus odoratus	Royal Desert Lupine
Astragalus mohavense	
A. lentiginosus	Locoweed

Geranium Family	
Erodium cicutarium	Red Stem Filaree
Spurge Family	
Euphorbia albomarginata	Sand-Mat
Mallow Family	
Malvastrum exile	White Mallow
Sphaeralcea ambigua	Apricot Mallow
Loasa Family	
Mentzelia affinis	Yellow Comet
Mentzelia nitens	Venus Blazing Star
Cactus Family	
Opuntia ssp.	Cholla
Evening Primrose Family	
Camissonia campestris	
Camissonia clavaeformis	Brown Eyed Primrose
C. boothii condensata	Bottle Washer
Oenothera primiveris	Yellow Dune Primrose
Parsley Family	
Lomatium mohavense	Mohave Parsley
Morning Glory	
Cuscuta californica	Dodder
Milkweed Family	
Asceplepias erosa	Desert Milkweed
Phlox Family	
Langloisia Matthewsii	Desert Calico
Linanthus aureus	Golden Gilia
Eriastrum eremicaum	Eriastrum
Gilia leptomaria	
Waterleaf Family	
Phacelia fremontii	Fremont Phacelia
Phacelia distans	Wild Heliotrope
Nama demissum	Purple Mat

Mint Family	
Salvia carduacea	Thistle Sage
Borage Family	
Cryptantha circumscissa	
Coldenia plicata	Plicate Coldenia (pleated)
Potatoe Family	
Lycium andersonii	Anderson Thorn Bush (red Tomatoes)
Figwort Family	
Orthocarpus purpuracens ornatus	Owl's Clover
Grass Family	
Oryzopsis hymenoides	Indian Rice Grass
Stipa speciosa	Desert Stipa
Bromus tectorum	
Bromus rubens	Foxtail Brome
Schismus ssp.	
Bellflower Family	
Nemacladus rubescens	Thread Plant
Sunflower Family	
Eriophyllum wallacei	
Malacoxbrix glabrata	
Hymenoclea salsola	
Tetradymia stenolepis	
Monoptilon bellififorme	Desert Star
Haplopappus cooperi	
chaenactis fremontii	
C. carphoclinia	
Ambrosia dumosa	
Layia glandulosa	
Coreopsis bigelovii	
Machaeranthera tortifolia	Mojave Aster
Stephanomera pauciflora	Desert Straw
S. Parryi	Parry Rock Pink
Anisocoma acaulis	
Glyptopleura setulosa	
Artemesia spinescens	Bud Sage Brush
Acamptopappus sphaerocephalus	Goldenhead

Appendix 4

Due to the confidential nature of site location information, Appendix 4; site records, locations, and photographic documentation, has been deleted from copies of this manuscript to be circulated outside the internal offices of the Bureau of Land Management. Appendix 4 will be permanently stored in the library facilities of the Bureau of Land Management, Bakersfield District. Interested researchers are urged to consult these when needed as this information, of course, will be available to all qualified researchers.

Copies of site records will also be forwarded to the State of California for assignment of permanent numbers and will be available from this facility as well.

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